

A METHODOLOGY FOR THE SYSTEMATIC COLLECTION,
STORAGE, AND RETRIEVAL OF TREND DATA FOR THE
U.S. ARMY ENGINEERS RECREATION PROGRAM¹

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INTRODUCTION

In 1979, over 450 million recreation days³ of use were reported at 419 Corps of Engineers lakes and other project areas. This figure represents a 2.7 percent increase in use over 1977 (424 million recreation days). The Corps and other agencies (quasi-public, state, local and other federal agencies) manage 3,175 recreation areas on a total of 11.2 million acres of land and water. The Corps manages 2,229 (70 percent) of the recreation areas and has the responsibility for managing more than 44,000 developed campsites. Other agencies, excluding concessionaires, manage 946 recreation areas with 28,000 developed campsites.

The tremendous use of such a large and diverse recreation resource has led to resource deterioration, social conflicts, and inadequate manpower in some areas. As a result, Corps managers and planners need information concerning resource carrying capacities and user preferences for various facilities and activities. Recreation behavior, however, is not a static phenomenon.

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³A standard unit of use consisting of a visit by one individual to a recreation development or area for recreation purposes during any reasonable portion or all of a 24-hour period.

Thus, managers and planners also need to be able to observe trends in recreation preferences and behavior patterns over time. This paper describes current and proposed information systems developed to assist Corps personnel in monitoring such trends.

CORPS OF ENGINEERS INFORMATION SYSTEMS

Figure 1 represents the functional relationships among the various information sources and systems that influence the Corps-wide recreation programs. The arrows denote directions of information flow. Figure 1 represents the conceptualization upon which this paper was based. Thus, further discussion will focus on each of the elements of this figure. Actual data will be presented where appropriate to exemplify the types of recreation trend information being monitored.

CORPS-WIDE RECREATION PROGRAM

The Corps-wide recreation program includes all elements ranging from the individual projects and OCE are two more administrative layers, the Districts and the Divisions. There are 10 Divisions in the contiguous 48 states with several Districts in each Division.⁴ For this discussion, the pertinent line function running through OCE to the Divisions, to the Districts, and finally to the projects is the Recreation Resource Management Branch (RRMB). In OCE, personnel in this Branch are primarily

⁴The one exception to this generalization is the New England Division, which has no Districts.

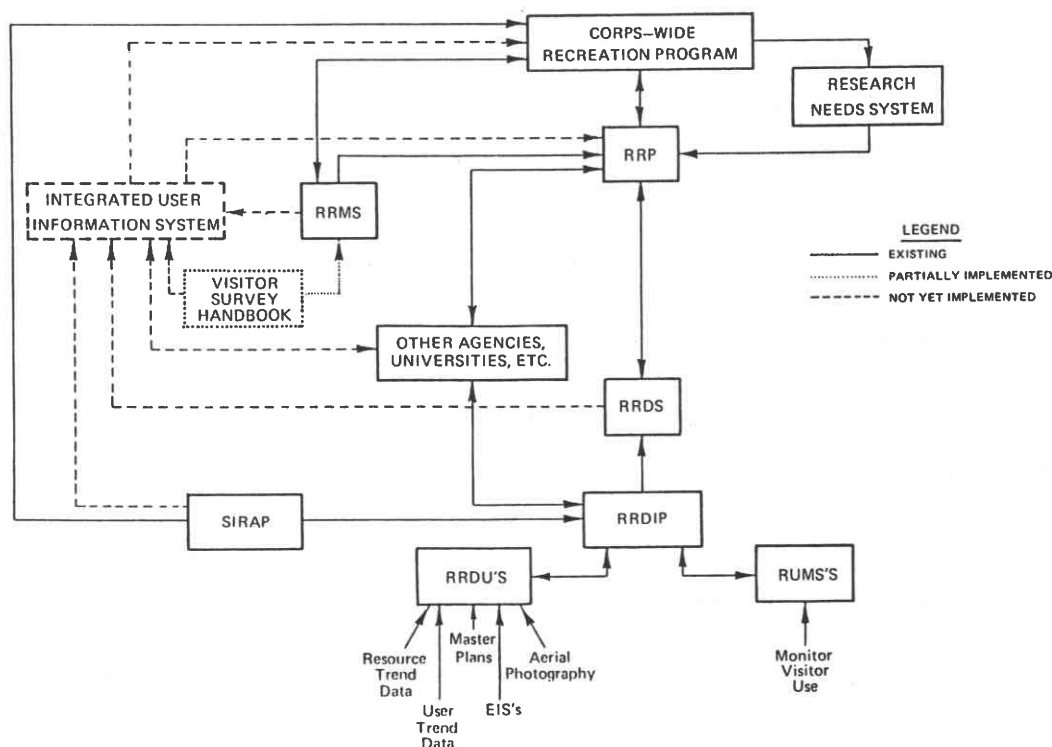


Figure 1. Relationships among information sources and systems in the Corps of Engineers recreation program (arrows denote direction of flow of information). Acronyms are defined in the text.

involved with developing field guidelines, storing and retrieving data, and disseminating information. Personnel in the RRMBS of the Districts and Divisions are involved with developing field guidelines, but also have duties in recreation planning and operations. Personnel at the project level have the responsibility for recreation site management and handling daily operations and maintenance functions, which may vary from project to project.

To help solve recreation design and management problems and to formulate policy, the Corps-wide recreation program receives information from a wide variety of sources. Three of the existing (solid line) sources are illustrated in Figure 1. First, the System of Information Retrieval and Analysis for Planners (SIRAP) was developed by OCE to assist District and Division planners. The SIRAP is a computerized system containing such census and population data as income and employment, demographics, city and county information, and economics.

Second, the Recreation Resource Management System (RRMS) is an automated system for processing recreation data for each project having an annual visitation of 5,000 recreation days of use or more. The RRMS provides for the entry, annual update, scheduled reporting,

and manipulation of standardized data fields. The RRMS contains over 450 project variables ranging from monthly visitation counts to the number of unpaved road miles. The data presented in the introductory paragraph of this paper are examples of the types of information found in the current RRMS data files. OCE manages this system, using its contents for nationwide reports and for providing data to other agencies, organizations, and individuals. Field elements (i.e., project, District and Division personnel) not only enter data into the RRMS but also use such data to help make planning and management decisions. This two-way flow of information is represented by the double-pointed solid line in Figure 1.

Third, the Corps-wide recreation program receives information from the Recreation Research Program (RRP), an element administered by the Corps' Waterways Experiment Station in Vicksburg, Mississippi. The RRP is composed of personnel with expertise in recreation planning and design, resource management, park administration, economics, research design, and social sciences.

RECREATION RESEARCH PROGRAM

An important mission of the RRP is to conduct research, the results of which are re-

sponsive to the needs of field personnel. To ensure that this goal is achieved, OCE implemented a Research Needs System for all Corps research elements, including the RRP. According to the Research Needs System, anyone in the Corps can submit for review a problem which he or she feels needs to be researched. Once each year these problems are reviewed by the field and are prioritized. Generally, those problems receiving the highest ratings are funded for research. Thus, the RRP usually conducts research only on high-priority field problems.

To carry out its research and information transfer functions, the RRP receives information from a wide variety of sources that included OCE, Corps field elements, the RRMS data base, other agencies, universities, and private organizations. Once research on a given topic is completed, the results are disseminated to the field in a form suitable for implementation. Success of the RRP is measured primarily by the use of research findings rather than by the production of reports and publications. However, the RRP also produces technical reports and publications for distribution to OCE, Corps field elements, other agencies, and universities.

The RRP does not directly input data into the RRMS but may, through research, influence the methods of data collection at the project level and the types of information which the RRMS contains. For instance, Mischon and Wyatt (1979) of the Midwest Research Institute produced "A Handbook for Conducting Recreation Surveys and Calculating Attendance at Corps of Engineers Projects" for the RRP. The need for such a handbook grew out of the recognition that each Corps District and project had essentially developed its own procedures for collecting visitation data for the RRMS. Other major problems included using outdated load factors, double-counting recreation vehicles within a project, and disregarding proper sampling procedures. The new handbook offers a standardized methodology for counteracting these and other problems. Errors in collecting visitation data have not been entirely eliminated because numerous projects and Districts have not yet implemented the new procedures (dotted line in Fig. 1). However, as the handbook becomes more widely used, visitation figures entered into the RRMS should become much more reliable than in the past.

RECREATION RESEARCH AND DEMONSTRATION SYSTEM

As stated previously, the RRP conducts research on field-related problems. Those problems of highest priority are funded for research by OCE and administered by the RRP

as work units to be completed by a specific date. Examples of such work units include "Cost Efficiency of Methods of Operating and Maintaining Corps Recreation Areas" and "Planning and Design Standards for Recreational Roads and Sanitary Facilities". Another work unit, of primary concern to this paper, is the Recreation Research and Demonstration System (RRDS).

The RRDS was initiated in October of 1978 with some of the following goals:

- a. To monitor national and regional trends in the quantity and nature of use of Corps recreation resources and the biological, physical, economic, and social impacts associated with such use.
- b. To serve as a focus for research and testing in all recreation and natural resource subject areas for which the Corps has responsibility.
- c. To provide outdoor laboratories where new methods, structures, designs, and management techniques can be tested and results demonstrated.
- d. To meet the requirements of as many of the RRP work units as possible.
- e. To attract research interest on the part of other federal agencies, state agencies, universities, and other research organizations.
- f. To draw the understanding and support of those Corps operating elements which the RRDS is designed to serve.

To meet these goals, the RRDS is composed of 25 Recreation Research and Demonstration Units (RRDU's) and 9 Recreation Use Monitoring Stations (RUMS's). With only one exception, all components of the RRDS are administered by the Corps. The exception is Lake Amistad National Recreation Area, which is under National Park Service (NPS) jurisdiction. The locations of the RRDU's and RUMS's are shown in Figures 2 and 3, respectively. Each RRDU and RUMS is either an entire Water Resources Development Project or an officially designated portion of such a project.

Projects included in the RRDS were selected to be representative of a wide range of geographic, biological, physical, social, administrative, and operational conditions found at Corps projects nationwide. A primary rationale for the establishment of the RRDS is that individual research projects will be able to utilize and in turn contribute a common data base, thereby realizing savings both in



Figure 2. Locations of Recreation Research and Demonstration Units.



Figure 3. Locations of Recreation Use Monitoring Stations.

time and money.

The RUMS's include such Corps projects as ocean jetties, waterways, and harbors. One reason for including the RUMS's as part of the RRDS is that they are not included in the RRMS. Thus, annual Corps of Engineers visitation data do not include the tremendous use incurred at some jetties, waterways, harbors, and other such developments. One future task of the RRP is to develop a methodology for visitation trends at areas such as these RUMS's where access is not tightly controlled.

The RRDU's include the conventional multi-purpose reservoirs, navigational reservoirs with locks, dry reservoirs, modified natural lakes, and local flood-protection reservoirs. Detailed recreation data on each of the RRDU's is contained within the RRMS data base. However, such data are not available on a trend basis. That is, the RRMS contains the current year's data only. Each year the data from the previous year are erased from the computer files, thus making the chronological comparison of trend data difficult and inefficient.⁵ It is for this reason that the RRP staff is currently attempting to develop special forms, identify key variables, and implement an automated system for monitoring national and regional trend information.

RECREATION RESEARCH AND DEMONSTRATION INFORMATION PROGRAM

As Figure 1 indicates, the RRP staff administers the RRDS, and in turn the RRDS is supported by the Recreation Research and Demonstration Information Program (RRDIP). Briefly, RRDIP is a program for the systematic collection, storage, manipulation, retrieval, and display of detailed information concerning the 25 RRDU's and 9 RUMS's.

For purposes of classification, the data contained in the RRDIP are divided into five components: natural, man-made, economic, social, and institutional environments. To stratify the data even farther, four geographic divisions were chosen: within project boundary, physical impact zone, economic impact zone, and recreation market zone. The combination of five components and four geographic divisions results in a matrix of 20 primary cells, the basic conceptual framework for RRDIP. Of course, there are substantial differences in the types and quantity of data that will occupy each cell. Some of the cells await the results of ongoing and future re-

⁵ However, it is expected that from this year forward, historical data will be retained in the RRMS.

search.

The following steps are necessary for making the RRDIP operational:

- a. Develop RRDU catalogs
- b. Analyze District file information
- c. Fill in gaps in the RRDIP data cells
- d. Routine management of the RRDIP.

The first step, development of RRDU catalogs, has already been completed. The initial catalogs were limited to existing information primarily from maps, master plans, environmental impact statements (EIS's), SIRAP, other agencies, universities, and a recreation facilities inventory conducted by the RRP staff in the summer of 1979. The data are cataloged according to the 20 data cells previously described and are bound in large loose-leaf notebook for ease of addition and revision. These catalogs of information are available for loan to researchers as they are needed. If funds become available, some of the data in these catalogs may be computerized, thereby increasing the ease of access. Similar catalogs for the RUMS's are not yet available.

Once key variables are identified and final methodologies are chosen, both resource and user trend data will be continual additions to the catalogs. Preliminary methodologies now being tested along with some user trend data are presented below.

The second step, analysis of District file information, has also been completed. During this step, the RRP staff obtained from each RRDU additional information such as aerial photography and reproducible drawings of recreation-area developments. Some of this information has also been incorporated into the RRDU catalog data cells. Another product of this analysis was the identification of those cells with significant gaps in data.

The third step will consist of filling in gaps in the RRDIP data base with the results of ongoing or future research. A major source of such results will be the RRP work units. Results generated by other Corps elements, other agencies, and universities will also be incorporated into the RRDIP catalogs.

The final step is routine management of the RRDIP data base. Included in this step will be such tasks as shifting from manual to computer processing of some of the data elements, redefining some of the data cells if necessary, and adding new information to the data cells.

The primary objective of the RRDIP is the support of research and demonstration; the

primary users are intended to be researchers. However, the RRDIP is obviously not oblivious to field needs. The RRDIP catalogs are made available to District and project personnel as aids in administering the RRDU's. Moreover, many of the RRP research work units will use the RRDIP data to find better ways to plan and manage Corps recreation and other natural resources. Third, the trend information to be gathered will be of value to Corps planners, managers, and policy makers at all levels.

MONITORING OF TREND DATA

One of the objectives of the RRDIP is to "accept regularly generated measurements of key factors of the recreation and related natural resources environment and to report these data in timely fashion as trend information". To meet this objective, members of the RRP staff began a pilot recreation monitoring program during the summer of 1979 at selected campgrounds within the Lake Ouachita (Arkansas), West Point (Georgia/Alabama), and Shenango (Pennsylvania) RRDU's. The monitoring program was designed to select sample areas and to test a proposed recreation use-impact monitoring methodology.

Vegetation and Soil

One field test consisted of sampling various parameters of soil and vegetation in order to establish a data base for subsequent sampling. These parameters included vegetative species composition, growth habits, percent coverage, and erosion. In addition, permanent photo plots were established, and litter (trash, paper, etc.) counts taken at each sample location. Since this first effort resulted in the establishment of a data base, it will require additional testing before any meaningful conclusions can be drawn. Additional methodological tests are planned for the summer of 1980.

Campsite User Impact

Another concern of this pilot monitoring program was how to monitor effectively the number of recreation days of use per campsite, type of equipment brought to the site by users, and occupancy preference. Accurate information to assess the effects of recreation visitors on the environment is extremely important to the success of the monitoring program.

Although the Corps of Engineers already uses a standardized campground receipt form at each of its fee camping areas, the information derived from the form was not detailed enough to be of substantial value. The RRP staff concluded that a supplementary campsite registration form (Fig. 4), completed by the camp-

RECREATION RESEARCH PROGRAM	
USER IMPACT MONITORING PROJECT	
CAMPSITE USE RECORD	
RECREATION AREA _____	SITE NO. _____
DATE IN _____	TIME () AM () PM
DATE OUT _____	TIME () AM () PM
ZIP CODE _____	
NO. IN GROUP _____	
EQUIPMENT - CAMPING:	EQUIPMENT - OTHER THAN PRIMARY MOTOR VEHICLE:
() TENT	() SECOND CAR/TRUCK
() POP UP	() MOTORCYCLE
() PICK-UP CAMPER	() BOAT
() TRAILER	() TRAILER
() R V	() BICYCLE

Figure 4. Initial supplementary campsite registration form.

ground gate attendant, would be the most effective method of recording needed data and should be tried on an experimental basis. Most of the requested information would be obtained from observation, with the exception of zip codes and time departure.

Initial Findings

The initial phase of the user impact study has been completed, and the data obtained from the supplementary registration forms have been compiled (Table 1). One major finding which emerges from Table 1 is the preponderance of the use of tents over other types of camping equipment in two of the three RRDU's. This finding is somewhat clouded by the fact that some camping groups possessed more than one type of equipment (e.g., a pickup camper and a tent). This is why the column percentages adjacent to "camping equipment" add up to more than 100. Future recording forms (to be discussed later) will distinguish between groups with more than one and groups with only one type of camping equipment. Other notable results include the large percentage of second vehicles at all three campgrounds and the relatively high percentage of bicycles. All these findings have direct planning and management implications, especially when the same data are collected over a period of several recreation seasons and significant trends are identified.

Table 1
Recreation Variables Monitored at Three Corps Campgrounds
During the Summer of 1979 as Part of the Pilot
Recreation Use Monitoring Program^a

Variables Monitored	Amity		Denby Point		Shenango		Total	
	No.	%	No.	%	No.	%	No.	%
<u>Camping Equipment^b</u>								
Tent	283	28	83	56	155	50	521	36
Pop-up Camper	140	14	18	12	29	9	187	13
Pick-up Camper	127	13	38	26	42	14	207	14
Camping Trailer	371	37	22	15	38	12	431	30
RV ^c	145	14	20	13	45	15	210	14
<u>Other Equipment^d</u>								
2nd Vehicle	328	33	46	31	126	41	500	34
Motorcycle	20	2	5	3	15	5	40	3
Boat	450	45	86	58	65	21	601	41
Bicycle	110	11	12	8	51	17	173	12
No. Camping Groups	1,003.00		149.00		309.00		1,461.00	
No. Camping Visitors	3,397.00		584.00		1,293.00		5,274.00	
Avg. No. Persons/Group	3.39		3.92		4.18		3.61	
No. Rec. Days Spent/ Group ^e	3,983.00		594.00		872.00		5,449.00	
Avg. Length of Stay/Group (in Rec. Days)	3.97		3.99		2.82		3.73	
Total Rec. Days Spent ^f	13,846.00		2,330.00		3,646.00		19,462.00	

^aThe three campgrounds and dates of monitoring were: Amity Campground (West Point Reservoir), 14 May-3 September; Denby Point Campground (Lake Ouachita), 20 June-3 September; and Shenango Camping Area - Phase IV (Shenango Reservoir) 24-30 May, 1-14 July, and 20-22 July.

^bPercentages represent the number of groups utilizing a particular type of camping equipment. Column totals exceed 100 percent because, in many cases, each group had more than one type of camping equipment (e.g., a tent and a trailer).

^cVans were recorded in the RV category.

^dColumn totals are less than 100 percent because not all groups possessed some type of other equipment.

^eA recreation day is a visit by one person during any portion or all of a 24-hour period. These figures were determined by summing across all groups the number of entire and partial days each group stayed.

^fFor this table, total recreation days spent were determined by multiplying the number of camping visitors by the average length of stay per group.

The advantages of such a monitoring program are numerous. The additional information generated by the use form will be beneficial to both RRDU planners and resource managers. For instance, some of the data could be used for economic demand modeling and predicting visitor use without the added burden of having to fund and administer a special survey.

Comparison of several years' data with such secondary data as nationwide sales of rec-

reational vehicles will provide a reliable basis for identifying both national and local trends in recreation use patterns, information that is lacking in most Corps District Offices.

Revised Registration Forms

One disadvantage of the form shown in Figure 4, the inability to separate groups with more than one type of equipment from those with only one, has already been discuss-

ed. Another disadvantage was that there were not enough categories for all the different types of equipment being use. For these reasons, this special-use form has been revised (Fig. 5) and will be further tested in other Corps-operated fee campgrounds during the summer of 1980.

PROJECT _____		DATE _____	
<u>CAMPSITE USE RECORD</u>			
REC AREA _____		SITE NO. _____ ZIP CODE _____	
NO. IN GROUP _____		LENGTH OF STAY _____	
IS THIS YOUR PRIMARY DESTINATION _____ OR STOPOVER FOR LONGER TRIP _____?			
HOW MANY TIMES DID YOU VIST THIS AREA LAST YEAR? _____			
<u>PRIMARY VEHICLE</u>		<u>EQUIPMENT (NONCAMPING)</u>	
☐ CAR		☐ SECOND CAR/TRUCK	
☐ TRUCK		☐ (NON 4 WHEEL DRIVE)	
☐ VAN		☐ 4 WHEEL DRIVE	
☐ MOTORHOME (INCLUDES CONVERTED BUSES)		☐ VEHICLE	
☐ OTHER _____		☐ SAILBOAT	
		☐ CANOE/KAYAK/RAFT	
		☐ POWERBOAT	
<u>EQUIPMENT (CAMPING)</u>		☐ BOAT TRAILER	
☐ TENT		☐ BICYCLE	
☐ POP-UP TRAILER		☐ OTHER _____	
☐ VAN			
☐ PICKUP CAMPER			
☐ TRAVEL TRAILER			

Figure 5. Revised supplementary campsite registration form.

The amount of extra paperwork to be performed by the gate attendants, often retired couples working on a contract basis, was considered in the derivation of the forms. The collection of the information for the original form (Fig. 4) did not prove to be overly burdensome during the recent pilot test; thus, the expanded form (Fig. 5) is not expected to pose any serious problems, especially as gate attendants become accustomed to its use. In addition, a detailed set of instructions and definitions will accompany the new form, thereby eliminating some of the uncertainties that the gate attendants face in categorizing types of equipment and other information.

Another form for recording use data be-

sides the forms shown in Figure 5 will also be tested during the summer of 1980. This form is simply a standard IBM computer card that has perforations for each number in each column. Instead of someone keypunching the data onto IBM cards, gate attendants will use a stylus to punch out the perforated sections in the card. For ease of location, the names of all the variables shown in Figure 5 will be printed above the appropriate columns. If gate attendants find this procedure simple enough it will have the added advantage of saving one step in the data coding process.

TREND MONITORING AND THE ENERGY SITUATION

The RRDIP will be of obvious value to planners and resource managers. However, as previously stated, a primary purpose of the RRDIP is to support research and demonstration. The user-impact monitoring program now being tested provides one good example of how the RRDIP will benefit researchers.

At the beginning of the current fiscal year, the RRP staff began research on a new work unit concerning the effects of the energy crisis on the Corps recreation program. The objectives of this work unit were (1) to determine changes in visitation patterns resulting from the increased cost and decreased availability of motor fuel and (2) to determine the regional and local impacts of such changes on facility and personnel requirements.

To meet the work unit objectives, the RRP staff planned to establish trends for several visitation parameters including origin, destination, frequency, duration, type of equipment used, and group size. However, it was soon apparent that either these data were of poor or unknown quality or, in most cases, simply did not exist and would be too expensive or time-consuming to collect. Therefore, a recommendation has been made to stop progress on this work unit, prepare a report summarizing secondary data sources (e.g., U. S. Trend Data Center) indicative of trends, and redefine the goals of the work unit so that it may be successfully completed at a later date. The point is that implementation of the RRDIP, with its inherent capabilities for collecting, storing, and monitoring trend data, will enable a study of this nature to be conducted in only several months and will produce more reliable data at a considerable savings in cost.

DEVELOPMENT OF AN INTEGRATED RECREATION USER INFORMATION SYSTEM

By now the reader should be impressed with

the fact that, within the Corps of Engineers recreation program, there are a wide variety of information systems that contain information from diverse sources and serve many different clients. By themselves, these systems cannot, nor were they intended to, serve the needs of every possible user. For example, the RRMS contains only a portion of the recreation information required by Corps planners and managers. This is because the RRMS was originally designed to support appropriations requests. Once fully operationalized, the RRDIP will contain much detailed information from many different sources besides the RRMS. However, the RRDIP will be based entirely upon a small but fairly representative sample of Corps projects, not the entire system. The need to integrate all the available sources of data into one supplemental user information system and the means of implementing such a system are found in a report prepared for the RRP by Midwest Research Institute (Mischon and Wyatt, 1978).

The relationship of this integrated user information system to existing systems and administrative elements is shown in Figure 1. As indicated by Figure 1, the integrated user information system would be a large, computerized data-management program that interfaces data from the RRMS, RRDS, SIRAP, other agencies, universities, and research organizations. The system would be interactive and capable of responding to the needs of field personnel, the RRP, researchers, and other agencies. One important aspect of the system would be the continual input of annual data regarding recreation use patterns. Such information would enable Corps personnel to spot changing leisure patterns and forecast the effects of these trends. Once implemented, this system would simplify the monitoring of such phenomena as the effects of the energy crisis on visitation.

SUMMARY

A good deal of text in this paper was devoted to a discussion of the functional elements in Figure 1. However, a total picture of all Corps recreation information sources and systems was required to indicate where recreation trend data will be collected and utilized by various Corps elements. Such a discussion was also felt necessary because of the relative newness of the Corps' Recreation Research Program and its associated work units.

The Corps-wide recreation program is composed of OCE's Recreation Resource Management Branch and corresponding line elements in the field (i.e., Division, Districts, and water resources development projects). The RRP has no line authority over the field but exists in

a different chain-of-command as an element whose primary function is to conduct field-applied research and disseminate results in a useable form. To ensure that Corps research elements, such as the RRP, conduct only field-applied research, OCE developed a Research Needs System. Through this system, the RRP receives funding for only those research work units given high priority ratings by the field.

One of the first work units for which the RRP was given responsibility was the Recreation Research and Demonstration System (RRDS). The backbone of this system consists of 24 Recreation and Research Demonstration Units (RRDU's) and 9 Recreation Use Monitoring Stations (RUMS's) selected to be representative of Corps' projects nationwide. The data system supporting the RRDS is called the Recreation Research and Demonstration Information Program (RRDIP). A major purpose of the RRDS is to identify key variables indicative of recreation trends and then to develop appropriate methodologies for monitoring such trends. One method of monitoring developed campground use, the supplemental form shown in Figure 4, has received limited field testing. Problems that were identified during initial testing led to the development of a new form (Fig. 5) to be tested at a number of campsites in the summer of 1980. Major advantages of these forms include a heavy reliance on observation for filling out the forms and the generation of reliable data that can be used to document national, regional, and local recreation trends needed for planning and management purposes.

Another work unit, the effects of fuel shortages and prices on visitation, was used as an example of the need to collect reliable trend data. It was concluded that development and implementation of methodologies for monitoring trends at the 25 RRDU's will make the completion of this and other work units more efficient in terms of reliability, time, and dollars spent.

The need for a central location for the interfacing of recreation use data from a wide variety of sources led to the recommendation and plan for an integrated user information system. This is the only element of Figure 1 not yet implemented. Again, a primary function of this system will be to monitor trends in recreation use. However, the integrated user information system will contain data from the entire Corps recreation program, not just the 25 RRDU's, and from various secondary sources not currently being used by the RRDS. Such a system will be of obvious benefit to both researchers and field personnel.

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