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RECREATION RESEARCH AND DEMONSTRATION SYSTEM: ITS SELECTION, OP--ETC(U)
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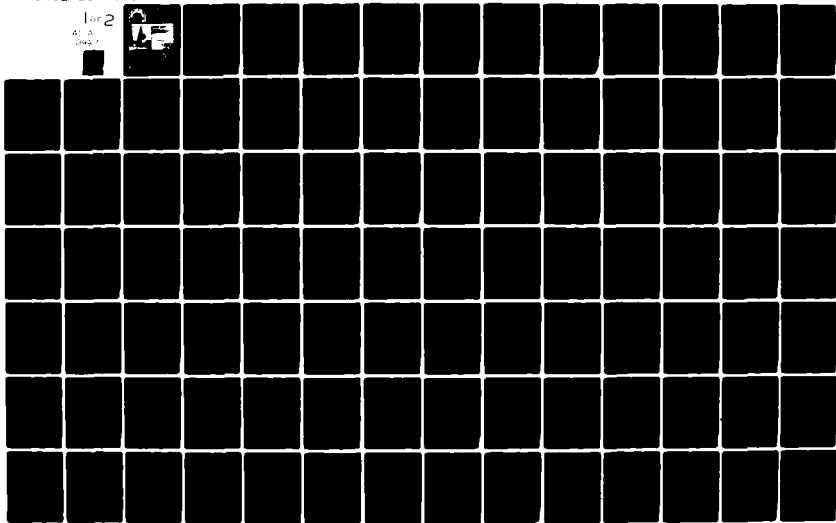
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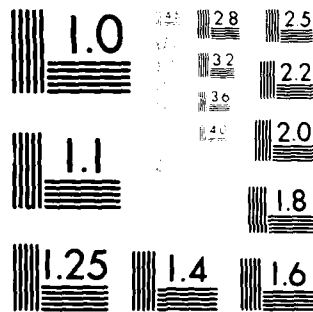
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**RECREATION RESEARCH AND
DEMONSTRATION SYSTEM:
ITS SELECTION, OPERATION
AND POTENTIAL UTILITY**

By William J. Hart

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FINAL REPORT

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20. ABSTRACT (Continued).

distribution, attendance, and administrative mode found in the Corps-wide system of projects.

The purpose of the system is to provide permanently designated outdoor laboratories for the conduct of research in the pysiographic, social, economic, and institutional aspects of recreation and related natural resources.

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PREFACE

This technical report describes work performed as part of Work Unit CWIS 31544, Selection of Research and Demonstration Areas and Development of Baseline Data, within the Civil Works Recreation Research Program (RRP).

Initial funding was made available for work in fiscal year (FY) 1977. A preliminary selection of areas for a Recreation Research and Demonstration System (RRDS) was released for field review in April 1978. Division Engineers, following consultation between Division and District staffs and the U. S. Army Engineer Waterways Experiment Station (WES) Recreation Research Program staff, made the final selection of candidate areas in the form of nominations to the Chief of Engineers. Activation of the RRDS by the Office, Chief of Engineers, on 11 October 1978 marked the end of the selection portion of the research work unit.

"Development of Baseline Data" has been interpreted to mean "Development of a Data Base." Data-base development activity cannot, as a practical matter, be separated from data-base management: there is no discrete point at which the base can be designated "complete." A conceptual framework for a Recreation Research and Demonstration Information Program (RRDIP) was completed during the selection period reported upon herein, but work to develop the RRDIP data base continues to be actively pursued.

Mr. William J. Hart was principal investigator (Mr. Hart was at the WES under the terms of an Intergovernmental Personnel Act Agreement with Duke University); Mr. R. Scott Jackson, Recreation Research Team, completed the final work on the project. The work was performed under the direct supervision of Dr. A. J. Anderson, Manager, Recreation Research Program, and the general supervision of Dr. C. J. Kirby, Chief, Environmental Resources Division, and Dr. John Harrison, Chief, Environmental Laboratory. In October 1978, Mr. William J. Hansen became Leader, Recreation Research Team, and Mr. Jack K. Stoll became Chief, Environmental Assessment Group, within the Environmental Resources Division of the Environmental Laboratory.

Significant contributions were made by the officially designated Division RRP contacts: Messrs. Clyde A. Redmon, Lower Mississippi Valley Division; Dudley Rehder prior to October 1977 and Donald Dunwoody thereafter, Missouri River Division; Gregory T. Buteau, New England Division; Charles Stone, North Atlantic Division; E. Carl Brown, North Central Division; John D. Tyger, North Pacific Division; Gerald T. Purvis, Ohio River Division; Robert Solheim, South Atlantic Division; James D. Sears, South Pacific Division; and Mark King, Southwestern Division.

The Technical Monitor was, successively, Messrs. Dale A. Crane, David Wahus, Raymond R. Mitchell, and H. Roger Hamilton.

COL John L. Cannon, CE, and COL Nelson P. Conover, CE, served as Commanders and Directors of WES during the conduct of this study and preparation of this report. Mr. F. R. Brown was Technical Director.

This report should be cited as follows:

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CONTENTS

	<u>Page</u>
PREFACE	1
CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI)	
UNITS OF MEASUREMENT	5
PART I: INTRODUCTION	6
Purpose	6
Background	6
Scope	12
PART II: SELECTION OF PROJECTS FOR THE RECREATION	
RESEARCH AND DEMONSTRATION SYSTEM	14
Framework for Selection Criteria	14
Criteria for Representativeness	18
Procedural Criteria	28
Applying the Criteria	35
Characteristics of the Initial RRDS	49
PART III: CONCEPTUAL FRAMEWORK OF THE RECREATION RESEARCH	
AND DEMONSTRATION INFORMATION PROGRAM	59
Format for Information System Design	59
RRDIP Characteristics	60
RRDIP Design Considerations	62
Conceptual Design of RRDIP	63
Development of a Data Base	67
PART IV: ADMINISTERING THE SYSTEM	74
Dual Purposes	74
Current Administration	75
Conceptual Requirements for RRDS Administration	78
Initial Structure of the RRDS	80
Relations Between Districts and WES	87
Demonstrations	97
PART V: RESEARCH OPPORTUNITIES BY OTHERS	101
Research Opportunities for Agencies	101
Administrative Opportunities	102
Research Opportunities for the University	
Research Community	105
Recreation Research Clearinghouse Function	107
PART VI: CONCLUSIONS AND RECOMMENDATIONS	108
Conclusions	108
Recommendations	109
REFERENCES	111
PLATES 1-4	

CONTENTS

	<u>Page</u>
APPENDIX A: ENGINEER CIRCULAR AND LETTER ACTIVATING THE RECREATION RESEARCH AND DEMONSTRATION SYSTEM	A1
APPENDIX B: ENGINEER REGULATION GOVERNING RECREATION RESOURCE MANAGEMENT SYSTEM	B1
APPENDIX C: LISTING OF CORPS INVOLVEMENT IN RECREATION AND RELATED NATURAL RESOURCE ACTIVITIES	C1
APPENDIX D: RATIONALE FOR PHYSIOECONOMIC REGIONAL BOUNDARIES . . .	D1
APPENDIX E: DIVISION MEANS BY CLASS AND REPRESENTATIVE WATER RESOURCE DEVELOPMENT PROJECTS	E1
TABLES E1-E10	
APPENDIX F: ENGINEER CIRCULAR ESTABLISHING METHODOLOGIES FOR SURVEYING AND CALCULATING ATTENDANCE AT CORPS PROJECTS	F1
APPENDIX G: NOTATION	G1

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:

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
acres	4046.856	square metres
feet	0.3048	metres
inches	25.4	millimetres
miles (U. S. statute)	1.609344	kilometres
square miles	2.589988	square kilometres

RECREATION RESEARCH AND DEMONSTRATION SYSTEM: ITS
SELECTION, OPERATION, AND POTENTIAL UTILITY

PART I: INTRODUCTION

Purpose

1. A permanent Recreation Research and Demonstration System (RRDS)* has been established by the U. S. Army Corps of Engineers. This report documents the selection and activation of Recreation Research and Demonstration Units and Recreation Use Monitoring Stations, outlines some concepts of a supportive Recreation Research and Demonstration Information Program, explains the initial provisions for administration of the RRDS, and suggests the potential of the RRDS to serve the recreation research community.

2. The RRDS has been created, and is to be organized and administered, to facilitate research in outdoor recreation and related natural resources management. The RRDS is intended primarily for use by Corps laboratories, Districts, and Divisions and the Federal, State, and local government agencies who manage resources or operate facilities on Corps Civil Works water resource development project** land under license, lease, or other instrument. Use of the RRDS for research purposes by other Federal Agencies, universities, and private research organizations is encouraged.

Background

3. Research work reported herein was carried out under a research

* For convenience, symbols and unusual abbreviations are listed and defined in the Notation (Appendix G).

** Refers specifically to Civil Works water resource development projects. Hereinafter, the term "project" has the above limited meaning unless otherwise stated.

work unit of the Corps' authorized Civil Works Recreation Research Program (RRP). The RRP is charged with the conduct and coordination of research activities in the fields of: outdoor recreation and related natural resources management; planning and design of recreation areas and facilities; political, social, and economic equity of recreation cost-sharing; economic impact of recreation; social impact of recreation; and recreation data management.

4. Authorization of the RRP was a response by the Corps to rapidly increasing and more complex recreation and related natural resources management responsibilities associated with existing and planned projects while operating funds and manpower authorizations were decreasing. The Directorate of Civil Works recognized that more efficient and effective methods for planning, designing, constructing, maintaining, and operating Corps-controlled recreation areas were essential. It was concluded that a formal research and development effort would be necessary if improved effectiveness and efficiency were to be achieved.

Institute for
Water Resources report

5. In May 1975, the Deputy Director of Civil Works requested the U. S. Army Engineer Institute for Water Resources (IWR) to identify and define researchable problems in the area of recreation and related natural resources.

6. The IWR formed two groups of people to assist in the work. The first was an Advisory Group on Recreation Research composed of Corps personnel having direct interest and/or involvement in recreation and related resources management: four persons from Divisions--two from planning elements and two from resource management elements; four persons from District planning elements; and nine persons from the Office, Chief of Engineers (OCE), representing recreation resource management (one), planning (three), engineering design (one), research and development (one), management and staffing (one), policy (one), and the Real Estate Directorate (one). The task of the Advisory Group was to commit to writing major recreation and related natural resources problems facing Corps personnel. The second group convened by IWR was an ad hoc panel of

consultants on recreation research. The panel was interdisciplinary and was drawn from the academic (five), consulting (two), citizen conservation (one), and industrial (one) communities. Panel members, individually and collectively, drafted research statements describing procedures to research the problems stated by AGRR and suggested logical groupings and sequences of the draft research statements.

7. Personnel of IWR made sure that the proposed individual research statements matched the field problems identified. Time to complete, personnel, and cost were estimated for each research statement. The documentation and IWR recommendations were transmitted to the Deputy Director of Civil Works in May 1976 (U. S. Army Engineer Institute for Water Resources 1976).

8. Examination of the kinds of problems faced by Corps elements at all levels and the record of past recreation and related natural resources research led the designers of the Corps RRP to the concept of permanent research and demonstration areas (R&D areas). During coordination of the IWR report, the concept of R&D areas was explained to the Bureau of Outdoor Recreation (now the Heritage Conservation and Recreation Service (HCRS)) of the U. S. Department of the Interior (USDI) as follows (U. S. Army Engineer Institute for Water Resources 1976):

The R&D areas would constitute permanent outdoor laboratories for the conduct of recreation and natural resources research and for testing design and management alternatives....The R&D areas would consist of representative Corps projects and recreation areas; determination of their exact number and location would be a function of the recommended research.

9. The proposal to make the R&D areas the linchpin in the RRP was supported for a number of reasons. The IWR design accorded sufficient importance to the R&D area concept such that provision was made for the selection process to proceed from the outset of the RRP and thus be in position to support subsequent mission-oriented research. The IWR rationale for R&D areas was:

- a. "Many of the identified high priority research projects will be able to utilize and in turn contribute to the development of a common data base and thereby realize economies expressed as savings in both time and money.

In the most common approach to recreation and related natural resources research, each research work unit is considered a discrete entity. The initial task faced by each investigator is preparing a data base unique to the topic, location, and budget of his/her research topic. When the research work is done and the results published, the base data are filed away in the records of the investigator. The approach wastes scarce research money by forcing separate collection of the same data by each investigator and by not requiring a feedback of newly collected data for use by subsequent investigators; places unnecessary loads upon already overcommitted District and project personnel; and forces each researcher to spend time and money selecting representative samples of projects for particular study purposes.

- b. "R&D areas would permit the conduct of integrated research projects, the development and execution of which require the cumulative rather than piecemeal collection of data. Maintenance of precise site-specific data permits the replication of research tasks at selected time intervals thereafter with assurance that the data will be comparable. The advantages of ability to measure change over time to research in recreation and natural resources processes are obvious.
- c. "R&D areas would enhance the quality of research largely because of the cumulative data base from which individual research projects would be able to draw....Individual research projects would be able to consider (larger numbers of more) complex variables and make more inferences than would otherwise be the case. In like manner, research results would tend to be more reliable and ultimately more usable for feedback into the Corps Management Program.
- d. "...R&D areas would be particularly amenable to the conduct of research into design and management alternatives, economies of scale, behavioral and carrying capacity studies, vandalism and resource degradation and data collection studies which constitute some of the Corps' most urgent research needs.
- e. "R&D areas would provide an excellent opportunity for development and on-the-ground testing of new recreation facility designs and management concepts by in-house staff in a quasi-experimental setting. Many of the planning, design, and management problems inherent in the Corps' recreation program do not require formal research and can best be approached through trial and error testing for which R&D areas would be particularly adapted.
- f. "...the R&D areas would continue to serve as active public

recreation areas. As such they would enhance the chances for integration of research findings directly into the Corps recreation management program and its demonstration on the ground. The demonstration function of the R&D areas might be just as important in the long-run as their basic research purpose.

- g. "Operation of a system of R&D areas, which would be carried out largely by Corps project personnel, would have the effect of developing within the Corps a cadre of researchers and research technicians trained in the organization and conduct of research.
- h. "Because of their permanent research status, R&D areas should also take on an important role in academic training and come to be used for instructional purposes by adjacent colleges and universities with recreation and natural resources programs. There is a good likelihood of their use for research purposes by other public and private interests."

Sequence of the work

10. The IWR recommendations were forwarded to the Directorate of Civil Works in June 1976. The available staff began the research work unit prior to the beginning of fiscal year (FY) 1978. Initial attention was devoted to choosing criteria for selecting R&D areas including the solicitation of expert advice. In June 1977, a group of recreation experts met at the WES to review the IWR recommendations and to counsel RRP staff on criteria and the selection process. Two members of this group had also been members of the IWR ad hoc panel during the RRP program design deliberations.

11. Developing a more refined idea of what the R&D area system should be and developing criteria for selecting candidate areas were the first steps taken by the RRP staff. An issue paper was prepared outlining possible interpretations of IWR language. For example, did IWR intend an "R&D area" to be an entire project, a segment of a project, or a specific recreation area? The issue paper served initially as a focus for discussion among RRP staff and with the Technical Monitor to develop a common understanding of the final product.

12. As an aid in framing criteria, recent studies of Corps recreation and related natural resources programs that used some form of

stratified sample for data gathering and analysis were examined and noted. Selection criteria and projects to be selected for research purposes were solicited from relevant WES elements.

13. The RRP staff visited all Division RRP contacts* during September 1977. The counsel of the Division RRP contacts was reflected in the formulation of a general concept of a RRDS composed of +27 Recreation Research and Development Units (RRDU's). The general concept, a preliminary listing of selection criteria, and the first approximation of a research-oriented information program were presented to the RRP In-Process Review (IPR) in October 1977.

14. The general concept, a listing of possible selection criteria, budgets, nine major problem areas, and a summary of the IPR RRDS discussion were sent to the Division RRP contacts for further study by Division and District staffs. The solutions offered for the problems were tabulated and the tabulations were distributed to all Division RRP contacts.

15. During November and December 1977, the RRP staff met with individuals in selected Federal Agencies.** An overview of the RRP work program and state of development of the RRDS were presented; the Agency contacts were asked to offer advice on any aspect of the RRDS, to outline the geographic location and substantive nature of their research activities, and to suggest future research topics; and the Agency contacts were queried as to their interest in joining the RRDS. The coordinating meetings alerted the Agencies to the Corps' intention to create an RRDS and invited constructive criticism of those intentions; added interagency considerations to the list of selection criteria; invited interagency participation in the RRDS; and made certain that creation of

* The Deputy Director of Civil Works, on 25 January 1977, asked each Division Engineer and District Engineer to designate one person on their staffs to serve as a personal contact point for RRP communications.

** The Commander and Director of WES, with the advice and counsel of the Technical Monitor, formally requested the chief executive officer of certain Federal Agencies to name an individual through whom RRP liaison could be conducted. The Agencies selected were those administering recreation and related natural resources management and programs comparable to the Corps programs.

a RRDS would not duplicate nor compete with the research activities of any other Federal Agency.

16. Substantive criteria were refined and applied. The result of the application was a list of potential RRDU's generated in April 1978. The potential RRDU's were subjected to a joint RRP-District review of physical characteristics, fiscal and management capabilities, and project peculiarities that are not usually revealed in published data.

17. In June 1978, OCE issued Engineering Circular (EC) 70-2-24 (Appendix A). The EC prescribed a method for activating RRDU's and invited the Division Engineers to submit initial nominations for the RRDS. Those candidates for the RRDS that emerged from WES-District consultation would be nominated by the Division Engineers if the criteria were sound, correctly applied, and fully understood.

18. All Division Engineers' nominations were received by OCE by mid-July 1978. Without exception, the Division Engineers had accepted and nominated those projects identified during the selection process. The Division Engineers' nominations and OCE review of those nominations represented the final step in the selection process. On 11 October 1978, OCE activated the RRDS as nominated by the Division Engineers (see Appendix A).

Scope

19. The organization of this report reflects the major tasks performed as part of the research work unit.

20. Part II deals with all aspects of the selection process. Procedural and substantive criteria are described as are the methods used in the application of the criteria and the characteristics of the resultant RRDS in terms of the existing Corps recreation and related natural resources management universe.

21. The conceptual foundation of and the initial steps taken to implement the Recreation Research and Demonstration Information Program (RRDIP) are found in Part III. The work revolves around the anticipated needs of research and demonstration rather than the normal information

system design procedure which begins with field management.

22. The present state of development of institutional arrangements governing the research and operational aspects of the RRDU's is addressed in Part IV. Division of responsibility for administration of a single resource or entity is inevitably fraught with difficulty. The results reported here have encompassed the statutory responsibility of District Engineers to operate the projects within their territorial jurisdiction and the need for the WES to exercise substantive quality control over many aspects of data collection performed by District personnel.

23. Part V contains conclusions drawn from the completed work and recommendations for future activity.

PART II: SELECTION OF PROJECTS FOR THE RECREATION
RESEARCH AND DEMONSTRATION SYSTEM

Framework for Selection Criteria

RRDS objectives

24. The objectives adopted for the RRDS were drawn from the rationale which supported creation of the system as part of the RRP. The RRDS is to:

- a. Meet the requirements of as many of the individual work units now identified as part of the RRP as possible.
- b. Permit the conduct of integrated research projects which require cumulative, comparable data.
- c. Provide insights into national and regional trends in the quantity, quality, and nature of use of Corps recreation resources and the biological, physical, economic, and social impacts associated with such use.
- d. Enhance the quality of recreation and related natural resources research by maintaining a cumulative, or longitudinal, data base from which individual research units of the RRP or research topics of others can draw and, thus, be able for the same investment to consider greater numbers and/or more complex variables and make more inferences than would otherwise be possible.
- e. Provide outdoor laboratories for the type of testing of new recreation facility designs, planning techniques, and management concepts that can best be approached by trial and error procedures.
- f. Attract research interest on the part of other Federal Agencies, State agencies, universities, and other research institutions.*
- g. Enhance integration of research findings into the Corps' recreation and related natural resources programs.
- h. Offer identified research facilities in close proximity to Division and District personnel where investigations and testing that respond to significant regional problems can be performed.
- i. Produce significant demonstration and training benefits.

* "Other research institutions" means research institutes, such as Resources for the Future, Inc., and industry groups, such as the Outboard Boat Association.

- j. Anticipate the nature of future Corps recreation and related natural resources initiatives and programs.
- k. Draw the understanding and support of the elements of the Corps that is designed to serve.

Responsiveness to objectives

25. The objectives were analyzed to ascertain significant factors for developing selection procedures and criteria. Two key factors were identified: the system must be representative and the system must be supportable. Representativeness was judged to be a factor that could be accommodated by selecting substantive criteria, such as the spectrum of biological, physical, social, and economic conditions; supportability was judged a factor that could be accommodated by adopting procedural criteria.

26. There was substantial interaction between the two sets of criteria during the selection process. There are many examples: some manipulating of available substantive data occurred prior to the procedural step of presenting a tentative RRDS concept to Division RRP contacts; information solicited from Federal Agencies concerning the nature of research activities became an aid in criteria selection as well as a procedural safeguard against duplication and overlapping; and procedural contacts with Corps laboratories aided in choosing and weighting substantive criteria.

Data base for substantive criteria

27. Two primary sources of data were used to apply the substantive criteria: the Recreation Resource Management System (RRMS) and the State Water Resources Development Reports issued by the several Engineer Divisions.*

28. Recreation Resource Management System. The RRMS is designed for annually collecting and analyzing recreation-resource management information for all projects that (a) have annual attendance of 5000 or more recreation days and (b) the Corps has continuing recreation and

* For example: U. S. Army Engineer Division, North Central, 1977. Water Resources Development in Iowa, Chicago, Ill.

related natural resources management responsibilities (Headquarters, Department of the Army 1977).

29. The RRMS provides computer printouts displaying various combinations of the basic data file, which, in part, include the volume, distribution, and activity of persons visiting Corps projects. In addition to printouts provided by OCE, the RRMS computerized data may be accessed by resource managers at all levels to assist in their management programs. Project and District personnel prepare the data that are included in the system. The uniformity of format, timing, and definition make the system an invaluable resource when reviewing Corps recreation and related natural resources activities. (A description of the 1977 RRMS is provided in Appendix B.)

30. The most recent calendar year for which RRMS reports were available was 1976. Thus, all data cited in this report reflect 1976 conditions even though reports describing activity in calendar year 1977 became available during the course of the research.

31. State Water Resources Development Reports. The state reports are designed to describe past, current, and proposed Corps activities in each state. The descriptions are comprehensive. Among the activities described are: Corps river basin water resource studies, other water resource studies, small flood control projects, small navigation projects, small beach erosion projects, floodplain management services, urban studies program, and permit issuing under the Rivers and Harbors Act of 1899 and the Federal Water Pollution Control Act amendments of 1972. Many of the activities described have significant recreation and related natural resources management components. The following description, which is located in an index listing 166 projects and activities in New Jersey as "Navigation," exemplifies the situation (U. S. Army Engineer Division, North Atlantic 1975):

Shark River is a small stream entering the Atlantic Ocean 20 miles south of Sandy Hook. It is 40 miles*

* A table of factors for converting U. S. customary units of measurement to metric (SI) units is presented on page 5.

by water south of the Battery, New York City. The Waterway is extensively used by pleasure boats and fishing craft. The existing project provides for a channel 18 ft deep at the entrance of the inlet, and a width of 100 ft and depths of 12 ft and 8 ft, from the inlet to the upper limit of the Belmar Municipal Boat Basin....The project was completed in 1947.... Passengers amounting to 442,000 were reported in 1972 (emphasis added).

Although listed as an ordinary navigation project, it is clear that many current benefits are derived from recreation use.

32. Secondary data sources. A variety of secondary data sources was also employed. Among the sources were the most recent available master plans; published reports of major research projects that utilized samples of Corps projects; and reports prepared by Districts, universities, and others for individual projects or groups of projects. Some of the major studies had already been reviewed for guidance on selection criteria. Extensive data, some very specialized, had been collected for each of the projects in the sample.

Problems with the data

33. RRMS. The requirements for entry into the system indicate that the RRMS does not encompass all projects with Corps recreation functions. Obviously, those projects with less than 5000 recreation days of use are not included. More important, however, a large number of the projects that require no Corps operating presence, and are therefore not included in RRMS, are extremely important when quantity and location of public outdoor recreation opportunities are taken into consideration. One example is the system of small craft harbors and harbors of refuge constructed by the Corps on the Great Lakes. Neither the recreation boating facilities nor the recreation use made of the facilities enter the RRMS.

34. The RRMS does not always contain data that quantify some substantive selection criteria. For example, the RRMS reports only the average elevation of the water surface during the peak attendance period (normal pool), the spillway elevation (flood pool), and the minimum elevation to which the water may be lowered. There is no statement of the

range of fluctuation during the use season.

35. Corps studies have reported substantial variation in the quality of attendance figures reported to RRMS (CZRC 1975; Brown et al. 1974; Mischon and Wyatt 1978). Still, the data are the best available and are suitable for distinguishing highly used projects from those receiving light use.

36. The RRMS does not contain data suitable for assigning entire projects to categories based on the nature of adjacent land use. Projects that are entirely or partially within 50 miles of a Standard Metropolitan Statistical Area (SMSA) may be separated from the rest. However, this measure often has little to do with the nature of recreation and related natural resources problems that stem from adjacent land use. For example, most projects in the New England Division (NED) are located entirely within SMSA's, yet the adjacent land use is rural. Further, most projects in the Ozarks are not within the SMSA plus 50-miles criterion, yet second homes adjacent to the projects approach urban densities.

37. State Water Resources Development Reports. The state reports are inconsistent. Each Division adopted a format and nomenclature suited to its needs. The lack of a consistent format complicates the acquisition of needed information, and the lack of a standard nomenclature makes comparisons of the data difficult.

Dual selection system

38. The nature of the readily available data forced adoption of a dual selection system. The first part addressed that portion of the Corps recreation and related natural resources spectrum that is included in the RRMS. The second part dealt with the remainder of the spectrum, or those recreation and related natural resources projects not included in the RRMS.

Criteria for Representativeness

39. The following criteria were used to ensure that projects selected for inclusion in the RRDS would be representative of the diversity found in the Corps system.

- a. Full range of recreation and related natural resources activities in which Corps functional elements* are active at any level.
- b. Broad spectrum of physical, biological, locational, climatic, and competitive position characteristics of projects and related natural resources and social and economic conditions that influence the use of those projects and resources.
- c. Distribution of RRDU's in proportion to the magnitude of the Corps' recreation-resource base and/or provision of recreation opportunities.
- d. Range of operating conditions found at completed and authorized multiple-purpose projects.
- e. Typical recreation and related natural resources planning, design, and management tasks performed by individual Corps units.

Range of recreation and
related natural resources activities

40. A listing of Corps elements that exercise responsibilities in the recreation and related natural resources field was drawn from descriptions of Corps activities. The listing showed the types of activities performed by staffs who would benefit from more reliable data produced by the RRP. The listing is shown in Appendix C.

41. Identifying the Corps element and the recreation and related natural resources activities in which they currently engage did not define strata within which specific projects could be classified. The method used to satisfy this criterion was a system that forced classification of all Corps projects according to the characteristics of the project. It was assumed that there would be a high correlation between the characteristics of the project and the combination of Corps elements involved. The classification represents the full range of research and data collection opportunities that can be used in pursuit of Corps

* Element means a group of individuals organized to perform a specific function. It is not possible to assign specific titles that have general applicability because of the variations in organization charts and titles among Corps Districts, Divisions, and OCE. Some examples of elements are: Recreation Resource Management Branch, Design Section, Master Planning Section, and Environmental Resources Branch.

missions. The eight general classes and seven subclasses of the navigation class are shown in Table 1.

42. Projects listed in RRMS/state reports were examined according to the classification shown in Table 1. The weaknesses of the state reports as a data source limited the work. It was not possible, from the data available, to be consistent with descriptions of Corps activities effecting, for example, local flood protection. Further, some activities symbolized by the classification headings consist solely of planning reports.

43. The 402 projects listed in the 1976 RRMS were placed within an appropriate class.*

44. Listing the RRMS projects by category and some trial quantification of a few of the descriptive parameters revealed that the classification process would aid in meeting other criteria, for example, full range of multipurpose functions.

Broad spectrum of physical, biological, social, and economic conditions

45. This criterion expresses fundamental supply-user relationships. Both the research literature and experience strongly suggest that the relationships existing between the quantity, character, and quality of the supply of water-oriented recreation opportunities and the location of potential user populations significantly influence recreation behavior. Examples of behavior thought to be influenced are volume and seasonality of participation in recreation activities, length of stay per visit, size of visiting party, mix of recreation activities in which visitors participate, and the proclivity of groups with similar socioeconomic backgrounds to do similar things at similar places.

46. Several attempts were made to compile all-encompassing lists of the supply and user variables that have been thought to explain the majority of observed differences in the use made of water-oriented

* There is actually a larger number of structures and impoundments. A few Districts lump into one listing several locks and dams where the head of one pool reaches the toe of the next and there is relatively little change in the character of the river.

Table 1
Classes of Corps Civil Works Projects Used as Strata to Ensure All
Corps Recreation-Related Activities Are Included in the
Recreation Research and Demonstration System

Conventional multiple-purpose reservoir*

Navigation

Multiple-purpose reservoir with lock*

Inland waterway pools with locks and dams*

Intracoastal waterways

Inland waterways without locks and dams

Jetties and similar structures

Commercial navigation channels used principally by recreation boaters

Small craft harbors and harbors of refuge

Dry reservoirs**

Modified natural lakes*

Missouri River Main Stem reservoirs*

Beach protection and stabilization

Local flood protection

Unclassified.

* All existing projects are probably included in RRMS because of the Corps' continuing operating responsibility.

** Some dry reservoirs are not included in RRMS because the annual recreation days of use are less than 5000.

Includes some incomplete projects and some old projects that do not fit the other classes.

areas in general and Corps projects in particular. A listing process produced an array of interrelationships with opportunities to create a nearly infinite number of strata useful for selection purposes. The partial listing shown in Table 2 is intended to illustrate the types of factors considered even though the listing is not as exhaustive as the present literature would permit. A more holistic approach was therefore necessary. The approach employed was able to identify general regions within which characteristics, such as those shown in Table 2, are similar. Thus, geographical regions become the selection strata for this criterion. The approach combined biological-physical homogeneity with social-economic homogeneity.

47. Biological-physical regions. The first step was to plot lines demarcating differences in landscape homogeneity as expressed by the eight recognized Topographic Regions and 22 Topographic Provinces of the United States (U. S. Geological Survey 1970). The configuration of the regions and provinces is shown in Plate 1. The delineations describing the extent of the Potential Natural Vegetation (Geological Survey, 1970), the Forest Types of the United States promulgated by the Society of American Foresters, and the 20 Land Resource Regions as promulgated by the U. S. Department of Agriculture (USDA) were compared with the regions and provinces shown in Plate 1. Maps portraying average annual sunshine, precipitation, snowfall, and temperature were compared with the regions shown in Plate 1. General climatic conditions, as expressed by measurements of sunshine, precipitation, wind, and temperature, match the topographic region/province lines very well except when the provinces have extensive north-south ranges, such as the Great Plains, the Atlantic Coastal Plains, and the Blue Ridge Mountains. In these areas the present and potential vegetation maps indicated the need to refine certain provinces into smaller units.

48. The utility of regions based on topographic considerations can be best understood by comparing the nature of streams found in several regions. Mountain streams usually have steeper gradients; travel through steep, narrow water courses; and have colder water temperatures than streams flowing through water courses in a flat landscape. Both

Table 2
Factors Influencing Recreation Use Patterns at Corps Water
Resource Development Project Recreation Areas

Attractiveness of recreation areas:

Diversity of landscape and the land/water interface, which in turn is influenced by:

Area of water surface.

Prevailing topography or relief.

Fluctuation of lake surface elevation.

Vegetation within sight of the water's edge.

Water quality as expressed by easily perceived characteristics, such as:

Temperature

Turbidity

Depth

Setting in which the water body is located, such as:

Grass prairie with gentle slopes.

Intensive agriculture with level land.

Steep terrain with hardwood forest.

Mined land.

Land dominated by heavy industry.

Facilities available to meet user desires:

Quantity of facilities

Diversity of facilities located within a general area:

Resort lodges and cottages.

Campgrounds.

Launching ramps.

Picnic areas.

Beaches with change houses.

Utility of the facilities:

Located adjacent to deep water.

Shaded campgrounds.

Level of maintenance

(Continued)

Table 2 (Concluded)

Ease of access:

Quality of roads:

Regional

Inter-regional

Connectors

Availability of public transport

Competition of other recreation opportunities

Climate

Proximity of population concentrations:

Dense residential population:

Permanent residents

Seasonal residents

Sparse residential population:

Permanent

Other, including seasonal

Special populations

Abundance of fish and wildlife

Characteristics of principal groups having access:

Age

Per capita income

Education level

Family size

Traditional behavior

types are different from streams passing through rolling topography. Similarly, the lakes formed when the streams are impounded exhibit characters as different as did the streams and for the same reasons. Thus, projects located in mountainous terrain will tend to be narrow, deep, cold, and dendritic with irregular shorelines. Projects located in level landscapes will tend to be broad, shallow, warm, and elliptical with a smooth, regular shoreline.

49. Social and economic conditions. Most published social and economic data are organized according to political subdivisions.* The boundaries of the physiographic regions described above show very little correlation with the boundaries of political subdivisions. This is not a shortcoming of the regions as analytic units for the study of recreation and related natural resources; however, it does make difficult the testing of the hypothesis that there is social and economic homogeneity present within each physiographic region that is as distinctive as, and directly related to, topography. It seemed, intuitively, that economic activities, use of the land, and social characteristics of resident populations found in the Great Plains region are as relatively uniform as they are in the Carolina Piedmont and the Columbia Plateau and that these internal similarities are different from the social and economic conditions found in the adjoining mountain regions.

50. Comparisons were made to determine how the physiographic regional boundaries should be modified so that the resulting configurations would encompass social and economic homogeneity as well as topographic-vegetative homogeneity.

51. The Census Divisions were used for the first test of the hypothesis because they have been the analytical units used by the HCRS in preparing the nationwide outdoor recreation plans (USDI 1973). The

* The Office of Business Economics-Agricultural Research Service (OBERS) data series present Census type data for the 20 Water Resource Regions. The OBERS work demonstrates that Census data can be made to fit resource defined regions but at considerable cost. The Water Resource Regions are not significantly better matched to the physiographic regions than the political boundaries; therefore, the Bureau of the Census data rather than OBERS data were used in subsequent analysis.

extent of the Census Divisions is shown in Plate 2.

52. The more influential social and economic characteristics, first cited by the Outdoor Recreation Resources Review Commission (ORRRC 1961), were selected. They were: population growth, population density, mobility, and age of the population. The Statistical Abstract of the United States (Census Division, U. S. Department of Commerce 1977) was searched for relevant current data. Selected recreation-related data, shown in Table 3, indicate that the various regions of the country do have internal consistencies that distinguish the people and their activities from those in other regions.

53. The most useful data are those compiled by the so-called Title V Economic Development Regions* and the Appalachian Regional Commission (see Plate 3). The regions have been formed to include homogeneous social and economic conditions; their exterior boundaries, formed by county lines, divide states geographically.**

54. Remarkable agreement exists between the boundaries of these regions and the physiographic regions proposed for use in the selection process. Most notable are the Coastal Plains, Appalachian, New England, and Ozark regions. Northern Great Plains and Four Corners regions are helpful, but to a lesser degree. Moreover, the Appalachian Regional Commission (ARC) has further divided the region into northern, middle, and southern segments using social and economic criteria.

55. The analyses show there is a correlation between topographic, vegetative, social, and economic conditions. The social and economic data from the economic regions and OBERS bear directly upon determining final regional boundaries as strata for RRDS selection. These data and judgment were used to modify the topographic boundaries to better reflect social and economic homogeneity in setting final geographic strata.

56. Strata for RRDS selection. The regions constructed for

* Title V, Public Works and Economic Development Act of 1964 (Public Law).

** Even this utility is diluted in the west because of the size of the counties.

Table 3

Differences in Selected Characteristics of the U. S. Population by Census Division

Census Division*	Annual Rate of Population Change, percent**		Population Density in 1970** per square mile	Age of Population, percent**				Federal Outdoor Recreation Land† 000 acres
	1960-1970	1970-1975		Age of Population, percent**				
				<5 yr	5-17 yr	18-65 yr	>65 yr	
New England	1.2	0.5	188.1	6.6	23.5	58.1	11.8	1,022.9
Middle Atlantic	0.9	2.0	670.8	6.7	22.9	59.2	11.2	551.2
East North Central	1.1	0.3	164.9	7.6	24.4	58.1	9.9	5,099.6
West North Central	0.6	0.4	32.1	7.2	23.9	56.7	12.2	9,172.3
South Atlantic	1.8	1.8	114.9	7.6	23.2	58.5	10.7	9,748.8
East South Central	0.6	1.1	71.5	8.2	24.1	57.1	10.6	4,326.8
West South Central	1.4	1.5	45.2	8.4	24.3	57.2	10.1	6,491.2
Mountain	2.1	2.9	9.7	8.7	24.9	57.6	8.8	129,272.9
Pacific	2.5	1.2	75.0	7.2	23.0	60.1	9.7	101,034.2

* Geographic extent shown in Plate 2.

** Census Division, U. S. Department of Commerce (1977).

† USDI (1973).

selection purposes are shown in Plate 4. A discussion of the rationale for the choice of certain boundaries is contained in Appendix D. With a single exception, in the lower Mississippi Valley, the external boundaries of the topographic-vegetative regions prevailed; the adjustments consist of splitting off topographic provinces and making internal divisions based upon social and economic distinctions. Thirty physioeconomic regions are defined in this construction. The regions are listed in Table 4. Each region is a potential stratum for selection of a project.

57. Some of the potential strata are not relevant to the selection of Corps projects simply because there are few or no Corps projects and very slight Corps program activity that occurs in them. In other regions, there is significant Corps activity but it is overshadowed by other agencies. The 12 regions dropped as relevant strata are indicated in Table 4 as well as the reasons for dropping them.

58. One project, regardless of class, located within each region would represent the extent of principal variation in the nature of Corps recreation and related natural resources and the use made of them.

Range of operating conditions found at projects

59. Strata to satisfy this criterion were developed from an evaluation of RRMS-listed projects and enumeration of significant factors that describe the range of differences that may occur in the operation of a project. The factors chosen and the strata are shown in Table 5.

60. Selection of one or more projects that demonstrate one or more of the factors ensures that the RRDS will account for the majority of the variability found in the Corps' recreation resource system.

Procedural Criteria

61. Five potential RRDS user communities were identified on the basis of the objectives set out for the system: the Corps field organization, the Corps research community, other Federal Agencies with recreation and related natural resources programs that are similar to or which complement Corps programs, those State and local governments that have

Table 4
Physioeconomic Regions Used as Strata for Recreation
Research and Demonstration System Selection

<u>Number</u>	<u>Region</u>	<u>Reason for Dropping Region</u>
1	New England	
2	Adirondacks-Catskills	No projects; moderate Corps activity
3	Hudson-Champlain Trough St. Lawrence Plain	Low Corps activity
4	Northern Atlantic Coastal Plain	
5	Southern Atlantic Coastal Plain	
6	Northern Piedmont Plateau	
7	Southern Piedmont Plateau	
8	Northern Appalachian	
9	Southern Appalachian	Region dominated by Tennessee Valley Authority (TVA)
10	North Central Lowlands	
11	South Central Lowlands	
12	Ozark Plateau-Ouachita Mountains	
13	Laurentian Shield	
14	Northern Great Plains	
15	Southern Great Plains	
16	Wyoming Basin	No Corps projects; Bureau of Reclamation (BuRec) area
17	Northern Rocky Mountains	Three Corps projects; BuRec area
18	Central Rocky Mountains	No Corps projects; BuRec area
19	Southern Rocky Mountains	Two Corps projects; BuRec area
20	Great Basin	Not more than four projects; BuRec area
21	Colorado Plateau	One Corps project; BuRec area
22	Southern Desert and Mountains	BuRec area
23	Columbia Plateau	
24	Cascade Mountains	

(Continued)

Table 4 (Concluded)

Number	Region	Reason for Dropping Region
25	Sierra Nevada Mountains	
26	Northern Lowland Trough	One Corps project; low activity
27	Southern Lowland Trough	Small Corps projects; moderate activity
28	Northern Coastal Range	
29	Mid-Coastal Range	
30	Southern Coastal Range	

Table 5
Factors and Strata Chosen to Obtain Representativeness
of Project Operating Conditions in the Recreation
Research and Demonstration System

Factor	Unit	Stratum
Authorized multiple-purpose functions	Authorized functions	Flood control Navigation* Water supply Hydroelectric power Water pollution control Flow stabilization Irrigation Recreation Fish and wildlife enhancement
Changes in recreation controlling authorities over time	Year construction was initiated	Before 1941 1942-1952 1953-1962 1963-1978
Character of land use adjacent to project	Types of use	Urban-suburban Agriculture Second home/retirement Resort Public land
Range of gross project attendance	Recreation days per year	>6,000,000 3,000,001 to 6,000,000 1,000,001 to 3,000,000 100,000 to 1,000,000 <100,000
Range in amount of land held in fee above normal pool	Acres	>35,000 20,001 to 35,000 10,001 to 20,000 3,000 to 10,000 <3,000
Gross project size	Acres	
Area of water surface at normal pools	Acres	

(Continued)

* Limited to structural features on inland waterways.

Table 5 (Concluded)

Factor	Unit	Stratum
Variety of intergovernmental relations	Status of recreation areas administered by others	Other Federal Agency State government agency Local government Concessionaire** Other
	Nonrecreation outgrants. for management	Other Federal Agency State government agency Individuals
	Percent of recreation attendance recorded at Corps recreation areas	76-100 51-75 26-50 0-25
Variety and magnitude of direct Corps recreation management load	Is there a concession on a Corps recreation area?	Yes No
	Is there a Corps fee collection area?	Yes No

** Applies when concessionaire assumes responsibility for all operations of entire developed recreation area.

Outgrant is a term used to include all instruments by which individuals and public bodies are granted permission to use project resources. An outgrantee may be a permittee, licensee, lessee, or holder of an easement.

leases or other formal operating agreements for Corps lands and/or facilities, and the research community.* To achieve maximum utility from the RRDS, the understanding of these communities and their support for the system are essential. Therefore, several procedural steps were built into the selection process to (a) inform members of as many of the communities as possible of the Corps' intent to select and activate an RRDS, (b) actively involve the Corps' field organization in the entire selection process, and (c) fully coordinate the selection process with the Corps research community and the community of Federal Agencies having closely related recreation and related natural resources programs.

Corps field organization

62. The selection process must be a true collaboration between the WES and the District, Division, and OCE levels. The procedural criteria that evolved included:

- a. Soliciting the views of the Division RRP contacts on the definition of the RRDS, choice of selection criteria, and solutions to the problems inherent in dividing operating and research responsibilities on the area.**
- b. Revealing the mechanics for applying the criteria and displaying preliminary results to Division RRP contacts for critical reaction.
- c. Meeting with District personnel to explain fully the substantive selection mechanics and to gain from them their views for improving selections.
- d. Limiting to one the number of projects selected for the RRDS administered by any one District.

Corps research community

63. The IWR report noted that recreation and related natural resources research has been conducted at several Corps laboratories. The report listed the Hydraulics Engineering Center (HEC) at Davis, California; the Construction Engineering Research Laboratory (CERL) at Urbana, Illinois; IWR; and WES as "...having considerable experience in

* The research elements of other Federal Agencies, State agencies, universities, and other research institutions.

** Division RRP contacts were urged to consult with the District RRP contacts in their Division and to supply consolidated responses to WES.

recreation-oriented research." In addition, several research assignments to the WES complement or supplement the RRP. The procedures used to involve other laboratories and programs in the selection process were:

- a. Inviting representatives of CERL and IWR to attend and participate in the major IPR's when RRDS was being developed.
- b. Meeting with managers of other research programs at the WES to determine the nature and extent of interfaces with RRP, particularly if selection of samples of projects was included in the study design. The selection methods of the programs, as well as any sites that had been selected, were to be taken into account by RRP criteria and procedures.

Other Federal Agencies

64. Agencies already identified as having a high degree of correlation with Corps recreation and related natural resources programs were: Heritage Conservation and Recreation Service (HCRS), Bureau of Reclamation (BuRec), Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), and National Park Service (NPS) of the USDI; Forest Service (FS) of the USDA; and Tennessee Valley Authority (TVA). Procedural criteria for the design of the RRDS included:

- a. Consulting with the Agencies as soon as a concept for an RRDS was in hand.
- b. Promoting the participation of those Agencies that now might manage recreation and/or related natural resources under lease or other legal contract on those projects that are chosen as parts of the RRDS.
- c. Encouraging the inclusion of additional areas under the jurisdiction of the Agencies to make the RRDS representative of national water and related land recreation resource research issues rather than limited to the Corps.

65. No formal procedural criteria were formulated to address the aspects of State and local governments or the non-Federal research community.*

* The advice of six university research persons was sought in the early stages of choosing selection criterion.

Applying the Criteria

Distribution in proportion to magnitude of Corps presence

66. With a few exceptions, Corps Division and District boundaries, based upon hydrologic considerations, do not correspond to the regions defined for selection purposes.* Nonetheless, work load analyses could proceed only on the basis of administrative units. Thus, the subsequent discussion is couched in terms of Corps Districts and Divisions, but the part of the analyses dealing with geographic locations is based upon the physioeconomic regions as described above.

67. The occurrence of each class of project was recorded and summed by District and Division. The total of each class of project within each District and Division constitutes a profile of the type of recreation and related natural resource work load performed in each administrative unit. The results of the summing are shown in Table 6.

68. Observation of these data show that Districts and, to a lesser degree, Divisions exhibit distinctive personalities. Some Districts address recreation only in the context of navigation or in the context of coastal problems. The New York District and the North Atlantic Division (NAD) illustrate this trait; the Ohio River Division (ORD) Districts--particularly the Huntington District--exhibit remarkable balance among noncoastal classes; and the North Central Division (NCD) illustrates variety among Districts within a Division--the three Great Lakes Districts' recreation-oriented work load does not resemble the recreation-oriented work load of the two Mississippi River Districts.

69. The method applied here simply weights the number of

* Agreement is found in: NED with the New England region; Missouri River Division (MRD)--Southwestern Division (SWD) boundary with separation of Great Plains into northern and southern segments; Galveston District--Fort Worth District boundary with the extent of the Gulf Coastal Plains in Texas; and the North Pacific Division (NPD)--South Pacific Division (SPD) boundary with the southern extent of the Columbia Plateau.

Table 6
Sum of Project Classes by Division and District

Conven- tional Reservoirs*	Locks and Mul- tiple Pur- pose Dams*	Dams with No Perma- nent Pool*	Missouri River*	Modi- fied Natu- ral Lakes*	Other New*	Small Craft Harbors*	Small Navigation Channels*	Beach Protection**	Piers and Jetties	Atlantic Intra- coastal Waterway†	Gulf Intra- coastal Waterway†
20	0	10	0	0	0	39	7	3	††	N	N
New England											
North Atlantic	11	0	0	0	0	28	35	12	-	-	-
Baltimore	8	0	0	0	0	6	7	1	1†	Y	N
New York	0	0	0	0	0	18	17	1	††	N	N
Norfolk	0	0	0	0	0	2	7	1	††	Y	N
Philadelphia	3	0	0	0	0	2	4	9	4†	Y	N
South Atlantic	10	9	0	0	5	10	23	23	-	-	-
Charleston	1	0	0	0	0	0	4	1	††	Y	N
Jacksonville	0	0	0	0	0	3	8	12	8†	Y	Y
Mobile	5	0	0	0	1	1	3	1	††	N	Y
Savannah	2	0	0	0	0	1	3	1	††	Y	N
Wilmington	2	0	0	0	3	5	5	8	2†	Y	N
Ohio River	61	36	5	0	0	0	0	0	0	-	-
Huntington	26	9	4	0	0	0	0	0	0	N	N
Louisville	16	4	0	0	0	0	0	0	0	N	N
Nashville	5	0	0	0	0	0	0	0	0	N	N
Pittsburgh	14	23	1	0	0	0	0	0	0	N	N
North Central	8	29	1	0	1	103	4	6	-	-	-
Buffalo	0	0	1	0	0	22	0	6	††	N	N
Chicago	0	4	1	0	0	18	2	0	††	N	N
Detroit	0	1	0	0	0	42	2	0	††	N	N
Rock Island	2	10	0	0	1	4	0	0	0	N	N
St. Paul	6	14	0	6	0	17	0	0	††	N	N
Lower Mississippi											
Valley	15	5	1	0	3	7	8	0	-	-	-
Memphis	1	0	0	0	0	3	0	0	0	N	Y
New Orleans	3	0	1	0	1	0	8	0	††	N	N
St. Louis	4	0	0	0	2	0	0	0	0	N	N
Vicksburg	7	2	0	0	0	4	0	0	0	N	N

(Continued)

* Headquarters, Department of the Army (1976).

** Selected on basis of descriptions in State water resource development reports.

† Passes through, N = No; Y = Yes.

†† Unknown.

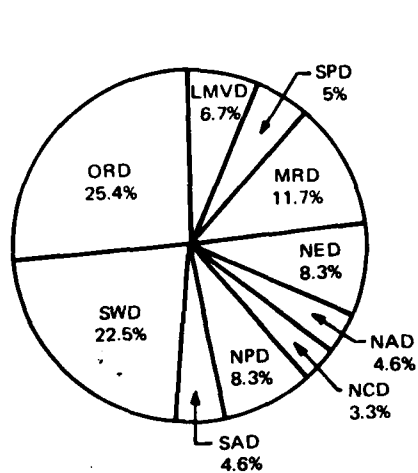
‡ Minimum number.

Table 6 (Concluded)

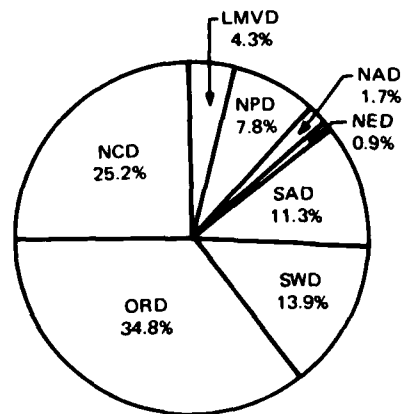
Locks and multiple Purposes Dams														
Conventional Reservoirs	Dams	Waterways	Dams with No Permanent Pool	Missouri River	Modified Natural Lakes	Other New	Small Craft Harbors	Small Navigation Channels	Beach Protection	Piers and Jetties	Atlantic Intra-coastal Waterway		Gulf Intra-coastal Waterway	
Missouri River	28	0	0	6	0	1	0	0	0	0	0	-	-	-
Kansas City	11	0	0	0	0	1	0	0	0	0	0	N	N	N
Omaha	17	0	0	6	0	0	0	0	0	0	0	N	N	N
Southwestern	54	4	5	0	0	0	15	3	0	7	-	-	-	-
Albuquerque	2	0	4	0	0	0	0	0	0	0	N	N	N	N
Fort Worth	17	0	0	0	0	0	0	0	0	0	N	N	N	N
Galveston	0	0	1	0	0	0	15	3	0	7	N	N	Y	Y
Little Rock	8	2	10	0	0	0	0	0	0	0	N	N	N	N
Tulsa	27	2	2	0	0	0	0	0	0	0	N	N	N	N
North Pacific	19	8	1	1	1	0	7	1	0	-	-	-	-	-
Portland	13	3	0	0	0	0	0	1	0	†	N	N	N	N
Seattle	3	0	1	1	1	0	7	0	0	2†	N	N	N	N
Walla Walla	3	5	0	0	0	0	0	0	0	0	N	N	N	N
South Pacific	12	0	6	0	0	0	12	3	10	-	-	-	-	-
Los Angeles	3	0	6	0	0	0	9	0	10	6†	N	N	N	N
Sacramento	8	0	0	0	0	0	0	0	0	0	N	N	N	N
San Francisco	1	0	0	0	0	0	3	3	0	3†	N	N	N	N
National Totals	238	20	95	29	6	7	10							
	58.8													

† Minimum number.

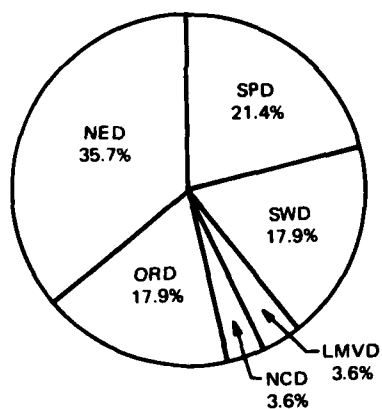
‡‡ Does not total 402 because of adding new projects not yet carried in RRMS.



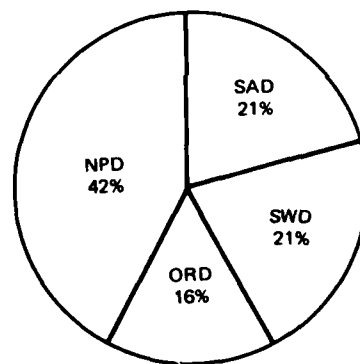
a. MULTIPLE-PURPOSE
RESERVOIRS
239



b. LOCKS AND DAMS
96



c. DRY LAKES
28



d. LOCK AND
MULTIPLE PURPOSE
19

Figure 1. Relative importance to the Division of RRMS-listed classes of projects

project size;* shoreline miles; number of recreation areas; total, average monthly, and highest and lowest month's attendance; distribution of attendance between recreation areas managed by the Corps and recreation areas managed by others; and dispersed recreation use.**

73. The RRMS values were recorded for each of the descriptors for each project. In addition, possible water surface fluctuations were recorded as a check on shoreline attractiveness.

74. District and Division averages were computed for each key descriptor by project class (see Appendix E).

75. The range of choice using District means was simply too large to be practical. Therefore, Division averages were the basis for describing a typical Division project in each class represented in that Division.

76. Analysis of the Division means revealed additional characteristics that distinguish between operating modes in the Divisions. In some Divisions, the overwhelming majority of attendance occurs at recreation areas administered by others while in other Divisions the preponderance of attendance is registered at recreation areas managed by Corps personnel.

77. All the project descriptors in each class were compared with mean Division descriptor values. This was done by selecting the four projects in each class that were closest in gross project size and attendance to the Division average values for these two descriptors. Thereafter, choices among the projects were made on the basis of matching the following project descriptors with the Division descriptor

* The difference between gross project size and the sum of water surface and fee land is accounted for in flowage or other easements--a distinctive project class characteristic. For example, a large proportion of the gross project size of lock and dam class projects is flowage, which is seldom the case with conventional reservoirs.

** Dispersed recreation attendance is defined as the difference between gross project attendance and the sum of attendance from all recreation areas expressed as a percent of total attendance, or

$$\text{Dispersed Recreation} = \frac{\text{Total Attendance} - \text{Attendance in Recreation Areas}}{\text{Total Attendance}} \times 100$$

values for (a) distribution of gross project size between water surface and fee land; (b) distribution of gross project attendance between Corps recreation areas, non-Corps recreation area, and dispersed attendance; (c) shoreline miles; (d) distribution of total recreation areas between Corps and others; and (e) average annual attendance at recreation areas. For each class represented within a Division, one project whose descriptor values most nearly matched the Division mean descriptor values was chosen as typical of that class in that Division. Using the same procedure, two other projects within the class were selected: one larger and the other smaller in size and/or attendance.

78. The ratio of classes within each Division, shown in Figure 1, was used to set the number of projects within each class that might be selected in each Division. For example, due to the large number of lock and dam pools in the NCD relative to other classes of projects, choice of two Mississippi River Pools was deemed more appropriate to the Division's work load than inclusion of a conventional reservoir. Further, in the SWD two conventional reservoirs and one multipurpose lock and dam reservoir is representative of the mix of project classes found in the Division.

79. A total of 73 RRMS-listed projects were listed as available for Division selection. The listing is shown in Appendix E.

80. It was hypothesized that an RRDS consisting of units from the list would stand an excellent chance of meeting all criteria. To test the hypothesis, the attributes of those projects that would be chosen as nearest Division means (and, therefore, would be recommended to the Division by the WES) were tested against the criteria. They were plotted against the physioeconomic regions shown in Plate 4; their characteristics were matched with the other strata.

81. Sample projects. The sample drawn on the basis of Division means would contain 23 projects from the RRMS listing. Such a sample would be deficient for a number of reasons: it is not representative of all instances of Corps involvement in recreation and related natural resources; five of the specified physioeconomic regions are not

filled;* one gross project attendance stratum is not filled; the out-grants of recreation areas to other Federal Agencies is underrepresented; there are four Districts plus NED with more than one selection; and, there is no project in this sample that is still under construction.

Non-RRMS-listed projects

82. The listing of classes shown in Table 1 and Table 4 indicate six classes of examples of projects not found in the RRMS. The list could be expanded by adding dike and levee systems along major rivers, for example.

83. A decision was made that old navigation projects with heavy recreation use and similar projects constituted a sufficiently large volume of recreation use to warrant inclusion as a class in the RRDS.

84. The state reports were studied to spot high visibility recreation projects in Districts with otherwise light or nonexistent RRMS-listed recreation loads. As mentioned earlier, examination of the first few reports provided sufficient evidence to reduce the number of classes to four. The two classes dropped were Intracoastal Waterways (combined with commercial navigation channels used principally by recreation boaters and renamed recreation navigation) and local flood protection. Projects that were listed in this partial and judgmental procedure are shown in Table 7 along with the administering District.

Complementary research activities compared

85. The projects listed as potential RRDU's and recreation use monitoring stations (RUMS's) were compared with the lists of projects that had been or were to be used for research purposes. The objective of the comparison was to draw chances for collaboration to the attention of the Division and District RRP contacts and the WES Program Managers. If the prospects for money saving and substantively sound collaboration were seen by the contacts and/or Managers and positively put forward, Division Engineers could consider nominating those projects to the RRDS.

* Northern Atlantic Coastal Plain, southern Atlantic Coastal Plain, southern Great Plains, Columbia Plateau, mid-Coastal Mountains.

Table 7

Non-RRMS Projects Considered for Inclusion in the
Recreation Research and Demonstration System

<u>Project</u>	<u>District</u>	<u>Class</u>	<u>Location</u>
Shark River	New York	Recreation navigation	Within New York metropolitan area, near Sandy Hook*
Wildwood	Philadelphia	Beach protection	Traditionally high value, south Jersey beach
Sturgeon Bay	Chicago	Small craft harbor	Part of Michigan SCORP**
Grand Haven	Detroit	Small craft harbor	
Oregon Inlet	Wilmington	Piers and jetties	
Cape Canaveral	Jacksonville	Recreation navigation	Cape Hatteras National Seashore
Crescent City	San Francisco	Small craft harbor	Recommended by NPS
Port Aransas	Galveston	Piers and jetties	North end of Padre Island National Seashore

* National Park Service officials suggested a site at Sandy Hook where Corps and Park Service now collaborate to solve coastal erosion problems.

** SCORP = state comprehensive outdoor recreation plan.

Special opportunities also examined

86. In the same way and for the same reason, those projects selected under one program or another as recipients of significant appropriations outside normal cost-sharing requirements were examined. Opportunities to test user reactions to new facilities or to tap unique situations where particularly useful data might be obtained were the motivation for the examination.

87. An example of an opportunity considered involves the Saylorville-Des Moines floodway-Red Rock complex in Iowa. It was seen that the Red Rock project was under consideration as a water quality data gathering station in the EWQOS* program and that extensive water quality sampling records for the Saylorville project watershed had been compiled by Iowa State University. The projects are roughly equidistant from Des Moines, one upstream and one downstream. Research opportunities into the substitutability aspects of a new set of facilities opening in a location competitive with an older set of facilities are evident. In addition, the floodway through Des Moines is an opportunity to collect badly needed data on nonreservoir recreation use (Coughlin et al. 1978).

88. The values of such opportunities were compared with adherence to the established selection process and the values were made known to the Division RRP contacts.

89. It became clear that the role in the RRDS of the non-RRMS-listed projects selected would be considerably different than the role of RRMS-listed projects. For the most part, little or no land has been acquired in fee simple by the United States, no recreation support facilities per se have been built by the Corps, and no permanent personnel from the operations elements are assigned to management tasks at the sites. There would be very little opportunity to test and demonstrate recreation layout, design, and administrative alternatives on such sites. A distinction in title was needed to reflect the difference in function: the sites will be used primarily as places for the gathering of reliable

* EWQOS is the WES Environmental and Water Quality Operational Studies program.

data series to support planning and design elements. The title, Recreation Use Monitoring Station (RUMS), was chosen for these projects.

Division/District
coordinating meetings

90. The failure of the mean project sample to meet all criteria has been discussed. Identifying average projects, however, had a further utility. The strata represented by geographic location, class, size, and attendance provided very small ranges within which projects could be considered for inclusion in the RRDS--a tight framework within which the relative merits of every project for research and demonstration purposes could be discussed.

91. The Division RRP contacts were provided the lists as displayed in Appendix E; they already had access to the locations of complementary research activities and other Federal Agency suggestions. The RRP staff requested the Division RRP contacts to arrange a forum to discuss the mechanics of selecting average projects in each class and the implications of an RRDS consisting solely of Division means. Invitations to, and arrangements for, meetings with the WES personnel were the responsibility of the Division RRP contacts.

92. Division and District personnel did contribute their experience to the selection process. Their reaction to the projects that would be chosen solely on the basis of mean values was: what is average may not be typical, and there are some things about all projects which statistics alone will not reveal.

93. Some of the significant changes made to strengthen the representativeness of RRMS-listed RRDU's were:

- a. Eliminating the Laurentian Shield and modified natural lake as a selection stratum. North Central Division and St. Paul District personnel were unanimous in their feeling that Corps involvement in modified natural lakes is minimal relative to other regions and classes. It was further agreed that the Upper Mississippi River pools (MRP) so dominate the project structure of the St. Paul and Rock Island Districts that selection should focus on the waterway class. The MRP 10 was substituted for Lac Qui Parle.

- b. Substituting Milford Lake for Pomona Lake. The substitution was suggested by the Kansas City District staff. While Pomona Lake most nearly matches the means for the MRD, its location in the central uplands makes it atypical of Kansas City's conventional reservoirs, most of which are in the southern Great Plains region.
- c. Choosing Detroit Lake rather than Fern Ridge Lake in the Portland District. Descriptor values for Fern Ridge Lake are closest to the NPD mean for the conventional reservoir class. The RRMS numbers do not reveal that the major share of the District's conventional reservoirs is located along the eastern side of the Cascade Mountains and is so situated that most of the reservoir shorelines are Federal lands administered by the FS. District and Division representatives reported that total attendance shown in RRMS for these reservoirs does not, under formal arrangement with the FS, include the attendance that occurs within the National Forest boundary. Further, District representatives stated that the Cascade lakes are the only ones in the Corps system that support coldwater fisheries. The substitution of Detroit Lake for Fern Ridge Lake achieved the selection of a more typical RRDU within the same class and strengthened representation in the stratum covering intergovernmental relations.
- d. Finding a way to stay within the one RRDU per District criterion and gain better geographic coverage in NPD. Two projects in the Portland District had descriptor values most closely matching NPD means for conventional reservoir and for lock and multiple-purpose reservoir classes. Retention of one of them, Lake Bonneville, would cause doubling in the District and in the Cascade Mountain region--a condition that did not exist prior to the Portland staff's strong support for Detroit Lake--and no selection in the Columbia Plateau region. Examination of options within the lock and multiple-purpose reservoir class limited choice to the Walla Walla District since there are no projects of this class in the Seattle District. Walla Walla personnel advanced the McNary project (Lake Wallula)--in the Columbia Plateau region--as their choice.
- e. Reconsidering the merit of including a dry reservoir project in the ORD. Division personnel argued strongly that dry reservoir class projects were not as significant in the overall management responsibilities of the Districts as are conventional reservoirs. Thus, the Mohawk project in the Huntington District was dropped from consideration. The Nolin River Lake in the Louisville District was chosen to supplement the conventional reservoir most closely matching the Division means--Shenango River Lake in the

Pittsburgh District. The Nolin River Lake project not only added a conventional reservoir to the mix of the potential RRDS, but added a project in the southern Upland Plains region and ensured at least one project with known heavy adjacent subdivision activity.

- f. Replacing the Racine lock and dam project, a waterways class project on the Ohio River, with the Captain Anthony J. Meldahl lock and dam. Personnel of ORD opted for the Captain Anthony J. Meldahl project because of its proximity upstream from Cincinnati and because of the interest in water releases for whitewater boating typified by Meldahl.
- g. Substituting the Knightville dry reservoir project for the Birch Hill dry reservoir project in the NED. The Birch Hill project has a significant natural pond within the project area, which is the recreation area outgranted to the Commonwealth of Massachusetts. The Birch Hill project is not typical of dry reservoir projects in the NED; the Knightville project is.
- h. Remediating three deficiencies in the mechanically applied means process to projects in the South Atlantic Division (SAD). Two projects in the Mobile District closely matched the SAD means for both conventional reservoir and lock and multiple-purpose reservoir classes; both are in the Mobile District, and inclusion of both would violate the one RRDU per District criterion. West Point Lake was judged to be a project that met the definition of an average project, but is not typical. It would have taken further analysis to discern that the project is not as old as most large operating projects in the Division and, therefore, has incorporated in its initial master planning many modifications learned from experience, such as fewer but larger recreation sites. There are other more typical conventional reservoirs in the Mobile District, but SAD personnel felt strongly that West Point Lake should become a SAD nomination because of its special demonstration status conferred by the Chief of Engineers. Even though the analysis of Division work loads showed the SAD merited a choice in either the lock and multiple reservoir or the waterway classes, the need for confining the Division choices to these categories was not as compelling as in other Divisions. At the suggestion of Savannah District and SAD personnel, the Lake Hartwell conventional reservoir was substituted for the Millers Ferry lock and multiple-purpose reservoir as being typical of Division conditions.
- i. Adding a project under construction. The SAD has the most active present and proposed project construction

program of the continental Divisions. Thus, SAD personnel urged that requirements of the age of project stratum could be best met by a nomination of the B. Everett Jordan conventional reservoir in the Wilmington District (formerly the New Hope project).

- j. Updating the RRMS data. Descriptors for the Lavon project in the Fort Worth District reported in the 1976 RRMS did not include a major increase in the height of the dam and the attendant raising of water levels, enlargement of the recreation pool, and diminution of the fee land above summer pool. Fort Worth District personnel preferred inclusion of Lake Somerville while the WES staff argued for a project in the urbanized southern Great Plains region. A compromise favorable to both parties was to include both Lake Somerville and Lake Benbrook with the District's full concurrence to violate the one-per-District rule. The compromise also made the weighting of conventional reservoir RRDU's in the SWD closer to the proportion of total Corps RRMS-listed projects that is comprised by conventional reservoirs in the SWD.
- k. Exchanging Greers Ferry and Robert S. Kerr Lakes for Hugo and Dardanelle Lakes. Hugo Lake is a relatively new project on the south edge of the Ozark Plateau-Ouachita Mountains and has the majority of all operations and maintenance assigned to a contractor rather than to Corps personnel. Again, while the descriptors for the Hugo Lake are close to the Division means, the project is not typical of conventional reservoir projects in the Little Rock and Tulsa Districts. Greers Ferry Lake was judged more typical of conventional reservoirs in the Ozark Plateau-Ouachita Mountains region. Since Greers Ferry Lake is a Little Rock District project, Tulsa District personnel agreed to support nomination of the Robert S. Kerr lock and multiple-purpose reservoir.

94. Negotiations for non-RRMS projects occurred at the same time but were less well organized. No RUMS's were suggested for the NED because there would be two RRDU nominations from the Division and it was feared too many units would deter Division participation (the NED has since proposed adding one or more RUMS's to the RRDS and the possibility of a nomination from the Division Engineer is being discussed); proposals for RUMS's in the mid-Atlantic states were dropped when District personnel in the NAD evidenced little interest in participating (there is still no project in the northern Atlantic Coastal Plain region); District personnel in the SAD were quick to support recreation use

monitoring in the Atlantic Intracoastal Waterway (AIWW) and suggested more appropriate locations; Galveston personnel were satisfied with the concept of recreation use monitoring associated with the jetties protecting the entrance to Port Aransas; the Jacksonville, Los Angeles, and Seattle Districts recommended specific jetty projects at Fernandina, Florida; Newport Beach, California; and Grays Harbor, Washington, respectively; and the Chicago, Detroit, and Buffalo District staffs selected heavily used recreation boating facilities on the Great Lakes. All the potential RUMS sites were chosen by District personnel as presenting maximum opportunities to explore and quantify existing recreation phenomena thus filling a clearly identified data need for improving Corps recreation planning. The changes made while complying with the procedural criterion of Division/District consultation are shown in Table 8. Of the 23 RRMS projects nominated, 12 were among the 73 circulated to the Division RRP contacts as closest to the Division means by class.*

Characteristics of the Initial RRDS

95. The 24 RRDU's selected on the basis of the criteria comprise 6 percent of the projects for which the Corps exercised substantive management responsibility in 1976; the 9 RUMS's represent an unknown proportion of Corps designed, built, and maintained projects providing substantial outdoor recreation opportunities for which the Corps is not charged with substantive management responsibility.

96. The RRDS consists of 409,379 acres of water surface during the summer recreation season; 298,356 acres of land above the summer pool held in fee simple by the United States; and 5,479 miles of shoreline. The system accommodated 42.5 million recreation days of use in 1976: 22.7 million recreation days of use occurred on the 267 recreation areas managed directly by Corps personnel; 12.9 million recreation

* The B. Everett Jordan project was under construction in 1976. Therefore, there was no Corps operating responsibility and the project was not listed in RRMS.

Table 8
Comparison of Mechanical Selections and Final Recreation
Research and Demonstration System

	<u>Mechanical Selections</u>		<u>Final Selections</u>	
	<u>Project</u>	<u>Corps Element</u>	<u>Project</u>	<u>Corps Element</u>
LMVD* RRMS	DeGray Shelbyville	Vicksburg St. Louis	Ouachita Shelbyville	Vicksburg St. Louis
Non-RRMS	None			
MRD RRMS	Pomona Oahe	Kansas City Omaha	Milford Oahe	Kansas City Omaha
Non-RRMS	None			
NED RRMS	North Hartland Birch Hill	New England New England	Surry Mountain Knightville	New England New England
Non-RRMS	None			
NAD RRMS	Whitney Point	Baltimore	Whitney Point	Baltimore
Non-RRMS	Shark River Wildwood	New York Philadelphia	None None	
NCD RRMS	Lac Qui Parle MRP 17 Pokegama	St. Paul Rock Island St. Paul	MRP 10 MRP 17 None	St. Paul Rock Island
Non-RRMS	Sturgeon Bay Grand Haven	Chicago Detroit	Wilson Harbor Michigan City Au Sable Harbor Bolles Harbor	Buffalo Chicago Detroit Detroit
NPD RRMS	Fern Ridge Bonneville	Portland Portland	Detroit McNary	Portland Walla Walla
Non-RRMS	None		Grays Harbor	Seattle
ORD RRMS	Shenango Barkley Racine Mohawk	Pittsburgh Nashville Huntington Huntington	Shenango Barkley Meldahl Nolin	Pittsburgh Nashville Huntington Louisville
Non-RRMS	None			
SAD RRMS	West Point Millers Ferry	Mobile Mobile	West Point Hartwell B. Everett Jordan	Mobile Savannah Wilmington

(Continued)

* LMVD = Lower Mississippi Valley Division.

Table 8 (Concluded)

	Mechanical Selections		Final Selections	
	Project	Corps Element	Project	Corps Element
Non-RRMS	Oregon Inlet	Wilmington	Fernandina	Jacksonville
	AIWW Canaveral	Jacksonville	AIWW	Charleston
			Murrels Stuart	Jacksonville
			W. P. Franklin	Jacksonville
			Morehead City	Wilmington
SPD RRMS	New Hogan	Sacramento	New Hogan	Sacramento
	Sepulveda	Los Angeles	Sepulveda	Los Angeles
Non-RRMS	Crescent City	San Francisco	Newport Bay	Los Angeles
SWD RRMS	Lavon	Fort Worth	Benbrook	Fort Worth
	Hugo	Tulsa	Greers Ferry	Little Rock
	Dardanelle	Little Rock	Robert S. Kerr	Tulsa
			Somerville	Fort Worth
Non-RRMS	Aransas	Galveston	Channel to Port Aransas	Galveston

days of use occurred upon the 93 recreation areas managed by other public agencies and concessionaires. The key descriptor values and totals for the system are shown in Table 9.

97. The 6 percent sample accurately reflects the characteristics of the Corps' national system of recreation resources. For example, of the total projects listed in the 1976 RRMS, 59.4 percent are conventional reservoirs--58.3 percent of the 24 RRDU's are conventional reservoirs; 28.6 percent of all RRMS projects are locks and dams--25.0 percent of the RRDU's are locks and dams; and, in the case of single Missouri River Main Stem class project, only a portion of Lake Oahe was nominated, thus bringing the percentage below 4.2, which represents a single project. The sample also follows national distribution by physioeconomic region and the distribution of total attendance and attendance at Corps managed recreation areas by Corps Division. These comparisons are presented in Tables 10 and 11.

98. The selection process was weighted toward, and resulted in, a sample that reasonably reflects the general operating characteristics of each Division. For example, the overwhelming majority of recreation areas are, as a matter of policy, outgranted to non-Corps entities for management in the NAD and the NPD; all recreation area management at the RRDU in the NAD, Whitney Point Lake, is outgranted to the Broome County, New York, Park and Recreation Department; and the majority of recreation areas at the NPD's Detroit Lake RRDU is administered by the FS.

99. There is some skewing in the proportions shown in the strata representing land above summer pool, gross project attendance, and attendance at Corps managed recreation areas. It would probably not be possible to bring these proportions into agreement with national distribution by enlarging the sample size.

100. Three other criteria were specified for inspection: land use adjacent to the projects, age of the projects, and authorized purposes. The RRMS data do not permit an accurate tabulation of national distribution for these criteria.

101. Subsequent examination of the most recent master plans reveals:

Table 9
Summary of Recreation Research and Demonstration System as Nominated

Project	RRDU				RRDU Attendance				Recreation Areas				Monthly Attendance				Recreation Season Fluctuation
	Normal Pool	Fee Land	Gross Protect	Size Shoreline miles	Gross Areas	At Corps Recreation Areas	At Other Recreation Areas	% Dispersed	Total	Adminis- tration	Corps Adminis- tration	Other Adminis- tration	Maximum	Minimum	Mean		
Shelbyville*	29,406	11,100	40,506	172	2,997,238	1,587,982	965,932	11.0	19	12	7	Jul	526,193	Jan	41,466	249,770	27
Ouchita	40,060	42,313	82,373	690	2,521,581	1,953,136	214,649	14.0	19	18	1	Jul	485,993	Oct	86,614	210,132	43
Cabe*,**																	
Milford	16,189	33,030	42,219	163	1,704,122	855,174	718,401	7.7	10	7	3	Jul	329,890	Jan	20,283	140,010	13
Surry Mountain	260	1,446	1,706	4	193,483	193,483	0	0	2	2	0	Jun	60,141	Jan	1,120	16,124	0
Knightsville	NA	26,880	26,880	NA	42,240	42,240	0	0	2	2	0	Jul	5,422	Jan	620	3,520	0
Whitney Point*	1,200	3,378	4,645	11	200,595	0	200,595	0	3	0	3	Jul	44,221	Mar	2,976	16,716	7
MRP #1*	8,312	7,951	16,324	178	653,429	83,870	369,060	30.7	6	2	4	Jun	117,617	JF	6,350	54,452	4
MRP #10*	11,905	620	13,869	61	371,400	111,104	97,100	43.9	6	2	4	Jul	9,500	D-F	1,100	30,950	1
Detroit	3,460	978	7,282	36	10,839	4,839	6,000	0	2	1	1	Jul	1,886	Dec	115	953	113
McHenry*	35,922	12,290	53,912	242	4,301,435	900,162	2,945,280	10.6	15	7	8	Jul	879,989	Jan	129,813	358,453	5
A. J. Meldahl	21,700	0	28,233	506	712,500	238,600	402,300	10.0	12	6	6	Jul	111,700	Dec	12,400	59,375	0
Hollin	5,795	7,619	18,045	172	1,726,894	650,700	0	62.3	8	8	0	Jul	368,501	Jan	16,280	14,908	25
Barkley*	57,920	29,184	108,600	1004	4,982,600	1,962,100	1,684,200	26.8	44	38	6	Jun	800,900	Jan	132,500	415,017	13
Shenango*	3,550	10,994	15,071	44	1,249,400	905,600	255,800	7.0	6	3	3	Jul	354,200	Jan	1,300	104,117	11
West Point*	25,900	30,467	58,068	539	1,069,274	946,707	122,567	0	44	39	5	Jul	192,489	Feb	21,385	89,106	15
Hartwell	55,950	20,933	80,159	962	7,274,000	5,730,669	1,134,333	5.5	95	85	10	Jul	1,280,300	Dec	230,700	606,167	35
B. E. Jordan																	
Sepulveda*	NA	2,097	2,097	0	1,457,500	0	1,457,500	0	1	0	1	MAJ	174,000	Dec	66,000	121,458	0
New Hogan*	3,120	2,239	6,153	44	194,220	194,179	0	<0.1	4	4	0	May	30,600	Dec	2,020	16,185	90
Benbrook	3,770	4,531	11,295	40	1,948,204	712,488	1,224,057	0.6	6	3	3	Jun	301,615	Dec	46,459	162,350	72
Somersville	11,450	18,636	32,725	85	3,564,879	1,901,054	624,007	29.2	7	5	2	Jun	666,382	Dec	59,761	297,373	38
Jefferis Ferry	31,500	9,415	45,548	276	4,224,100	2,910,781	345,093	22.9	37	14	23	Jul	871,400	Dec	43,200	102,008	26
Robert S. Kerr*	42,000	21,455	65,706	250	1,054,900	764,973	171,410	11.2	12	9	3	Jul	194,900	Feb	37,100	71,967	1
	409,379	298,356	761,416	5479	42,454,833	22,657,841	12,938,284	16.2	360	267	93						

* Projects included in materials circulated to Division RRP contacts (Appendix E).
** Projects tested against the selection criteria strata as "average" class projects in the Division.

Table 10
Comparison of RRDS with Total Corps Recreation and
Related Natural Resource Responsibility

<u>Criteria/Strata</u>	<u>Percent of RRMS</u>	<u>Percent of RRDS</u>	<u>No. of Non-RRMS</u>
Project class			
Conventional reservoirs	59.4	58.3	
Lock & multiple-purpose dams	4.7	12.5	
Waterways	23.9	12.5	
Dry dams	7.0	8.3	
Missouri River Main Stem	1.5	4.2	
New/unclassified	1.5	4.2	
TOTAL	98.0*	100.0	9
Physioeconomic regions			
New England	7.5	8.3	
Northern Atlantic Coastal Plains	0	0	0
Northern Piedmont Plateau	0.5	0	
Northern Appalachian	17.4	8.3	
Southern Atlantic Coastal Plains	0	0	2
Southern Piedmont Plateau	2.5	12.5	
Northern Uplands	19.2	16.6	4
Northern Great Plains	4.5	8.3	
Southern Uplands	5.5	8.3	
Southern Great Plains	8.5	4.2	
Interior Highlands	7.7	12.5	
Gulf Coastal Plains	3.5	4.2	1
Columbia Plateau	1.9	4.2	
Cascade Mountains	3.7	4.2	
Sierra Nevada Mountains	3.5	4.2	
Northern Coastal Range	0.7	0	1
Middle Coastal Range	0	0	
Southern Coastal Range	2.5	4.2	1
TOTAL	89.1**	100.0	9
Project conditions			
Year construction began			
Prior to 1941	31.9	20.8	
1941 to 1952	30.7	12.5	
1953 to 1962	30.4	29.2	
1963 to 1972	7.0	33.3	
1973 to 1978		4.2	
TOTAL	100.0	100.0	

(Continued)

* Will not total 100 because some projects, e.g. modified natural lakes, are omitted.

** A total of 359 projects are included; this represents 89.3 percent of the projects.

Table 10 (Concluded)

<u>Criteria/Strata</u>	<u>Percent of RRMS</u>	<u>Percent of RRDS</u>	<u>No. of Non-RRMS</u>
Fee land above normal pool			
>35,000 acres	5	14	
20,001 to 35,000 acres	8	14	
10,001 to 20,000 acres	12	23	
3,000 to 10,000 acres	22	14	
<3,000 acres	53	36	
TOTAL	100	101†	
Gross project attendance per year			
>6,000,000	1	4.3	
3,000,001 to 6,000,000	7	17.4	
1,000,001 to 3,000,000	21	43.5	
100,001 to 1,000,000	47	21.7	
<100,000	23	13.0	
TOTAL	99†	99.9†	
Intergovernmental relations			
Percent of projects with recreation areas in			
Other Federal Agency	3.5	16.7	
State government	41.0	50.0	
Local government	34.3	3.6	
Concessionaire	4.5	20.8	
Other	9.2	8.3	
Percent attendance at Corps areas			
76-100	17.2	43.5	
51-75	17.2	21.7	
26-50	17.2	13.0	
0-25	48.2	21.7	
Corps Concessions	22.9	39.1	
Corps Fee Areas	33.3	47.8	

† May not total 100 due to rounding.

Table 11
Comparison of Gross National Corps Attendance and Attendance at RROS by Project Class and Division

Division	Conventional Reservoirs										Locks and Multiple-Purpose Dams										Waterways										Dry Dams										Missouri River Main Stem										Modified Natural Lakes										Totals																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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* Source: Headquarters, Department of the Army (1976).
 ** Does not total 100.0 due to rounding.
 † 6,955,000 recreation days occurred at "unclassified" projects.
 ‡ Based on 391,409,139 recreation days.

- a. Land uses occurring adjacent to the RRDU's by stratum are: urban-suburban, 4; agricultural-forestry, 16; second home, 3; resort, 2; community, 2; and public land, 3.*
- b. All of the multiple purposes for which projects are authorized by the Congress are represented by at least one of the RRDU's.

102. In the realm of complementary activities, the RRDU's have the following attributes: one is the site of reservoir water quality data collection and monitoring under the EWQOS program; two are sites of experimentation in shoreline vegetation under the same program; five were used for the collection of attendance data published in Brown et al. (1974); four were the subjects of case studies in the "Study of Land Use for Recreation and Fish and Wildlife Enhancement" (CZRC 1975); one was used as part of a national sample for the collection and analysis of data on law enforcement (PRC 1974); and at least nine are in close proximity to universities with active park and recreation research and teaching programs.

103. The nine RUMS's contribute to satisfying the strata for two criteria: project class and geographic distribution. They represent major Corps recreation-related activities not recorded as part of RRMS and, while only two additional physioeconomic region strata are filled solely by RUMS's, their location in the coastal zone materially expands the geographic diversity of the RRDS. Initial research applied to the RUMS's may show the appropriate total number of such projects by class so that a better structured sample of such Corps-provided opportunities may be chosen.

104. As the RRDS is now constituted, only one District has responsibility for more than one RRDU--Fort Worth, one District has responsibility for one RRDU and one RUMS--Los Angeles, one District has one RRDU and a portion of a RUMS--Wilmington, and two Districts have responsibility for two RUMS's--Detroit and Jacksonville; all other Districts have responsibility for no more than one RRDU or RUMS.

* Totals more than 24 because several projects exhibit more than one type of adjacent land use.

105. The size of the system appears to be large enough to be useful, but not so large as to pose a burden for participating Districts. The RRDS appears to be an administratively feasible entity.

PART III: CONCEPTUAL FRAMEWORK OF THE RECREATION RESEARCH
AND DEMONSTRATION INFORMATION PROGRAM

106. Central to the utility of the RRDS is a program for the systematic collection, storage, manipulation, retrieval, and display of data.

Format for Information System Design

107. Information programs are most commonly found in highly structured organizations where decisionmakers must and do act upon whatever information is available to them. The design of systems to serve such needs normally begins with identifying (a) the decisionmakers arrayed in some hierarchical fashion and (b) the types and timeliness of information needed for the decisions taken. As important as the pivotal positions in the organization is the flow of information used in decisionmaking: who originates it, how often, in what format, and to what standards of accuracy.

108. Quite naturally, persons at different levels in the organization have different information needs and, in turn, generate information used by others--perhaps for policymaking. Analysts frequently discover that some people receive involved, specifically prepared reports when, in fact, their needs could be well met by aggregating the reports used by their subordinates. In such cases, standard formatting saves time and money and encourages improvement of the quality of information utilized at all levels.

109. Because moving and displaying large quantities of information in a timely fashion are such frequent problems, computer-assisted automation has become nearly synonymous with information systems; however, information programs and systems need not be automated nor use a computer to store and manipulate all relevant data. Standardizing formats and networking can be performed manually and still achieve efficiency as an information program; manual indexing and cataloging sources of relevant information, some of which is stored in a computer-operated system, also constitutes an information program.

RRDIP Characteristics

110. There are three characteristics that separate RRDIP from other information programs. First, the primary objective of the RRDIP is the support of research and demonstration. Second, the fields of research and demonstration, while simply categorized as recreation and related natural resources, are heterogeneous. Third, as a program, it is not intended that all available information be contained within a single, centralized "black box."

Support of research and demonstration

111. The principal clients for the information formatted and made available through RRDIP are to be researchers. Thus, the steps normally taken to design an information program are not applicable: it is simply not possible to identify in some hierarchical construction the universe of researchers who may query RRDIP, let alone deal with formats, specificity, and periodicity of data to be accessed.

112. This does not mean the program is oblivious of policy, planning, and administration needs. First, the data that are accessed through RRDIP can be made available directly to functional elements at District and Project levels as aids in administering the RRDU's. Second, many of the research work units will use RRDIP information to find better ways to plan and administer Corps recreation and related natural resources. Third, the operation of RRDIP is itself part of the already identified high priority research in data management. Fourth, the trend information to be compiled from periodic monitoring of key factors will be of substantial value to Corps policymakers at all levels.

113. It does mean that RRDIP is not to be designed by a questionnaire to a cross section of Corps recreation planners, resource managers, facility designers, real estate specialists, and so on. This step had already been taken under the RRP (Mischon and Wyatt 1978). The designers must be conscious of the topics that are already identified and scheduled as research work units and the data needed to drive models of recreation behavior. Most important, RRDIP must have not only the capability to

handle the voluminous historic data for each RRDU, but also the new data that are to be accumulated by the research community, either as part of RRP work units or as independent projects.

114. It is not the data accessed through RRDIP that will be of the greatest value to Corps recreation and related natural resources personnel; it will be the products of the research supported by RRDIP that will be of most value to the field.

Heterogeneous fields of coverage

115. The research topics that RRP is mandated to pursue, as directed by the field, span a host of diverse aspects of recreation and related natural resources. Some of the fields identified by OCE and IWR and included in IWR's report (U. S. Army Engineer Institute for Water Resources 1976) involve:

- a. Management of recreation and renewable natural resources, including fish and wildlife biology, forestry, parking, beaches, trails, and visitor centers.
- b. Recreation economics.
- c. Sociology of recreation and human experiences in using renewable natural resources.
- d. Planning and designing recreation areas and facilities.
- e. Equity of recreation programs and services.
- f. Managing data.*

116. Some of these fields are best served by graphic display of spatial relationships; other fields are best served by tabular data sets; and some fields--as well as synoptic analysis of recreation phenomena--require the interaction of quantitative and spatial data.

An information program

117. An important component of all research in the economic and social aspects of recreation is census data. Particular configurations of these data will be the keystones for a number of priority research work units. The RRDIP will be able to access the required data from the census through ready access to systems maintained by other Corps entities.

* Designing and operating RRDIP is inherently an essential part of researching and demonstrating improved data management.

The RRDIP will also be able to access the nature, quality, and location of relevant RRDU data maintained in District files rather than replicate the data in a WES computer file. Certainly the RRP will maintain some necessary items for direct access, e.g., recreation area development plans, but RRDIP will consider at the outset a map file as sufficient rather than committing the site plan map data to a digital computer program.

RRDIP Design Considerations

118. Since RRDIP, as a part of the RRDS, will be designed to serve recreation and related natural resource research in general and the RRP in particular, all the objectives set for the system prevail. To fully serve RRDS in meeting its objectives, RRDIP should have at least seven capabilities.

- a. Contain and present basic information available to date about each RRDU and RUMS gleaned from District files and other archives.
- b. Receive and store in compatible form additional data obtained through the conduct of research work in five of the above-listed six substantive fields. Sources of these data may be RRP research work units, RRP work tasks specifically performed to gather certain data sets, and research products or operational records from other Corps entities, other public agencies, and universities.
- c. Record and display in ways useful to researchers sources of relevant data not stored within the data element of RRDIP.
- d. Link selected secondary sources of primary data, such as those accessed through the System of Information Retrieval and Analysis for Planners (SIRAP),* to the data element of RRDIP for easy manipulation and analysis.
- e. Array available data in formats that will facilitate the operation of attendance estimating and predicting models, value and cash flow models, physical and biological impact models, and other models whose use has already been

* A computer storage and retrieval system that makes current census data immediately available to Corps planners in a variety of geographic configurations in addition to census enumeration tracts and political subdivisions; for example, ZIP code areas and river basins.

noted as very probable during the conduct of the presently listed RRP research work unit.

- f. Accept regularly generated measurements of key factors of the recreation and related natural resources environment and to report these data in a timely fashion as trend information.
- g. Respond to the requests of researchers from all disciplines for data displayed graphically and/or tabularly.

Conceptual Design of RRDIP

119. No project can be built without the accumulation of a huge volume of statistical and descriptive information. Depending on the age of the project, some of these data are stored in archives; some will be found in libraries and active files; and some will be found only in the memories of persons who were involved in planning, constructing, and operating the project.

120. At the same time RRDIP is being organized, at least three major RRP research work units will be active. Therefore, the first need was structuring of pigeonholes into which similar data from diverse sources could be organized. The structure chosen accounts for substantive dimensions and spatial arrangements.

Substantive divisions

121. Data describing the recreation and related natural resource setting of an RRDU encompass a major portion of the parameters of the human environment. Recreationists behave according to their perceptions of environmental quality at the point of consumption and at their home; their social and economic condition; the mores of regional culture; and all the other influences discussed in the definition of physioeconomic regions. In addition, a complex array of biologic factors enters the management of project lands and waters for fish and wildlife which are important parts of recreation experience, particularly when the habitats are most often the product of severe modification and where the forces of succession are dynamic. Recreation data also include the design and quantity of facilities--roads, campsites, and marinas--constructed to

facilitate enjoyment of the resources and user reaction to those facilities.

122. For ease in classifying data and discussing interrelationships and utility of data to model building, the human environment was divided into five components.

- a. Natural environment. This component is involved with data describing terrestrial and aquatic biology, the physical characteristics of the water and air, soils and subsurface water, and related factors that are partially preconstruction and partially postconstruction.
- b. Man-made environment. Data describing the man-made facilities located on or within the natural environment would be lodged in this component. Examples are roads, sewage treatment plants, interpretive buildings, lodges, and trails.
- c. Economic environment. Into this component would be classified those data that reflect values expressed in the marketplace or through proxies for market conditions and tabulations of economic activity. Concession profit and loss statements, recreation spending, wages paid by the industrial sector, sales taxes collected, composition of local recreation economic sectors, and costs of public services would be items included in this segment.
- d. Social environment. Data relating to the condition of society would be classified for inclusion in this component. Examples of such data include age composition of a population, educational achievement, family size characteristics, behavior of visitors, and satisfaction of visitors.
- e. Institutional environment. Data classified for inclusion in this component deal with relations between the RRDU and other government entities that are affected, formally or informally, by Corps actions and, conversely, whose action affects the RRDU. Examples include fire protection, law enforcement, sewage and solid waste systems, and hunting and fishing control.

Spatial arrangements

123. Each substantive dimension can be confined to a limited analytic area or range over multistate regions or the entire Nation. Some geographic confines for each dimension are needed to further ease classification and, more importantly, to permit the ordering of data to deal with different scales of analysis. Clearly, much more work at a

very small scale will be done in recreation areas that are parts of the RRDU's; work relating RRDU recreation areas to developed recreation facilities in a large region will probably be done at a larger scale.

124. Four geographic areas were chosen to further segment the substantive divisions. The four geographic areas are:

- a. Within project boundaries. The title is self-explanatory: concern is with those lands that have been acquired in fee simple or upon which certain easements have been acquired by the Federal Government. The area can be easily divided further by applying the seven zones into which projects are divided plus the permanent water body.* Again, the matter of scale is important in making such distinctions: research in the recreation area-intensive zones is likely to require a map scale of 1 in. = 200 ft or larger, while research in the forest reserve zone may be efficiently supported by map detail at a scale of 1 in. = 2000 ft.
- b. Physical impact area. As implied by the title, the area is the one in which each action will or can result in some direct physical impact upon the RRDU. Local hydrology is an effective way to delineate such an area: land plowed, streets paved, septic tanks operating, trees cut, and volume of people residing within an area that drains directly to the RRDU will impact upon RRDU water quality and aesthetics.**
- c. Economic impact area. The area is defined by the boundaries of those counties that are immediately adjacent to the RRDU. County units were chosen because existing economic data are organized by county and because use of political boundaries eases classification of data in the institutional environment.
- d. Recreation market area. The aerial extent of the recreation market area (RMA) will be based upon the need to monitor changes in areas contributing the bulk of recreation attendance to an RRDU. In some RRDU's, the situation is expected to be relatively simple: the majority of attendance originates from within the economic impact

* The zones are: recreation area-intensive, recreation area-extensive, natural area-geological/biological, natural area-historical/archeological, wildlife, forest reserve, and project operations.

** The areas should not be confused with the watershed above the RRDU. Land-use changes and resource use may change the character of the water flowing into the lake. The implications for corrective actions are much different in the two cases.

area. In others, however, conditions will be more complicated: a large share of attendance may come from one or two cities well beyond the economic impact area or nearly all attendance may come from a small section of a rural economic impact area.

125. When arranged with the substantive division on the vertical axis and the geographic areas on the horizontal axis, there are 20 primary cells (pigeonholes) created as the basic conceptual classification scheme for RRDIP (Figure 2). As should be expected, there are substantial differentials in the quantities and specificity of data series

Substantive Divisions	Geographic Areas			
	Within Project Boundary	Physical Impact	Economic Impact	Recreation Market
Natural Environment	PB1	PI1	E1-1	RM1
Man-made Environment	PB2	PI2	E1-2	RM2
Economic Environment	PB3	PI3	E1-3	RM3
Social Environment	PB4	PI4	E1-4	RM4
Institutional Environment	PB5	PI5	E1-5	RM5

Figure 2. Basic conceptual classification scheme for RRDIP

that will occupy the several cells. For example, given the area within the project boundaries, cells PB1, PB2, and PB4 have large numbers of parameters for which descriptive data will be sought, a condition that reflects the nature of the research work units and the needs of the RRP clientele; in the area of recreation market, only cells RM3 and RM4 have a significant number of parameters for which descriptive data will be sought. The explanation is the pragmatic consideration of which data will be of use in explaining the behavior of recreationists and their impact upon Corps-administered resources and facilities.

Development of a Data Base

126. Four interacting steps covering three time frames will have to be taken to push RRDIP past the operating threshold. The steps are:

- a. Develop RRDU catalogs.
- b. Analyze District/project file information.
- c. Fill in the gaps in the data base.
- d. Operate the juvenile RRDIP.

The steps are shown systematically in Figure 3. The steps must be interactive because the press of events demands that activities occur out-of-phase. As mentioned, one major study of physical and social carrying capacity was begun before RRDIP had a conceptual design; three other multiyear research work units will begin while essential data are collected and categorized for RRDIP.

Time frame

127. Organizing the steps to cover three time periods (historic, current, and future) is helpful in understanding the steps.

128. Historic data. The first time period is historic. As defined earlier, there are data that have been collected at some point in the history of the project that are stored in archives or inactive files at the District level.

129. Current data. An approximate 2-year time period is included for current data. Admittedly, some of the historic data extracted from active District files will be current. What is referred to as current will be data that represent significant statements of conditions to be reported in the PB (project boundary) series of cells but which have not been collected by the Districts. Current data found in active District files stand very good chances of continuation; the current data will be collected by special inventory study groups of the WES.

130. Future data. The future time dimension refers to all new data to be collected as a consequence of research work units, continuation of District data series, and RRP monitoring.

Interacting steps

131. Recreation research and demonstration unit catalogs. The

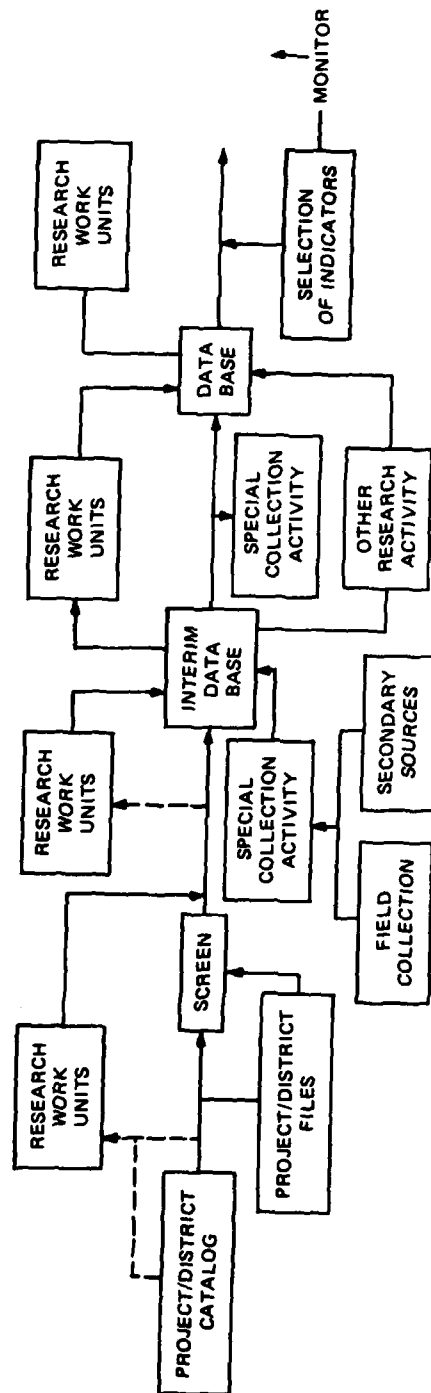


Figure 3. Schematic representation of steps in reaching data base management phase of RRDIP

first two steps focus upon the historic time frame. Step one is developing RRDU catalogs. The RRDU catalogs would contain information drawn from four sources: District publications, such as facility design memoranda (master plans) and Environmental Impact Statements (EIS's) or Environmental Impact Assessments (EIA's); source documents available from other agencies, such as the Agricultural Stabilization and Conservation Service (ASCS) for aerial photography and the U. S. Soil Conservation Service (SCS) for modern soil surveys; RRMS; and a questionnaire directed to the District that seeks to ascertain the quantity and quality of data that are available.

132. Some of the information will be acquired by the RRP and inserted in the RRDIP data element. Some of the materials that would be acquired include: existing aerial photographs, particularly those that provide coverage of designated recreation areas-intensive and recreation areas-extensive; "as-built" maps and layouts of facilities constructed in those zones; and visitor survey work sheets.

133. Other data will be listed with a short annotation, and the researcher will be directed to the location of the raw data. The Office of Water Data Coordination (OWDC) of the U. S. Geological Survey (USGS) uses a comparable approach to the reporting of water data. In fact, the RRDU catalog would extract the station listings for streamflow and stage and water quality shown in OWDC's Catalog of Information on Water Data relevant to the RRDU and refer the reader to the responsible agency for the station data. Another illustration is the continuous record of water elevations in the pool: the data would be listed as available, described, and the reader referred to a specific source in the District.

134. Analysis of District file information. The second step would largely entail an examination of the file sources revealed by the District responses to the questionnaire. The objective of the examination would be to extract those data needed and amenable for insertion in the cells of the conceptual design. The tests of need will be grounded in requirements for data to support new or existing RRP research work units. At the end of the examination, it will be clear which cells have significant gaps in data coverage. The identified gaps may point to

some specific actions that can be taken to gather the needed data or to supplement that which is available in the District files. Some of the actions suggested might be to establish plots or transects, conduct special visitor surveys or to run special tabulations of campground registers, or tap certain secondary sources for raw data. At the conclusion of the two steps, an RRDS catalog would be published and made available to Corps elements at all levels and to researchers.

135. Filling gaps in the data base. The third step would consist almost entirely of fleshing out the data base. The priorities assigned to special data-gathering work would depend upon analyses of the quality and utility of the data base contained in the catalogs. Otherwise, new data that will enter the RRDIP will come from already active research work units.

136. As an example of the first type activity, it is probable that visitor survey data entered into the RRDIP in Step 2 would not exceed the standards set in the "Handbook for Conducting Recreation Surveys and Calculating Attendance at Corps of Engineers Projects" (Mischon and Wyatt 1979).^{*} If analysis provided a sufficiently clear need for more rigorous measurement of attendance at certain sites or during certain seasons to warrant priority funding, the work could be commissioned during Step 3.

137. The largest flow of new data to enter the RRDIP during Step 3 will come from the ongoing RRP research work units. The raw data, which may consist of facility inventories, visitor surveys, market surveys, and District retrieval of historic data, must be made compatible with data already recorded in the various cells. The raw data must also be made a part of the RRDIP internal data element which includes data available to other researchers or RRDU managers.

138. Operating the program. The final step (Step 4) will be more or less routine data base management. Most of the actions will be taken in response to the RRDIP macrodesign. Some aspects of data base management become relatively more important. Priorities assigned in the

^{*} cf. EC 1130-2-175.

macrodesign can be adjusted in response to changes in research work units. When an element is scheduled to become operational or to be altered in mode, the element should be the subject of a microdesign. For example, when storage of the map detail contained in the RRDIP data element is to shift from manual to computer, the map and graphic element of RRDIP should be carefully designed and tested before the conversion begins. The design should deal with the problems of irregular scales, types of equipment best suited to the job to be done, programs for entry of drawings, analytic overlays of various maps, and manuals to facilitate user access and implement the interactions specified in the macrodesign.

139. The operating mode will be a continual building period for RRDIP. The program can grow incrementally as new substantive areas of research become active; modes for storage, retrieval, and analysis can change in response to volume and complexity of data in storage; and analytic routines can be updated in response to improved models. There may be many years when the program simply operates without change; in other years, substantial redesign and new construction may take place.

Use of the program

140. Internal to the Corps. Properly executed actions as described in the grossly generalized steps described above will be a major reason for the success of the RRDS. The information available in catalogs and a real time data element compiled from diverse sources, such as historic records, specially commissioned data collection, and active RRP research work units, will be a material reason for achieving the RRDS research effectiveness and efficiency objectives. Figure 4 illustrates relationships that can develop as RRDIP is implemented.

141. If properly designed and managed, a number of data series available for display in RRDIP will be very valuable to Corps policy-makers, planners, and managers without their insertion in and manipulation through a formal research work unit.

142. The information cataloged, stored, and available through RRDIP is to serve (a) researchers who are pursuing or will pursue formal research in recreation and related natural resources and (b) researchers and practitioners who will be able to draw inferences from the available

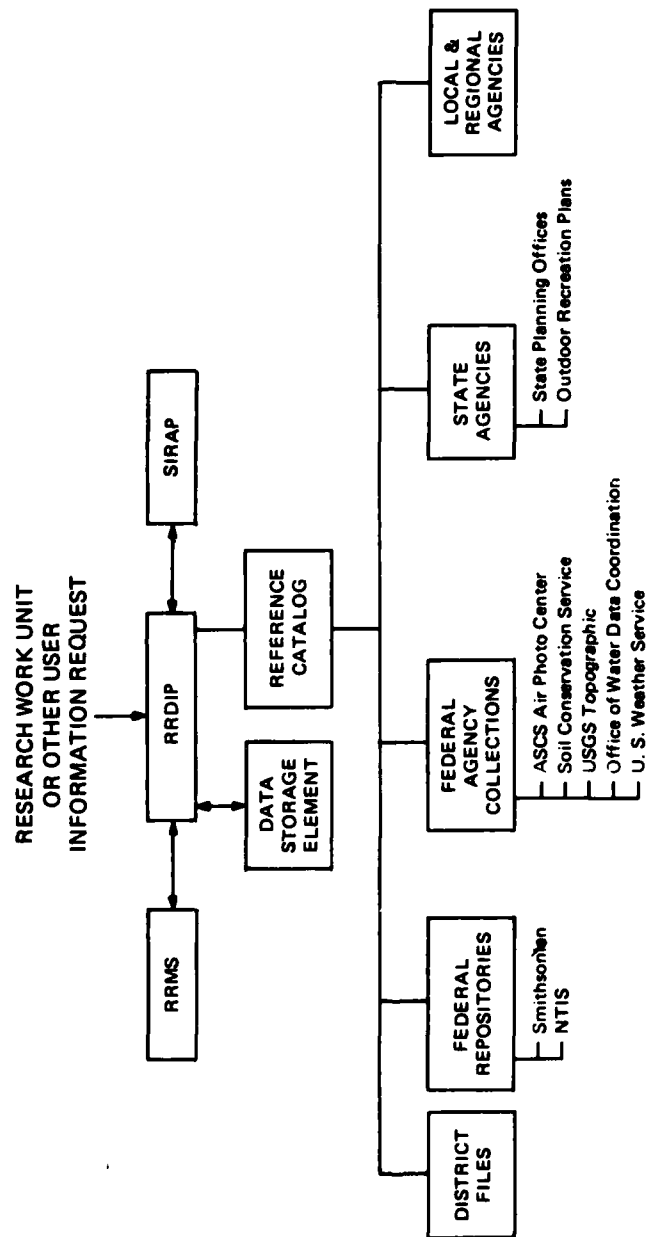


Figure 4. Recreation Research and Demonstration Information Program
method of operation

information--particularly the RRDIP data element. Internal utility will be directly proportional to accessibility provided Corps research institutions (e.g., CERL, IWR, HEC), Divisions and Districts, and RRDU managers.

143. External to the Corps. The RRDIP should be considered as one of the most powerful tools available to encourage use of the RRDS by other agencies, universities, and other research establishments. The utility of the steadily accumulating information base will be as useful to the research tasks undertaken by these entities as for Corps-sponsored research.

PART IV: ADMINISTERING THE SYSTEM

Dual Purposes

144. Altering the Corps' line of administrative responsibility for recreation and related natural resources for the RRDU's was explicitly rejected by the authors of the IWR report and was not considered by RRP staff during the design of the RRDS. The IWR recreation study group believed that conducting research and demonstration tasks in areas that were also used "...as active recreation areas...would enhance the chances for integration of research findings directly into the Corps recreation management program...." (U. S. Army Engineer Institute for Water Resources 1976). A second benefit would accrue to such a policy: public reaction could be a part of each research and demonstration work unit.

145. Thus, all recreation and related natural resources management services for an RRDU/RUMS will continue to be provided in the same manner as before activation of the project as an RRDU/RUMS, and the project's mission will continue to be those functions authorized by the Congress. At the same time, the RRDU's and RUMS's are to be used as outdoor laboratories where emphasis is to be placed on the storage and use of cumulatively gathered recreation and natural resources data and experience.

146. Serving two purposes at the same time opens many possible difficulties. A new administrator ordering a campground modification that obliterates a plot where many years of soil compaction data have been collected is one such difficulty experienced by other researchers.

147. The principal issue to be faced in devising an administrative structure for the RRDS was, and will continue to be, achieving checks and balances between the exercise of legally mandated authorities for operating projects and the authority necessary to establish and protect the integrity of the research and demonstration work performed. Continuous, clear communications between the WES RRP staff and the affected Division and District elements will be necessary to minimize

misunderstanding and confusion. The process was begun during the selection process when, as part of the procedural criteria, advice on administrative matters was sought from Division and District personnel.

Current Administration

Responsibility

148. At the District. Currently, there are wide-ranging differences in the way Corps field operations are conducted; the differences are rooted in the historic development and principal work load of each District (CZRC 1975). These differences are important to the design of an administrative arrangement that accommodates the legitimate concerns of the District and the equally legitimate concerns of the WES.

149. The District is the basic administrative unit of the Civil Works Directorate and, as is the case with any highly decentralized organization, maximum possible autonomy is granted to these basic field units. District Engineers assume nearly complete responsibility for all aspects of project operation within their Districts. The standard tour of duty is limited and the command usually changes every 3 years.

150. The relation of various Corps elements to recreation and related natural resources has been discussed in Part II (see also Appendix C). The elements are always recognizable entities, but they are organized somewhat differently, functionally and geographically, in each District. In some Districts, planning elements may be separate entities while in others they operate as a subelement of the Engineering Division. At the project, the project or lake manager may be the chief natural resource officer reporting directly to the District Recreation Resources Management Branch while at other projects the resource manager reports to a Project Engineer at the project. Some Management and Disposal Branches of the Real Estate Directorate operate with only centralized staff barely able to keep abreast of routine work, let alone the specialized problems of concessionaires and trespassers, while in other Districts the branches maintain field offices at the projects to handle management problems.

151. Relations with outgrantees also vary by District, as noted in Part II. The Corps outgrants up to 100 percent of operating responsibility for recreation and related natural resources to other agencies. The percentage of operating responsibility outgranted may be in the hands of a single agency or in arrangements with a large number of agencies at different levels of government. The RRDS is made up of projects exhibiting the full range of outgrant characteristics. To maintain the viability of the national sample represented by the RRDS, research and demonstration work should take place without discriminating against those projects with major outgrants. Administrative arrangements in these cases must involve the District, the WES, and the outgrantees.

152. It was believed that outgrantee involvement would be a problem only at RRDU's. However, at the Fernandina RUMS and Newport Bay RUMS, a State agency and a municipal government, respectively, are involved in ways that are nearly identical to those found at RRDU's. At other RUMS's, arrangements for research work will have to be made with the operating agencies in much the same way as at an RRDU with a 100 percent outgrant.

153. Each condition mentioned above--and others--compounds the complexity of RRDS administration.

154. At the WES. The WES is a research agency. As with all research establishments, the staff performs in a purely advisory capacity to the action field elements. The most persuasive tool the WES staff has is the quality of the work performed: accurate data, logical analyses, and supportable conclusions are indispensable. To maintain the credibility of research results, the research agency must have the ability to exercise control over the quality of the data that are collected.

Sources of funds

155. Constructing and operating recreation facilities, managing natural resources, and conducting research cost money. In drastically simplified terms, there are three funding channels that bear upon the administrative aspects of the RRDS. Two channels apply to project administration and one channel to research administration.

156. The first is a channel through which flows capital required

to acquire land and develop facilities. There are two situations: (a) acquisition and development performed with money appropriated by the Congress as line item parts of constructing an entire project and (b) the rehabilitation and/or construction of facilities at older, completed projects. Both situations have recently been greatly influenced by the cost-sharing provisions of the Federal Water Project Recreation Act (PL 89-72). Districts can now expect project funds to cover no land acquisition or facility construction beyond the minimum necessary for safe and sanitary public access unless there is an entity willing to share the cost of more extensive recreation development and assume all recreation-related management costs.* Similarly, major reconstruction of facilities at older projects requires a cost-sharing arrangement. There are, as was noted in the discussion of the selection process, instances of congressionally directed exceptions.

157. The second channel provides for the flow of money for day-to-day operation and maintenance of facilities and management of resources. These activities are funded by annual appropriations and collections from recreation fees that are apportioned by the OCE Construction-Operation Division to the field.

158. The third channel is a mechanism for allocating a fixed research and development appropriation to the support of Department of Defense research and development activities including the RRP. The request for and appropriation of funds for research and development is separate from the requests and appropriations that flow through the other two channels.

159. The Districts, acting in accord with the specific legislative authorities pertaining to a particular project, submit proposals for funds that will be budgeted through one of the first two channels depending upon Executive and congressional decisions. These funds are used by the District to offer public recreation opportunities at a given

* Standard land acquisition practice is 300 horizontal feet or 5 vertical feet from maximum pool elevation, whichever is greatest (agreement between the Secretary of the Army and Secretary of the Interior on land acquisition, Code of Federal Regulations (CFR)).

RRDU; funds in the research channel support the conduct of RRP research work units including maintenance of the RRDS.

Conceptual Requirements for RRDS Administration

160. Several administrative requirements emerge directly from examining the way recreation and related natural resources programs are administered within the Corps. Other requirements have come from suggestions made by District, Division, and OCE personnel and persons outside the Corps. The requirements are: permanence, dividing responsibility, continuity of research activities, clear administrative framework, accessibility by non-Corps entities, and meeting the cost of data base management.

161. Two aspects of permanence are involved: that projects selected for the conduct of research and demonstration not be taken lightly, and that a degree of flexibility be provided to add some projects to the RRDS and to delete others. A substantial number of the objectives set out for the RRDS underscore the necessity for permanence. The economics of using a common base data; the advantages of a growing, cumulative data base; the ability to exactly replicate studies at future times; and key factor series established by monitoring all depend on an RRDS that is reasonably stable in composition.

162. As success is experienced with the RRDS, District Engineers in Districts without an RRDU/RUMS could opt, for whatever reasons, to add a project in their District to the system. Conversely, new District Engineers viewing an RRDU as a burden could unilaterally drop the unit from the system. Similarly, pressures at the OCE level might tempt decisionmakers to modify the composition of the RRDS. Unlimited entry and unchecked deletions could seriously injure the representativeness of the RRDS and destroy the continuity and comparability of the data base.

163. Still, new projects do come on line, the pattern of recreation use does change, and new problems do arise that require realignment, expansion, or contraction of the RRDS to maintain representativeness.

164. One solution is a method of formal designation that makes

additions and deletions possible but difficult to accomplish, binds the several directorates with a stake in recreation and related natural resources, and occurs at a level sufficiently high to engender respect.

Division of responsibility

165. The fundamental division of responsibility for the RRDS and for the individual RRDU's and RUMS's must deal with:

- a. Protecting the objectivity of research work.
- b. Impacting upon the District.
- c. Establishing the RRDS as an operating entity with a need for separate administrative capacity to gather, store, manipulate, and display data.
- d. Shouldering the costs of research related tasks.

Continuity of research activities

166. The routine transfer of personnel already mentioned poses a danger that permanent monitoring stations or configurations needed for future replications of experiments will be altered. Forest Service researchers, long active in this field, referred to their own difficulties in maintaining permanent stations--particularly those established to measure the impacts of recreation use on the soil and vegetation of recreation sites.

167. As a minimum, therefore, administration of the RRDS and individual RRDU's and RUM's must place restrictions on precipitate changes in recreation sites, operating procedures, and management practices that are likely to upset long-term experimental work. Unfortunately, the range of threatening activities is very large. Examples that can be cited range from construction and renovation of facilities, mowing or other maintenance work, to changes in the release regimen controlling the pool elevation during the recreation season (Badger 1973).

Other conceptual requirements

168. The administrative framework for the RRDS should contain guidance governing relations with the outgrantees active at the units of the RRDS. Such guidance is necessary to avoid disruption of procedures for planning and administration currently in force and understood by Districts and outgrantee personnel. Also, guidance should minimize

conflict and overlap between the WES and the District.

169. To fully meet objectives set for the RRDS, units of the RRDS are to be:

- a. Available for the conduct by Districts and Divisions of research into problems of local and regional significance.
- b. Useful for research and teaching by universities and other research groups.

170. Issues affecting the substance of recreation and related natural resources information programs were addressed in Part III of this report. Managing data is an administrative issue. Setting physical and fiscal responsibility for collecting those data that are used by OCE field planners and managers and for collecting those data used by researchers must be addressed. This fact is particularly true of the RRMS-RRDIP interface.

Initial Structure of the RRDS

171. Issuance of EC 70-2-24 in June 1978 addressed the majority of the issues required for a conceptually sound administrative framework. Other issues are left for later clarification. Quotations from the EC are used herein where appropriate.

Establishing permanence of designation

172. Permanence is established by both language and by procedure. The language assurance is found in the statement of purpose: "The system (RRDS) will be composed of permanent...Units and...Stations."

173. The procedure for project entry to or exit from the system is the major stabilizing force. Each project deemed worthy of a place in the RRDS may be nominated to OCE by the cognizant Division Engineer. Nominations endorsed by OCE "...will be declared an active Unit (//) Station by the Chief of Engineers and will remain activated as a part of the system until deactivated by the Chief of Engineers." Activation of the units and stations in the present system was accomplished in exactly this way. Recommendations to deactivate an existing unit/station in the

system may be made by any responsible officer, but a recommendation must be initiated and then acted upon by the Chief of Engineers to deactivate a unit or station.

174. The procedure set forth in the EC builds upon the pivotal role in recreation and related natural resource management played by District personnel. For example, assume that planning element personnel in the St. Louis District believe recreation use data collected in the RRDS as now constituted will not adequately serve the recreation planning needs of the District in that reach of the Mississippi River between St. Louis, Missouri, and Cairo, Illinois. District staff may consult with the RRP manager, but would in any case prepare a justification showing the relationship between the work of the District, the needed data, and the location of an RUMS in that reach of the river. The District Engineer would consider the validity of the case and, if he finds it convincing, forward a recommendation for an RUMS at a specific and particularly useful site to the Division Engineer. A recommendation may arrive before the Division in other ways. Either WES, OCE, or the Division staff could forward recommendations to the Division Engineer.

175. The Division Engineer may refer the proposals he receives to appropriate planning and/or operations staffs and, if not already accomplished, the Division RRP contact will alert the WES RRP manager of those recommendations received. In this hypothetical case, the Division Engineer, LMVD, will make his own determination of the merits of the recommendation. The Commander and Director of WES may be asked for an appraisal of the effect of the recommended RUMS on the RRDS and the WES's ability to financially support data collection. Ultimately, the Division Engineer will consider the value of the recommended RUMS on the work of other Districts both within the Division, such as Vicksburg, and immediately adjacent to it, such as Rock Island, Nashville, and Louisville.

176. From his evaluation, the Division Engineer may (a) nominate to OCE the recommended site, (b) nominate another or a combination of sites that conform to the judgments of the involved Districts, or (c) reject the recommendation as addressing a problem germane only to

St. Louis, with the suggestion that the District seek other means to acquire the needed information.

177. Obviously, nominations will be acted upon by OCE according to their own criteria and interest. If approved, then the affected Division and District Engineers will be notified that the nominated RUMS has been activated.

178. The same procedure, offering the same number of opportunities for review and analysis by WES, OCE, Division, and District personnel, applies when any project is considered for deactivation. The key is: once activated, an RRDU or RUMS remains activated until OCE by specific action deactivates that project from the RRDS.

Dividing responsibility
for outdoor laboratories

179. Fundamental "...administrative responsibility for each RRDU (is) vested in the District Engineer...." The District Engineer will continue to operate the project for all the functional purposes authorized by the Congress. The District staff will continue their resource management programs as before activation of the project as an RRDU. The simplest portrayal of the situation is that maintenance personnel, rangers, resource managers, facility designers, dam tenders, lock masters, real estate specialists, and recreation planners are District employees held responsible by the District Engineer to meet his standards of service to the many publics served by a project.

180. However, the "...administrative responsibility for the (RRDS) system as a whole...(is) vested in the Commander/Director of the..." WES and the RRP Technical Monitor. This charge places on the WES the difficult task of maintaining the characteristics of a true system of laboratories in a structure made up of deliberately disparate parts, each operated in a style reflecting the personality of the District in which it is located. Success here will be no small intellectual feat. Important in maintaining the WES administrative position, vis-a-vis the Districts, is the authorization of a continuing flow of system operation money through the research and development channel.

181. The WES and the RRP Technical Monitor, partly as a separate

responsibility and partly to define specific tools useful in administering the system, also have responsibility "...for the conduct of individual research topics and for the integrity of the data collected and maintained in the RRDIP...." Assigning these responsibilities clearly implies willingness and ability to pay for them.

182. The division of responsibility for data collection corresponds with the separation of the research and development funding channel used by WES from the capital and the operation, maintenance, and replacement channels used by the Districts. Certain data are required if planners and operators are to make effective and efficient decisions about people, facilities, and resources.

183. Recognition of specific requirements of research in operating the RRDU. As soon as an RRDU or RUMS is activated, it becomes "...incumbent upon each District Engineer... (within whose District the unit is located) to recognize the specific requirement of both short-term and long-term research in planning and administering the project." This is a general condition that becomes effective the instant a project is activated as a unit or station in the RRDS. Even without further guidance, the District Engineer, as chief administrative officer of the project, is to exercise his judgment in ensuring that research and demonstration requirements are recognized in the activities of each of the District elements in any way involved with the project.

184. Notice of intent to prepare master plans. The Districts must alert the WES "...of master plan and natural resource management plan preparation...." This provision is intended to give lead time to the WES. The lead time will permit the WES to evaluate the utility of the RRDU or RUMS as a suitable site for inclusion in a new research work unit, examine possibilities for new or expanded research work units to take advantage of the proposed planning work, and notify all organizations with current research and management interest in the project of impending plan preparation that may result in proposals for substantial changes in facilities and/or operating conditions. The language should not be construed to indicate imposition of arbitrary WES dictums on the planning process. Rather, the notification procedure permits the full

research community to meet as interested partners with the District planning and management elements. Usually such exchanges will benefit the District by improving or expanding data gathering for the plans, providing more efficient use of available data, and yielding better plans to serve the using public without infringing upon continuing research. Importantly to the RRDS, the notification procedure enables the research portion of the joint administrative vehicle to make known past, present, and contemplated recreation and related natural resources research to the planners.*

185. Division coordination of proposed changes in facilities, roads, and operating practices. A second portion of the same paragraph directs the Division staffs "...to coordinate with WES, prior to approval, all proposals to modify and/or add to existing recreation facilities or access roads or to make significant changes in existing operation practices...." This provision has dual significance. One is rooted in the approval procedures for master plans. The District-prepared document is forwarded to the Division Engineer for review and comment. Division comments suggesting corrections and clarifications are returned for District consideration. Agreement must be reached before the Division Engineer will transmit the District's proposal to the Chief of Engineers. This does not mean the District must adopt all changes suggested by the Division; only that the District respond to the suggestions in ways that are satisfactory to the Division.** Second is the review role of the Division level in District budgeting. District proposals to, say, rehabilitate a major RRDU recreation area, will undergo the scrutiny of Division substantive personnel who can take the

* This feature is particularly valuable in cases where a District planning staff is only occasionally involved with recreation work or the plan is to be prepared by a contractor.

** An example might involve volumes of fish harvested by sports fishermen cited by the District using new census techniques. If Division personnel question the results, they may suggest the District change to a value derived from more standard procedures. Upon a showing by the District that the new methodology is superior the Division will accept the District's value in their endorsement to OCE.

opportunity to notify the WES RRP staff of the proposal. As in the case of master plans, the notification does nothing more than trigger a joint exploration of the proposal for research opportunities. It is altogether possible that the addition of research and/or demonstration purposes to the proposal will enhance its chances of approval. It is also possible for the WES staff to opt for complementary investment to cover certain research aspects of the rehabilitation proposal.

186. Making recreation research and demonstration a mission objective of the project. As part of RRDS implementation, the necessary recognition of making research a project mission is recognized as follows: "The policy of creating and maintaining an RRDS will be recognized as a mission objective for each designated RRDU and RUMS and will become part of the staffing and budget requirements for each Unit and Station..." (and) "The research mission will be recognized and duly incorporated in all future planning for the designated (activated) Units and Stations of the RRDS."

187. The four-part protection of research integrity seems sufficiently inclusive and in sufficient depth to do the job. There is a mandate to the District Engineer to recognize research requirements in all phases of project operation from grass mowing to altering water surface elevations and constructing new roads and facilities; an opportunity for researchers to protect their interests during the planning process; use of a powerful mechanism, one step removed from day-to-day pressures upon the District, to mediate conflicts; and opportunities for Districts to gain maximum advantage from making recreation research and demonstration one of the project's missions.

Guiding relations
with outgrantees

188. From a system of outdoor laboratories point of view, it is very important that resource and attendance relationships among component parts of an RRDU be inclusive and compatible if the entire unit is to be part of the sum of the system. There is great diversity in existing arrangements for managing the component parts. The simplest form for inclusiveness and compatibility is Corps management

of all project lands and facilities built thereon.* At the other end of the continuum, nearly all aspects of recreation and related natural resource management at some RRDU's and most RUMS's have been formally delegated to outgrantees. Gaining enumeration methods and standards comparable with all RRDU's and RUMS's will require considerable tact.

189. Districts are judged to be the most familiar with existing practices and personalities. The cognizant District is directed to "...seek the cooperation of the grantees to assure all phases of the 'Baseline Data' and periodic data collection will conform to the specifications of the RRDIIP." Obviously, the WES RRP staff will be dependent upon District staff for making physical arrangements with, and for gaining the understanding of, the outgrantees.

190. Looking forward to the times when certain research work units will necessitate measuring reactions to facility or operating changes at all RRDU's, further guidance is provided. The language deals specifically with those agencies who have shared with the Corps the cost of recreation facilities, but it is applicable to any situation where a grantee has invested cash or in-kind services developing and administering all or a portion of an RRDU.

In those cases when modifications in operating practices, facilities, or layouts in RRDU are deemed essential for the research mission of the RRDS and cost sharing partners are involved, the cost sharing partners shall be involved as equals in the design and conduct of the research work.

The language would seem to direct that the WES RRP staff, acting through the District Engineer, meet at a very early stage of the research design with officials representing the outgrantee to discuss at least the following points:

* However, even when 100 percent of attendance is served directly by Corps staff, those staffs do not regulate the taking of fish from the water nor the harvest of wildlife from RRDU lands. These are sovereign rights retained by the several States; obtaining comparable measures of fishing and hunting use and success will be dependent upon the cooperation/participation of Federal and/or State fish and wild life agencies.

- a. Purpose and end product of the proposed research.
- b. Degree to which the outgrantees facilities would be involved and the degree to which normal operation would be disrupted.
- c. Extent to which research funds will cover cost.
- d. If and to what extent the outgrantee's staff will be utilized in the conduct of the work.
- e. Interest and ability of the outgrantee to invest in the research work to gain greater intensity or substantive coverage.

By pursuing such an open policy, the significance of the research work in improving operating effectiveness and efficiency should be sufficiently clear to the outgrantees that they will want to actively participate in the research work units, including key factor monitoring.

Relations Between Districts and WES

191. Recognizing the wide array of conditions extant in the field, EC 70-2-24 places the burden upon the Commander and Director of the "...WES to enter into a letter of agreement with the appropriate District Engineer (with respect to) the operation and cost sharing of the RRDU or RUMS." The provision provides for an orderly process of communications between the operating and research missions of the RRDU/RUMS. Once a general agreement between the WES and the District to share information and costs is in hand, the specifics of individual requirements can more easily be discussed and agreed upon. Some requirements may stem from the conduct of individual research work units, some from the collection of standard data for inclusion in RRDIP catalogs, and some from the need to monitor field conditions.

192. To the end of establishing open communications, the EC contains general guidelines for the agreements between the WES and the participating Districts. The overriding consideration, recognizing the dual responsibilities for RRDU's/RUM's, is creating an equitable, useful partnership between administration and research for the mutual benefit of both. The rationale for equity is assigning responsibility for costs to the partners in proportion to their respective roles at the RRDU/RUMS:

the cost of administration to the District and the cost of research to the WES.

193. While the rationale seems clear-cut, moving beyond it to actual events can be confusing. The majority of the costs to be distributed among the partners relate to collecting, managing, and analyzing data. Using four categories for the data involved helps understand the EC guidelines: data collected explicitly for research purposes; data routinely collected for administering (planning, designing, and managing) recreation and related natural resources; data collected as part of an initial data base for the data element of RRDIP; and data collected for the purpose of monitoring key factors. Problems occur when the categories overlap or there is dual utility to be gained from the data collected.

194. The following paragraphs discuss EC guidance in relation to the WES responsibility and the District responsibility.

The WES responsibility

195. The WES partner is to be responsible for all aspects of performing the defined research work units including all data collection associated with that work. Responsibility means paying for performance of the work whether accomplished by contractors, by RRP staff, or by other means. Funding for this work is channeled from research and development sources and does not impinge upon District budgets. Thus, if a research work unit requires that interviews with users be conducted, the WES arranges through OCE for interview clearance with the Office of Management and Budget and pays the costs of administering the survey instrument and analyzing the data; if a research work unit requires special mapping or water quality measurements, the WES is responsible for the cost of the data collection even if it means investment in special instrumentation.

196. In the instance of RUMS's, the guidelines hold that since, "the majority of RUMS are not considered operating responsibilities of the Corps...the cost of periodic data collection at RUMS will be covered from WES funds."

197. The RRP obligations for data collection for a successful

RRDIP to support priority recreation and related natural resources research are extensive. Costs to WES will be incurred in three general activities: distillation of historic information, expansion of data series currently collected for RRDU's/RUMS's as a matter of regulation or accepted management practices, and collection of data beyond current series.

198. Distillation of historic information. The tasks involved in this activity include visits to the District and project offices; searches of real estate, planning, operations, and public affairs records to surface aerial photographs, maps, land records, visitor survey data, and reports of special studies; interviews with persons familiar with the conception, construction, and early operation of the RRDU/RUMS; and sorting and analysis of the information and preparation of a data package for each RRDU that displays values for significant factors listed in the RRDIP cell format, references the location of source documents, and contains photographs and other materials that evoke the character of the RRDU.

199. Expansion of current data series. District personnel in various elements now regularly collect data in response to regulations or for the exercise of their professional roles in the administration of projects in the District. One set of measurements deals with calculating the total attendance at the project. In the event the RRP requested that certain dimensions of visitor behavior be collected as part of the District's ongoing program, the marginal costs occasioned by expanding the work would be legitimately a charge against the WES research funds.

200. Collection of data beyond current series. The cost of routine collection of data clearly for research purposes, that is, for data clearly beyond the administrative needs of the District, is to be covered by WES funds. Examples of these data are: microclimatic records in the recreation area-intensive zones, cash flow of recreation-oriented businesses in the economic impact zones, characteristics and activities engaged in by occupants of dwelling units in the physical impact area, visitor spending patterns, tax structure of civil governments within whose jurisdiction the RRDU/RUMS is located, and cost of public services.

Identification of the data, design of samples to estimate values, and collection of the data are all part of the research responsibility.

The District responsibility

201. The guidelines assume that the District elements involved in administering the RRDU will be collecting and utilizing certain data for administrative decisionmaking, regardless of the RRDU status. The EC guidelines define these data as those "...which the District is presently required to... (collect) by regulation or by practices generally accepted as necessary to properly manage the resources...." By and large, these are data that are now collected by District/project staffs; it is simply not possible to spell out in detail all the kinds of data that are collected and maintained by administrative personnel. Some data must be collected in a specified form to comply with legislative or other external mandate or to meet OCE needs: these are set forth in regulations. Other data may be gathered in response to particular resources, for example the need to manage forest reserve lands or grazing lands.

202. The major regulation governing recreation and related natural resources data gathering is ER 1130-2-414, already referred to and shown in Appendix B. There are other regulations, of course, some of which involve preparing budgets and cost codes, preparing master plans, designing facilities, and recording of outgrant instruments by the Real Estate Directorate.

203. The regulations governing the preparation of reports imply collection of certain data to plan for or to measure the results of properly managing resources for which the Corps is custodian. Some examples of the data now reported fall under the categories of RRMS and master planning.

204. RRMS. Appendixes C-H of ER 1130-2-414, which are summarized in Appendix B, indicate that the following important data are to be reported by the District annually: recreation days of use, percent of activity use, facility inventory, number of land-based use permits, number of nontransient trailers, acres of forests (exclusive of ornamental plants), project personnel by class, warnings and citations issued, acres within the project boundary in various land uses (including wildlife

management and intensive forest management), actual Corps and/or managing agency expenditures by recreation area, and fees collected.

205. Master planning. The ER 1120-2-400 guides the preparation of master plans. Appendix C of the regulation strongly suggests inclusion in the master plan of the following data for the project area: basin hydrologic and climate summary; reservoir operation curves and tables; chronology of expenditures for public use; geologic, archeologic, and historic inventories; topography; vegetation; water quality; demographic factors; existing and projected travel arteries; population and growth trends; changes in visitation market area; and anticipated demand for specific types of facilities. Also cited in Appendix C of ER 1120-2-400 are the following minimum appendixes to the master plan: project resources management, forest management, fire protection, fish and wildlife management, project safety, and lakeshore management. Compilation of data needed to prepare these plans should remain a District expense.

Joint responsibility

206. The Districts are to be a major source of data initially incorporated in RRDIP, as outlined in the previous section. The guidelines suggest that District personnel "...make available...all pertinent historic data...such as, user surveys, analyses of economic and social impacts, facility inventories, capital investments in facilities, timber harvest(ing) and tree planting records, and wildlife habitat...(mapping)...." Most of the use is for research purposes and thus a WES responsibility; but if a part of the data base will benefit administration, then that part of the cost should be absorbed by the District.

207. A portion of the data series currently collected by the District for administrative purposes (e.g., incidence of law enforcement activities) is also likely to be part of the key factor monitoring program for research purposes. Equitable distribution of these costs will probably be left to case-by-case negotiation.

Probable problem areas

208. Comparable data not required. Information on attendance, recreation facilities, concession operations, and changing demand is mandated by regulation to be reported or used. However, the regulations,

with rare exception, do not specify comparable uniformity for collecting the data.

209. In the matter of attendance, for example, the Corps sponsored research for developing survey techniques for calculating attendance at existing projects. The complete survey format is fully described in what is referred to as "Technical Report No. 1" (Brown et al. 1969). However, other than its use at the 52 project sample mentioned in Part II to develop a use estimation technique for new projects (Brown et al. 1974) and in some Division regulations (most notably the ORD), consistent use of the estimating technique is not a matter of regulation. Research by the Midwest Research Institute documented the disarray in Corps attendance reporting, led to the conclusion that the Technical Report No. 1 procedures are sound, and showed that the procedures should be the cornerstone of a program designed to improve the Corps' user information system for project, District, Division, and OCE purposes (Mischon and Wyatt 1978). "A Handbook for Conducting Recreation Surveys and Calculating Attendance at Corps of Engineers Projects" is available to guide District personnel in upgrading attendance estimating (Mischon and Wyatt 1979); use of the prescribed methodology is directed by EC 1130-2-175 (Appendix F).

210. The situation presents a major dilemma for the RRP staff as final arbiters of which data will enter RRDIP. It will be perfectly legitimate for RRDIP to include in a catalog of information sources a reference to a 10-year series of attendance data to be found in District files. However, until District attendance data achieve at least the statistical reliability expected from applying Technical Report No. 1 type procedures, RRP cannot include them in RRDIP; in which case the only attendance data filed in the data element of RRDIP could be those collected by the special surveys that are part of the research work units.

211. Review of the issues surfaced by attendance clearly shows that there is no cure-all definition of the quantity or sophistication of data required of the Districts by regulation. Since no regulation explicitly demands Districts to collect and report to RRMS attendance figures in a certain way, it seems that District acceptance of the revised procedures depends on their acknowledgement that the level of

accuracy inherent in these procedures is essential to properly manage RRDU resources.

212. Absence of norms or standards. Very few normal or standard practices have been set for administering recreation and related natural resources. Without norms or standards, the term "generally accepted management practice" becomes ambiguous. For example, it is generally accepted that the District is responsible for maintaining lake water quality at levels sufficient for public health and safety. But a normal collection regimen for water quality data to meet that responsibility applicable to all RRDU's has not been set.

213. The problem is compounded by nonuniform performance by Districts. At some RRDU's, water quality data are available from intensive sampling performed in response to regulatory agency directives at public beaches, open water, water supply taps, and sewage outfalls. At other RRDU's, these data have not been collected. The RRP staff will be faced with leaving water quality data series "as-is," pay those Districts not now analyzing water samples to sample at the same level as those who do, or underwrite the cost of all water quality sampling. If a norm existed, the cost of normal water quality data collection would be a District responsibility; all increases requested by the WES in parameters measured, frequency of sampling, or number of areas sampled would be research responsibilities.

214. Similarly, there is not now a set of minimum standards for managing recreation and related natural resources. If a standard for forest management or wildlife habitat management existed, then data needs to support these accepted practices would not be so nebulous.

215. There are even more severe problems in defining normal or standard data collection responsibilities outside the RRDU boundaries. For example, some District and project personnel regularly record changes that occur in the physical impact area; they obtain copies of newly recorded subdivision plats and land transactions, record residential and commercial construction, and keep track of timber sale activity. Elsewhere, no comparable data are collected. For the WES, the issue is whether such data collection ought to be viewed as essential to proper

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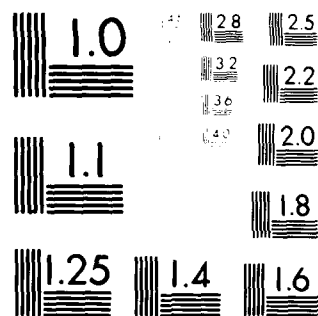
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management of the RRDU and thus to be expected from the District.

216. Similar questions are bound to arise over such vital factors affecting the quantity and quality of the supply of outdoor recreation opportunities as: the transportation network, including condition of roads connecting Federal primary or interstate systems to RRDU boundary; availability of public services, such as fire protection, law enforcement, sewage collection and treatment, water supply, and solid waste collection and management; and park and recreation programs.

217. For the present, WES-District negotiation will have to settle upon what is a level of data collection generally accepted by prudent and experienced recreation and related natural resources managers to properly manage RRDU resources. It will almost certainly be found that some Districts are already collecting sufficient data to maintain management activity at or above the general level; other Districts will be found to be operating considerably below acceptable levels. In the last instance, the provisions of EC 70-2-24, making recreation and related natural resources research an equal project mission, may be invoked by the District to gain sufficient strength to reach parity with the RRDS standard.

218. Judging from the range of information covered into RRDIP, there is room to ascertain general District practices in subject areas ranging from law enforcement citations to range management. In each case the level, generally accepted by resource practitioners, will represent the District's obligation. The District cost should approximate the cost of all people directly and indirectly associated with the RRDU. Part II dealt with the variety of District-level elements that participate in the management of an RRDU (Appendix C). True costs for management will begin to emerge when the share of all personnel dealing with recreation and natural resources administration is summed and charged to the RRDU. Thus, the negotiating process may develop a more standardized approach to cost accounting at the RRDU's.

Procedures for apportioning costs

219. In order to arrive at equitable annual distribution of cost, the District-WES agreements defining the partnership are to contain an acceptable procedure for the District to inform WES "...of staffing plans

and other routine operation and maintenance proposals for the RRDU prior to the beginning of each fiscal year." The bottom line figure for fiscal year 1979 should represent the District cost for managing recreation and related natural resources, including the collection of those data required by regulation and/or "...by practices generally accepted as necessary to properly manage the resources of the...(project) for which the Corps is custodian...." The District will incur some extra administrative costs by the activation of one of its projects as an RRDU. At the outset, the District/project staffs will have to respond to WES inquiries and have an obligation to budget time to "...make available to WES all pertinent historic data...whether collected by District personnel or by others acting for the District." The amount of time, converted to money, devoted to these research-related activities should represent the District share of RRDS administration, as suggested by language found in EC 70-2-24.

220. The RRP's annual administrative cost of the RRDS will equal the WES staff time assigned to RRDS administration, plus the costs incurred by the District in gathering data beyond those required by regulation or generally accepted management practices, plus any portion of a research work unit that includes costs that are administrative in nature, e.g., periodic observation by District personnel of instrument gages.

Agreements

221. The variety found in District administration modes is a sound reason for directing that there shall be agreements separately negotiated between WES and the involved Districts. In addition, negotiating agreements present opportunities to clarify or to give substantial meaning to general regulatory language.

222. Current regulations governing the administration of the RRDS and the agreements expanding operative points in the regulations are straightforward. The framework for cost-sharing is summarized in Table 12.

Table 12

District and WES Cost-Sharing for Administration of the RRDS

District	WES
Normal recreation and resource management (FY 1979 base)--including master planning Displaying all historic file data for RRDU	Authorized recreation research program work units--including data collection and reporting Reviewing historic records and selecting appropriate material. Unusual reproduction costs associated with transfer of selected materials to RRDIP
Additional staff time required to deal with change of project to RRDU status	Unusual demands made upon staff time
Gathering and reporting data required by regulation and/or accepted management practices	Gathering and reporting data beyond those required by regulation and/or accepted management practices
Special construction and rehabilitation projects	Demonstration projects
	Technology transfer

Demonstrations

Costs of demonstration

223. The demonstration-testing mode is one of the most common research techniques employed by the WES. Problems of vehicle operation in difficult terrain are addressed by constructing prototype vehicles and testing their performance; problems of stabilizing roadbeds are attacked by constructing test roadway sections over soils stabilized in alternative ways and then measuring the response to various loads. The most successful vehicle and road section are available to demonstrate the results of the testing work.

224. Also, as exemplified by vehicle development, a certain amount of tinkering is implicit in the process. Testing may show that the flotation of an all-terrain vehicle is significantly improved by widening the tracks 6 in., and subsequent tests reveal that the improved flotation necessitates a larger, heavier power unit. The results of the testing give engineers one of many trade-off curves comparing flotation with power plant weight. In exactly the same fashion, trade-off curves for initial construction, maintenance, and facility performance are needed for effective and efficient planning, design, and operation of recreation areas and facilities.

225. Including demonstration in the title of RRDS commits the system to pragmatic testing and demonstration. The demonstration aspects have the same need for administrative clarity as the more typical research aspects.

Types of demonstrations

226. There are three types of demonstration work now considered within the RRDS framework.

- a. Good or bad planning, design, or operations at existing facilities.
- b. Accepted methods and procedures, such as the design of traffic monitoring networks and surveys for attendance estimating.
- c. Effects of innovative management practices and alternate layouts, materials and standards upon user behavior,

construction and maintenance costs, benefits, and the natural resources.

227. Use of existing facilities. This type of demonstration is common in the park and recreation field. Campgrounds constructed on unshaded, uninteresting sites are shown as examples of poor planning and layout; comfort stations without interior hose connections and drains are shown as examples of poor design; and sloping ramps are shown as examples of adequate planning for the handicapped. The dimension most often missing is quantitative evidence of the impact of "good" or "bad" examples on the resources and/or user perceptions. Before the inventory of facilities and opportunities now available in the RRDS is judged, some evaluation will be necessary to distinguish which facilities and opportunities appear suited to demonstration. These demonstrations should then be monitored to determine use and impact. If the results of observation confirm a particularly useful layout or design, that facility with supporting quantification can be used for demonstration and training purposes.

228. Demonstrating methods and procedures. Demonstrations of this sort will probably stem from one or more research activities. Monitoring attendance is central to a number of research and management activities. Therefore, the equipment and methods employed at the RRDU's should serve as models for collecting similar data at other projects in the District/Division.

229. In the same vein, research work units are designed to improve such methodologies as estimation of physical and social carrying capacity. Application of the methodology and the results thereof would be appropriate topics for demonstration and training. The costs of performing the research work and transferring information will be borne entirely by the RRP. The costs of demonstrating the results over a period of several years also would be born by the RRP.

230. Showing the effects of innovative practices. Numerous solutions to a large number of troublesome operating problems, such as poor distribution of users within and among recreation facilities, involve untried techniques. Some of the proposed solutions are supported by strong

theoretical and intuitive evidence, but very little field evidence. Two hypothetical proposed solutions are offered as examples of the RRDS in the demonstration mode: differential pricing of campsites and varying road surfacing standards.

231. Differential pricing is a solution often proposed to modify maldistribution within a recreation area. It seems reasonable that since waterfront campsites are more attractive than those some distance removed from the water, fees should be higher for waterfront sites than for sites away from the water. In the same way, price level follows sophistication of facility offered: high rates for hardened sites each with electric, water, and sewer hookups; moderate prices for similarly hardened sites with sophisticated comfort stations, but only area water hydrants; and low prices for semihardened sites with area hydrants and minimal comfort stations. Present Federal policy prohibits differential pricing within a single recreation area. The question of whether the policy is worth changing cannot be answered without testing.

232. If OCE posed the pricing question to the RRP, some of the essential background data will be collected and available through regular RRDIP activities; specific tests could use these base levels to compare the shifts caused by policy changes. The results would demonstrate the consequences of such action through documented measurements of user reaction (distribution of use and severity of criticism), costs of administration, income from the fee schedule, and change in impact upon the resource base.

233. Clearly the testing and demonstration will have to be strongly desired by those interested in the management and policy implications to gain dispensations to apply the unique practices. Districts would be faced with the costs of administering the changes and the WES with the costs of measuring the impacts wrought by the trial practices.

234. In the second example, speculation similar to that described above is attached to road surfacing policies. Uniform road surfacing standards have been attacked by those who contend different classes of user seek different types of experience and that uniform standards homogenizes the recreation experiences offered at Corps projects.

235. Clearly, the effects of road alignments, road surfacing, campsite densities, and similar planning and design issues on benefits and costs, user satisfaction, and resource management objectives can be attacked only by field measurement. Some of the needed measurements will be generated through observation of existing facilities. Others, however, will require that demonstration facilities that vary from accepted standards be constructed, operated, and monitored.

236. The magnitude of the costs is likely to be quite large. Test road segments and facility layouts at one RRDU will be substantial, but whatever design of testing is adopted at one RRDU should be replicated three or four times within the system. Otherwise, the validity of the testing will be limited to single sites--a result that can be obtained by simply tinkering with any new construction. It will not be known, for example, whether the model of user dispersion along lines of access road quality is valid nationally or only in particular regions.

PART V: RESEARCH OPPORTUNITIES BY OTHERS

237. The RRP was created to meet pragmatic research needs posed by the recreation and related natural resources planning, design, operations, and management activities of the Corps; choice of an RRDS has been activated primarily to support that research. Consequently, the criteria used for selection emphasized an RRDS that is representative of the Corps recreation and related natural resources universe. One criterion called for inclusion of existing interagency relationships. Consequently, units of the National Forest System and the National Wildlife Refuge System are already parts of the RRDS and as such suggest the possibility of joint research activities with the managing agencies.

Research Opportunities for Agencies

238. The selection criteria recognized the variety in Corps project administration that results from granting recreation area and related natural resource responsibility to other agencies. The fact that Federal, State, and local agencies have management responsibilities in units of the RRDS that mirror the Corps-wide situation offers opportunities for the individual agencies and/or generic groups of agencies, i.e., county/regional parks or State parks, to use the RRDS for research purposes.

239. At the national level, two Agencies with highly developed research capability are involved as grantees of RRDU resources and facilities: the FS and the FWS. Active use of the RRDS for the conduct of specific FS research by personnel assigned to the several experiment stations is possible. In the same way, those RRDU's that have units of the National Wildlife Refuge System present research opportunities for the functional laboratories of the FWS, e.g., National Waterfowl Research Center in Patuxent, Maryland. The philosophy underlying the RRDS should be of considerable interest to the applied research work conducted by the FWS's Office of Biological Services. Several groups working in the Western Energy and Land Use National Team in Fort Collins, Colorado, and

the Stream Alterations National Team in Columbia, Missouri, have conducted, and are conducting, research projects the results of which could be enhanced in the long run if conducted in an outdoor laboratory setting. Low RRDU correlation with the national reservoir fishery research program headquartered in Fayetteville, Arkansas, probably minimizes RRDS utility for research by these FWS people.

240. It is known that at least one Corps grantee, Broome County (New York) Park and Recreation Department, has conducted notably good research in the area of park maintenance standards (Schaefer 1972). It is probable that many outgrantees have or are engaged in research activities, particularly when major portions of RRDU's have been outgranted to State or local governments.

241. The existing recreation and related natural resources research potential outlined here can be magnified by being included in the RRDS. Research work units funded through the RRP will be known to collaborators in the RRDS. Conversely, research activities and needs of the collaborators can be made known to the RRP staff and, at a minimum, the news will be disseminated by means of the RRP's information exchange bulletin (RECNOTES). Mutual research needs can be examined jointly and cooperatively in terms of money and skilled researchers.

Administrative Opportunities

242. It was noted in Part II that the Federal reservoir recreation system is administered by several Agencies. While there is some variation in the authorizing legislation for both the lakes and the administering Agencies, managing recreation and related natural resources at artificial water bodies requires a body of management techniques that is unique to the task and which crosses Agency boundaries.

243. It was also noted in Part II that the nature of recreation use--volume, seasonality, area of visitor origin, and experiences sought--would vary by physioeconomic region. Potential RRDU's/RUM's were deliberately not sought in 12 physioeconomic regions (Plate 4). Thus, RRDS, as a mirror of the Corps recreation and related natural re-

sources picture, represents only a portion of the national reservoir recreation spectrum. The RRDS selection process avoided the Rocky Mountain physioeconomic regions because water-oriented recreation dominance in those regions rests in the USDI Agencies (BuRec and NPS) and the FS (USDA); similarly, the southern Blue Ridge region was excluded as a selection stratum because of the TVA dominance in the region. In addition to the TVA lakes along the main stem and in the headwaters of the Tennessee River, the TVA has responsibility for the Land Between the Lakes National Recreation Demonstration Area (LBL), which is made up partially of land acquired by TVA for Kentucky Lake, partially of land acquired under special congressional authority for LBL, and partially of land out-granted by the Corps from the Lake Barkley RRDU. Most published accounts place a large share of the motivation for the establishment of LBL on a desire to demonstrate the values submarginal, badly abused farm and forest land could contribute as a managed recreation resource (Smith 1971). In achieving this goal, TVA administrators have pioneered a large number of recreation-oriented natural resources management techniques that are of considerable importance to Corps managers and planners.

244. Other Agencies with a stake in artificial lake recreation and related natural resources management are:

- a. Bureau of Reclamation/National Park Service. The NPS serves as a recreation consultant to BuRec for all authorized units of reclamation projects.* A memorandum of agreement specifying Agency roles has long been in force. Therefore, the beneficiaries of research conducted within an RRDS-like framework would be NPS planners as well as BuRec administrators.
- b. Forest Service. Often lost in the magnitude of multiple-use resources management responsibilities assigned to the FS in administering the National Forest System is the number of reservoirs totally or partially within National

* The term "project" is used differently by BuRec and the Corps. Corps usage has already been defined. BuRec projects, such as the Central Utah Project, are made up of many individual units constructed over long periods of time, e.g., Strawberry Unit of the Central Utah Project. The Strawberry Valley Reservoir of the Strawberry Unit is comparable to a Corps project.

Forest boundaries. The FS management loads for the water surface and lake shore lands exhibit wide variation.

245. It would seem that information exchange among all agencies with common interests in planning and managing reservoir recreation and related natural resources would be enhanced if projects mirroring other agency situations were parts of a single RRDS. All participants would benefit from the permanent outdoor laboratory approach with supporting RRDIIP. Just as the Corps' RRDS is designed to enhance the conduct of Corps-related recreation and related natural resources research, NPS/BuRec, FS, and TVA selections could be calculated to enhance research into problems facing each of the agencies. However, use of a common data base by all participants would make the utility of the research conducted greater than the sum of the individual parts.

246. In the event any agency desires to (through some selection process as described herein or by other means) have one of more artificial lakes become part of a larger RRDS, they can consider initiating memoranda of understanding with the Corps. The memoranda should contain explicit subscription to the principles of permanence and mission accorded to the RRDI's/RUMS's by OCE and provide for the rules and sharing of costs involved in assessing RRDIIP across agencies and for the disposition of accumulated data files in the event of deactivation.* Similarly, accords would be included to deal with sharing the cost of continuous monitoring of key factors--a not inconsiderable item--and to provide for the same cooperative approach to the design and execution of recreation research work units as is accorded Corps outgrantees in the current RRDS.

247. The roles of park superintendents, forest supervisors, regional foresters, regional directors, Division Engineers, and others (including, in some cases, agency heads) as well as the research arms of the affected agency will have to be considered in pursuing the necessary cooperative agreements on a case-by-case basis.

* EC 70-2-24 provides that in the event of a deactivation approved by OCE, "...disposition of the accumulated research data files...will be the responsibility of the Commander/Director WES."

Research Opportunities for the University Research Community

248. University-Corps recreation and related natural resources research considerations are best begun by considering two levels: the national level represented by the RRP and the RRDS, and the District level.

National level

249. Establishing the RRP represents for many university park, recreation, and natural resources faculties a major incentive to conduct research on Corps problems on Corps lands and water.

250. The universities stand to gain meaningful research opportunities and training grounds for students. The Corps stands to gain the interest of top theoreticians and practitioners in finding solutions to Corps problems.

251. The RRDS can play a major role in the two-way process. First, knowledge of the RRDS and the opportunities to address longitudinal problems that have in the past only been hypothesized will attract university research talent to the units of the system. In the same vein, the opportunities afforded by permanent outdoor laboratories, where a major part of data collection cost will be absorbed as part of the routine cost of operating the system, will probably encourage a substantial number of research-oriented faculties to seek funding from other sources to support more theoretical research beyond the ken of the operating agencies.

252. Universities now have some relationships with Corps projects that are the result of large national or regional studies. Such studies are frequently funded by a functional element of OCE. At the regional scale, for example, University of Wisconsin researchers hold a contract with the Great River Environmental Assessment Team (GREAT) to conduct recreation attendance and dispersion studies on three Corps Mississippi River pools. Also regional in scope, but funded nationally, was the study of the Kerr-McClellan waterway system on the Arkansas River conducted by Oklahoma State University researchers under contract from IWR.

District level

253. Extensive research relationships between Districts and nearby universities and research agencies currently exist.*

254. One type of relationship begins when a District staff faces a difficult problem at one or more projects. Many District-identified problems require short-term research. Therefore, District personnel turn to a nearby university or a so-called A&E firm having people with demonstrated research competence in the problem area.** The statement of the problem is converted to a scope of service and, in accord with prevailing procurement procedures, a contract is let. The result is a solution for a single project--often a single site within a single project. As much of the recommended solution is implemented as is feasible, the report filed (generally only a small number of copies if any are available for distribution), and the matter forgotten. Often, inventive methods are employed by the research team, but few practitioners find out about them. Some shortcomings include reports devoted to methodology development rather than to substance, untimely performance, elaborate solutions that cannot be applied, and reports that address problems other than the one contracted for.

255. A second type of relationship occurs in those cases when problem identification is done by the researchers. The chain of events may be triggered by a number of stimuli ranging from reports of deteriorating water quality to accidental deaths. The researcher frames his perception of the problem and his research approach as a proposal to the District. The District staff must judge the proposal in terms of priority uses for scarce capital, value of promised products to District programs, and technical merit of the approach. Once an unsolicited proposal is accepted and funded, the process becomes much like that encountered for District-identified problems.

* Nearby means both near to a particular project and near to a District headquarters, but usually within the same state as the project.

** A&E stands for architecture and engineering but means consulting firm or not-for-profit institute with expertise in urban, social, and economic planning, as well as more traditional engineering and architecture firms.

256. A third type of relationship may exist when the researchers secure funding to pursue either a District-identified or researcher-identified research project. The funding source now becomes the client for the research products and the direct utility to District programs may diminish accordingly. In the instance of non-Corps funding of researcher-identified topics, the District may have to respond to an after-the-fact request for permission to use project resources and/or lands for conduct of the research work.

Recreation Research Clearinghouse Function

257. The volume of District-supported research studies in the recreation and related natural resources field is unknown. Part of the field level research needs find their way into the user-needs research system; but an unknown number of what could be Problem Statements in the user-needs system become scopes of work for District-sponsored research. Even less is known within the Corps' research community of the volume or nature of researcher-identified and funded research work. In some instances, only project personnel are aware that students from a nearby university are interviewing attendees or observing participant behavior in several activities.

258. The RRP staff could perform the recreation research clearinghouse function as a complementary part of administering the RRDS.

259. Vital to the operation of such a clearinghouse would be an agreement on the part of the Districts, within which RRDU's and RUMS's are located, to forward to the RRP staff all District recreation and related natural resources research proposals and all requests received for permission to perform this sort of research upon a project administered by the District. How this can most effectively be accomplished could be negotiated by the WES and the Districts. There will be substantial problems to surmount, such as research activities performed by or known to outgrantees and the semantics involved in knowing whether particular topics are germane to the RRP.

PART VI: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

260. The 24 RRDU's constitute a stratified sample of those Corps Civil Works water resources development projects that meet the criteria for listing in the Recreation Resource Management System. The sample reflects the full extent and diversity of Corps-administered national recreation and related natural resources. Therefore, the 6 percent sample meets all the stated objective-based criteria for selecting the Recreation Research and Demonstration System except two. The sample, drawn from the RRMS, does not include projects in the coastal physioeconomic regions where there is a high level of Corps recreation-related activity; the sample does not include all of the Corps' planning and construction activities that materially affect the quantity and quality of outdoor recreation opportunities available to the public.

261. The nine RUMS's represent an unknown percentage of Corps projects not included in RRMS, but which do materially affect the quantity and quality of outdoor recreation opportunities. The activated RUMS's complement the RRDU's by providing locations in the physioeconomic regions not otherwise included and by expanding the recreation-related activities engaged in by Corps personnel. The nine RUMS's represent only a beginning in the quantification and analysis of the full range of Corps involvement in outdoor recreation.

262. The consultative procedures employed in the selection process ensure that the RRDS does not duplicate, nor conflict with, the activities of other Federal Agencies.

263. The RRDIP is a conceptually sound approach to data base management. Operation of the information program will do much to achieve the efficiency and effectiveness of Corps outdoor recreation and related natural resources research and will encourage research use by others of units and stations of the RRDS.

264. The administrative structure of the RRDS meets the requirements for operating a system of outdoor laboratories that are, at the

same time, being operated for a full complement of authorized multiple purposes. The structure provides for permanence, ensures continuity of research activities, provides for inclusion of outgrantees in research work, represents a good beginning of a partnership between the WES and the cognizant Districts, and takes full advantage of the historic roles and strengths of the Districts, the WES, and the Divisions. The partnership provides for:

- a. Equitable sharing of the costs.
- b. Exchange of intentions, plans, and actions.
- c. Involvement of field professionals actively engaged in planning, designing, managing, and operating recreation and related natural resources in the conduct of research work and the application of research results.

265. Demonstration and pragmatic testing are well-established approaches to problem solving employed by the WES. The RRDS is well suited to the use of demonstration and testing to solve problems and to transfer technologies.

266. The RRDS has been established primarily to support identified, high-priority Corps recreation and related natural resources research. The system is well suited for that purpose. The RRDS is also a framework within which complementary and supplementary research can take place. Such research could be conducted on the present RRDS by those Federal Agencies that exercise substantial management responsibilities on artificial lakes, State agencies, universities, and other research institutions.

Recommendations

267. That portion of the Corps' recreation and related natural resources activity spectrum not included in the RRMS should be further investigated to determine what is an appropriate number of RUMS's. The objective would be to obtain the same stratified representativeness for that part of the Corps' work as is now the case for projects included in the RRMS.

268. The administrative budget for continuing operation of the

RRDS should be reappraised. The annual support budget should recognize the size and diversity of the activated system, the creation of the RRDIP, and the essential role of routine monitoring. The size and diversity factor should include RUMS's; the RRDIP factor should include data unique to recreation research and interactions with data systems; and regular monitoring may include measuring impacts of recreation use upon the resource base and maintaining current aerial photographs. All such activities are part of the routine administration of the RRDS and are vital to meet the RRDS objective of increased effectiveness and efficiency in performing assigned research work units.

269. Other Federal Agencies and State and local governments should be encouraged to make use of the RRDS to capitalize on the availability of data and in turn to expand the existing data base for future research. In addition, the advantages of expanding the geographic scope of the consistent data base by adding man-made lakes administered by other Federal Agencies should be explained to appropriate Federal Agencies and administrative options for their participation prepared.

270. Members of the university and other research communities should be strongly encouraged to utilize the facilities of the RRDS for the conduct of outdoor recreation and related natural resources research. Availability of the RRDIP data base should be stressed. Other steps should be taken to publicize the existence and utility of the system, perhaps through the medium of university-Corps advisory committees.

271. A recreation and related natural resources research clearing-house function should be established within the RRDIP.

272. The additional volume of work and responsibility placed upon the District and project staffs of RRDU's should be recognized in establishing employment grades and tables of organization for staffing.

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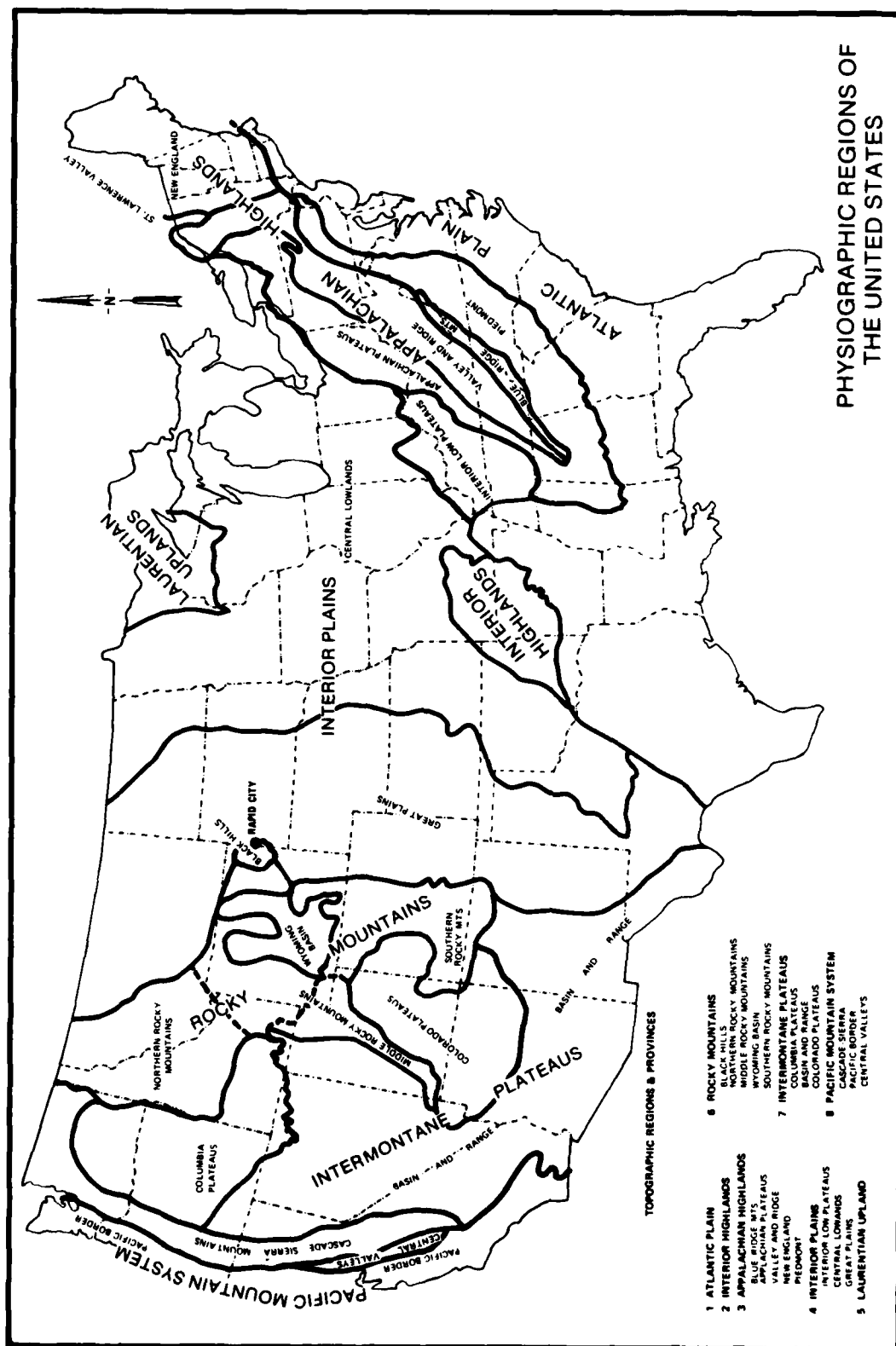
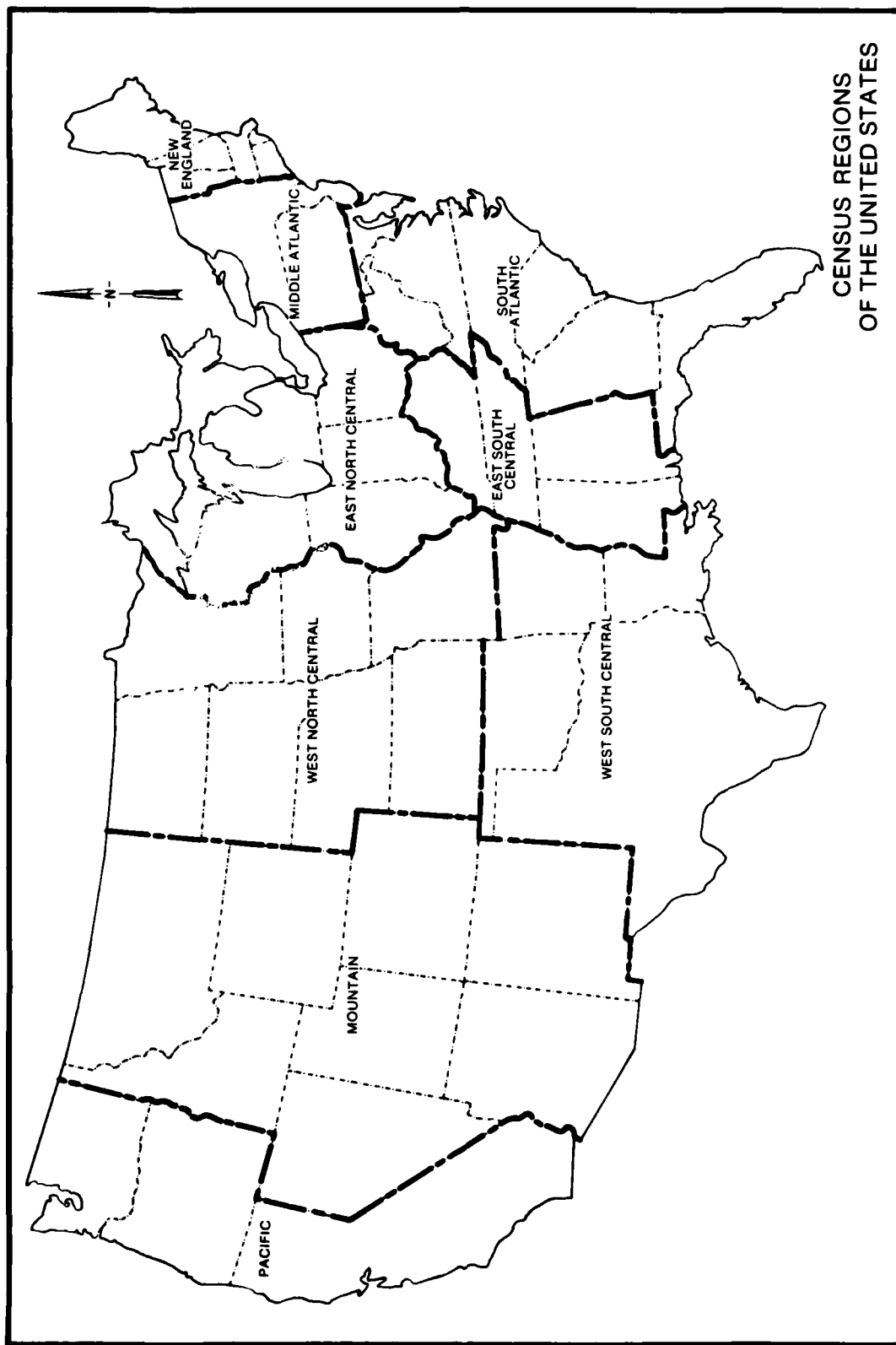


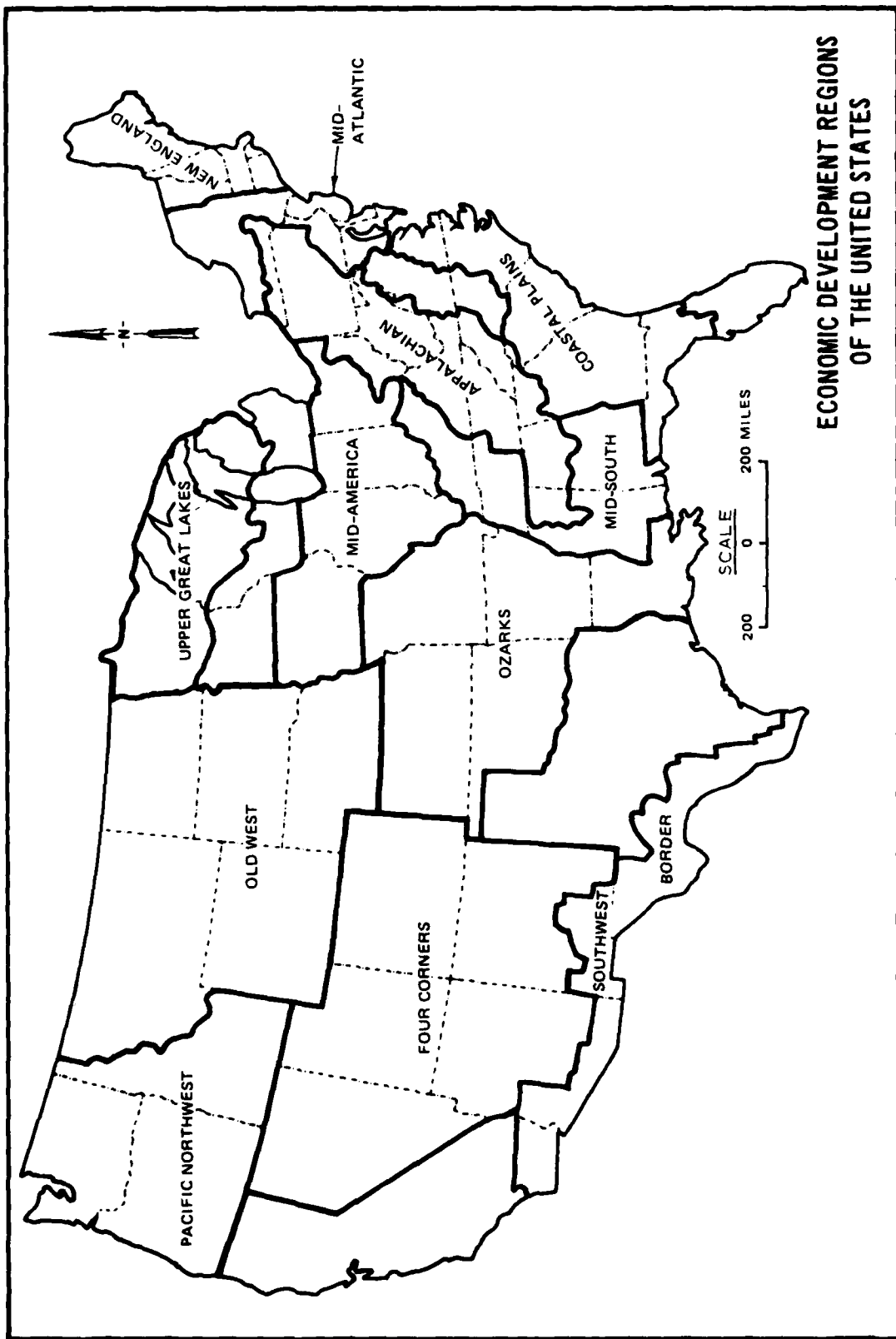
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FROM THE U.S. DEPARTMENT OF COMMERCE

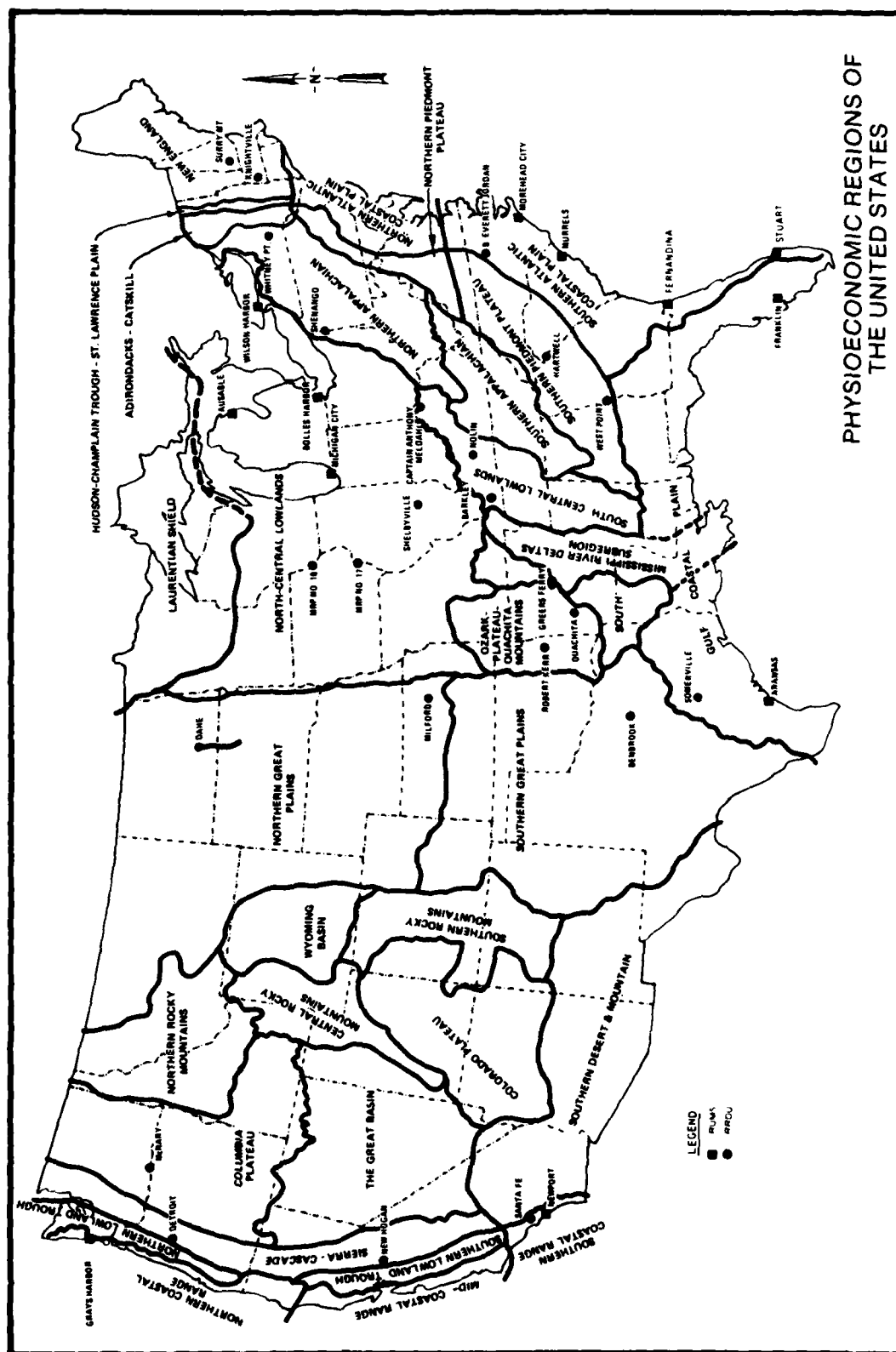
CENSUS REGIONS OF THE UNITED STATES

PLATE 2



**ECONOMIC DEVELOPMENT REGIONS
OF THE UNITED STATES**

FROM U.S. DEPARTMENT OF COMMERCE 1979.



**APPENDIX A: ENGINEER CIRCULAR AND LETTER ACTIVATING
THE RECREATION RESEARCH AND DEMONSTRATION SYSTEM**

DAEN-CWO-R
DAEN-RD

DEPARTMENT OF THE ARMY
Office of the Chief of Engineers
Washington, D.C. 20314

S-23 Jun 78

EC 70-2-24

Circular
No. 70-2-24

16 June 1978

EXPIRES 30 JUNE 1979
Research and Development
RECREATION RESEARCH AND DEMONSTRATION SYSTEM

1. Purpose. This circular authorizes the establishment of a Corps-wide Recreation Research and Demonstration System (RRDS). The system will be composed of permanent Recreation Research and Demonstration Units (RRDU) and Recreation Use Monitoring Stations (RUMS). This circular provides interim policy and procedures for activation and deactivation of such Units and Stations within the System, general guidance for the administration of the System, the individual Units and Stations, and a list of potential Units and Stations.

2. Applicability. This circular is applicable to OCE elements and Divisions and Districts having responsibility for Civil Works projects and programs.

3. References.

- a. ER 70-1-9
- b. ER 1130-2-414

4. Background.

a. Authority for considering recreation and natural resources in planning, designing, developing, and managing all Civil Works projects is contained in the Federal Water Project Recreation Act (PL 89-72). Specific authorities pertaining to recreation and renewable resources in planning, designing, developing and managing various types of water resource development activities are widely dispersed in Federal law and policy. Collectively these laws and policies generally mandate that the Secretary of the Army, acting through the Chief of Engineers, provide the public with safe, healthful and varied outdoor recreational opportunities; enhance fish and wildlife; protect and develop timber resources; preserve endangered species and their habitats; assure aesthetically and culturally pleasing surroundings; obtain the widest range of beneficial uses of the environment without degradation; preserve important historic and cultural aspects of our national heritage; and maintain, wherever possible, an environment which supports diversity and variety of individual choice while

16 Jun 78

striving for a balance between current public use and maintenance of a quality environment for succeeding generations.

b. The vast increase in importance and complexity of the Corps' role in meeting the above mandate--particularly meeting the quantity and quality of outdoor recreation opportunities demanded by all Americans--prompted the Directorate of Civil Works to question the effectiveness and efficiency of prevailing Corps practices. As a consequence, a Recreation Research Program was instituted for the Civil Works function of the Corps of Engineers to improve Corps data bases and methods at all administrative levels and, thus, improve the effectiveness and efficiency with which the Corps delivers recreation-resource related services to the public. Specific areas to be examined include: recreation and natural resource management; economic impacts of outdoor recreation; social impacts of outdoor recreation; planning and design of recreation areas and facilities; political, social and economic equity of recreation; and recreation data management.

c. A unique central feature in the design of the Corps' Recreation Research Program is the concept of permanent outdoor laboratories across the country within which uniform baseline data needed to support many individual research topics would be collected and within which much of the actual field research would take place. Accessible uniform baseline data will result in substantial economies and efficiencies in the conduct of the research program. The system of permanent outdoor laboratories will facilitate comparable measurements of public response to Corps plans and practices over time.

5. Interim Policy.

a. A system shall be created, organized and administered to facilitate research in outdoor recreation and natural resources management by Corps laboratories, Districts and Divisions, other Federal agencies, universities, and private research organizations.

b. The system will consist of entire Water Resource Development Projects (WRDP), or occasionally parts of projects to be officially designated as (1) a RRDU or (2) a RUMS. A RRDU is defined as a project or specifically defined portion(s) of a project upon which baseline project, recreation user, and renewable natural resource data files will be established and periodically monitored and updated and upon which high priority recreation resources research and demonstration projects will be conducted. A RUMS is defined as a specific WRDP, such as, a Corps constructed and maintained ocean jetty, a segment of a Corps maintained waterway, a Corps constructed harbor of refuge or a small craft harbor, upon which baseline project and recreation user data files will be established and periodically monitored to obtain valid information to assist Corps recreation related planning, policy, and maintenance activities.

EC 70-2-24
16 Jun 78

c. The RRDS will be supported by a Recreation Research and Demonstration Information Program (RRDIP). The information program will respond solely to the specific research mission requirements of the system but will be complementary to the Recreation Resource Management System.

d. Basic administrative responsibility for each RRDU shall continue to be vested in the District Engineer within whose District it is located. Administrative responsibility for the system as a whole, for the conduct of individual research topics and for the integrity of the data collected and maintained in the RRDIP shall be vested in the Commander/Director of the USAE Waterways Experiment Station (WES) and the Recreation Research Program Technical Monitor.

6. Purposes.

The RRDS is established for the following purposes:

a. Enhance the effectiveness and efficiency of high priority recreation resource management research into planning, design, and operational problems identified by the responsible levels and elements in the Civil Works and Real Estate Directorates;

b. Permit the consideration of larger numbers and more complex variables, and the drawing of more inferences for the same research cost;

c. Reveal through rigid, regular data monitoring procedures general national and regional trends in user behavior and in the physical, economic, and social impacts that stem from Corps recreation and resource policies and practices.

d. Serve as a focus for research and testing in all subject areas affecting those Corps elements having recreation and environmental resources policy, planning, design, management, disposal, and operating responsibilities.

e. Serve as outdoor laboratories where new methods, structures, layouts, and policies can be tested and results demonstrated.

f. Enhance the conduct of studies of regionally significant issues and problems by Districts and Divisions.

g. Provide public input into the recreation research program by continued public access to the outdoor recreation laboratories.

h. Expeditiously integrate the findings of research and demonstration into Corps policies and procedures.

7. Activation and Deactivation.

a. Potential RRDU and RUMS may come to the attention of Project, District and Division staffs in many ways. After evaluation by District and Division staffs, Division Engineers will nominate all or parts of a project for inclusion into the system. Nominations will be forwarded to HQDA (DAEN-CWO-R) WASH DC 20314. The selected nominated project will be declared an active Unit Station by the Chief of Engineers and will remain activated as a part of the system until deactivated by the Chief of Engineers.

b. It shall be incumbent upon each District Engineer within whose District there is a RRDU or RUMS to recognize the specific requirement of both short-term and long-term research and demonstration in planning and administering the project.

c. Changes in project conditions or other reasons may cause a RRDU or RUMS to lose relevance to the Corps' Recreation Research Program. Upon such determination, recommendations for the removal of a project from the system will be forwarded to HQDA (DAEN-CWO-R) WASH DC 20314. If approved, disposition of the accumulated research data files for a deactivated RRDU or RUMS will be the responsibility of the Commander/Director WES.

8. Administration. It shall be the responsibility of the Commander/Director WES to enter into a letter of agreement with the appropriate District Engineer spelling out the particulars of the operations and cost sharing of the RRDU or RUMS. Agreements negotiated under this paragraph shall be subject to indorsement by the Division Engineer, and shall generally conform to the following guidelines:

a. The formats for recording data pertaining to descriptions and inventories of natural and man-made resources and facilities, characteristics and behavior of users, expenditures for recreation services and flow of such money in a regional economy, public investments, cooperative activities, and related subject areas shall be specified by WES.

b. The District shall make available to WES all pertinent historic data for the subject project maintained by the District, whether collected by District personnel or by others acting for the District. Such data may consist of diverse materials, such as, user surveys, analyses of economic and social impacts, facility inventories, capital investments in facilities, timber harvest and tree planting records, and wildlife habitat surveys. The organization of available historic data into the "Baseline Data File" for the RRDU/RUMS will be the responsibility of WES.

c. Districts will inform WES and the responsible Division Recreation

16 Jun 78

Research Program Contact of staffing plans and other routine operation and maintenance proposals for the RRDU prior to the beginning of each fiscal year. This will affect the determination of costs to be borne by the Districts and WES.

d. WES shall be made aware of master plan and natural resource management plan preparation pertaining to all RRDU and RUMS. Divisions will coordinate with WES, prior to approval, all proposals to modify and/or add to existing recreation facilities or access roads or to make significant changes in existing operation practices at RRDU and/or RUMS.

e. The cost of periodic data collection for which the District is presently required to perform by regulation or by practices generally accepted as necessary to properly manage the resources of the WRDP for which the Corps is custodian, even when more rigorously defined by WES as to specificity and intensity, such as, visitor counts, observation of user behavior and evaluation of vegetative conditions, will be covered by District funds. These are generally data generated from within the exterior boundaries of RRDU. The cost of periodic data collection which the District is not required to perform by regulation or by generally accepted management practices, such as, monitoring vegetation transects outside RRDU boundaries, obtaining gross receipts information from business enterprises and tabulating changes in socio-economic conditions in areas where visitors originate, will be covered from WES funds. The majority of RUMS are not considered operating responsibilities of the Corps. Except for indirect District support, the cost of periodic data collection at RUMS will be covered from WES funds.

f. For those Units, recreation areas, lands, and Stations operated by other Federal agencies, State agencies, local governmental bodies, concessionaires, or other parties, the District shall seek the cooperation of the grantees to assure all phases of the "Baseline Data" and periodic data collection will conform to the specifications of the RRDIP.

g. In those cases when modifications in operating practices, facilities, or layouts in RRDU are deemed essential for the research mission of the RRDS and cost sharing partners are involved, the cost sharing partners shall be involved as equals in the design and conduct of the research work.

h. The reporting periods for data are expected to vary by class of data. For example, vegetation and wildlife measurements may be taken and reported annually while visitor use and cash flow measurements may be taken and reported quarterly. There can be no deviation from the schedules once established.

9. Implementation.

a. The policy of creating and maintaining a RRDS will be recognized

EC 70-2-24
16 Jun 78

as a mission objective for each designated RRDU and RUMS and will become part of the staffing and budget requirements for each Unit and Station so designated.

b. The research mission will be recognized and duly incorporated in all future planning for the designated Units and Stations of the RRDS.

10. Reporting (RCS DAEN-CWO (OT) 1089).

a. The lists of potential RRDU (Appendix A) and potential RUMS (Appendix B) are products of intensive collaboration between WES and the Divisions. Division Engineers will review the RRDU and RUMS selected from their respective Divisions and provide nominations for the final inclusion of water resource development projects into the system. Nominations will be submitted to HQDA (DAEN-CWO-R) WASH DC 20314, not later than 23 June 1978.

b. After designation of RRDU areas by the Chief of Engineers, an Engineer Regulation will be published to provide more detail as alternative administrative modes are refined. Comments or suggestions for improvement, questions, and criticisms on the contents of the circular and subsequent appendixes are encouraged. Communications should be directed to HQDA (DAEN-CWO-R) WASH DC 20314 (202-693-7177) and/or USAE WES (WESYR) VICKSBURG, MS 39180 (601-636-3111 Ext. 3657).

c. Report Control Symbol DAEN-CWO (OT) 1089 applies.

FOR THE CHIEF OF ENGINEERS:

2 Appendixes

App A - Recreation Research and
Demonstration Units

App B - Recreation Use Monitoring
Stations

C. A. Selleck, Jr.

Colonel, Corps of Engineers
Executive Director of Civil Works

EC 70-2-24
16 Jun 78

APPENDIX A

Potential Recreation Research and Demonstration Units

<u>Division</u>	<u>RRDU</u>	<u>District</u>
Lower Mississippi Valley	Lake Shelbyville, IL Lake Ouachita, AR	St. Louis Vicksburg
Missouri River	Milford Lake, KN Oahe Dam-Lake Oahe, SD & ND Dam and Downstream Recreation Area Mobridge Indian Memorial Complex Fort Rice North to Huff Indian Village (west bank) Little Bend Area Sibley Island to Hazelton (east bank)	Kansas City Omaha
New England	Surry Mountain Lake, NH Knightville Dam, MA	
North Atlantic	Whitney Point Lake, NY	Baltimore
North Central	Mississippi River Pool 17, IL & IA Mississippi River Pool 10, IA & WI	Rock Island St. Paul
North Pacific	Detroit Lake, OR McNary Lock and Dam-Lake Wallula, WA & OR	Portland Walla Walla
Ohio River	Capt. Anthony Meldahl Locks and Dam, OH & KY Nolin Lake, KY Barkley Lock and Dam Lake Barkley, KY Shanango River Lake, PA & OH	Huntington Louisville Nashville Pittsburgh
South Atlantic	West Point Lake, GA Hartwell Lake, GA & SC E.B. Jordan, NC	Mobile Savannah Wilmington
South Pacific	Sepulveda Dam, CA New Hogan Lake, CA	Los Angeles Sacramento
Southwestern	Benbrook Lake, TX Somerville Lake, TX Greers Ferry Lake, AR Robert S. Kerr Lock and Dam, OK	Ft. Worth Ft. Worth Little Rock Tulsa

EC 70-2-24
16 Jun 78

APPENDIX B

Recreation Use Monitoring Stations

<u>Division</u>	<u>RUMS</u>	<u>District</u>
NCD	Wilson Harbor, NY Michigan City Harbor, IN AuSable Harbor and Harbor of Refuge, MI Bolles Harbor, MI	Buffalo Chicago Detroit Detroit
NPD	Grays Harbor Jetties, WA	Seattle
SAD	Atlantic Intercoastal Waterway Murrels, SC Stuart, FL W. P. Franklin, FL Morehead City, NC Fernandina Jetty, FL	Charleston Jacksonville Jacksonville Wilmington Jacksonville
SPD	Newport Bay Jetties, CA	Los Angeles
SWD	Channel to Port Aransas, TX (Increment of Corpus Christi Ship Canal)	Galveston

DEPARTMENT OF THE ARMY
Office of the Chief of Engineers
Washington, D.C. 20314

Reply to
Attention of:

DAEN-CWO-R

10 OCT 1978

SUBJECT: Recreation Research and Demonstration System

SEE DISTRIBUTION

1. Nominations of projects for Recreation Research and Demonstration Units to be included in subject system (Incl 1) are approved as nominated. These projects will establish a Recreation Research and Demonstration System for the U.S. Army Corps of Engineers Recreation Research Program.
2. A letter of agreement between the Commander/Director of the Waterways Experiment Station and the appropriate District Engineer should be exchanged, confirming the particulars of the research units in accordance with EC 70-2-24.

FOR THE CHIEF OF ENGINEERS:

1 Incl
as

Hugh G. Robinson
Brigadier General, USA
Deputy Director of Civil Works

DISTRIBUTION:

Division Engineer, Lower Mississippi Valley
Division Engineer, Missouri River
Division Engineer, North Atlantic
Division Engineer, North Central
Division Engineer, New England
Division Engineer, North Pacific
Division Engineer, Ohio River
Division Engineer, South Atlantic
Division Engineer, South Pacific
Division Engineer, Southwestern

CF: Waterways Experiment
Station

APPENDIX B: ENGINEER REGULATION GOVERNING
RECREATION RESOURCE MANAGEMENT SYSTEM*

* Appendix B refers to the regulation as it existed at the time the RRMS was used in the RRDS selection process.

DEPARTMENT OF THE ARMY
Office of the Chief of Engineers
Washington, D. C. 20314

ER 1130-2-414

DAEN-CWO-R

Regulation
No. 1130-2-414

1 November 1977

Project Operation
RECREATION RESOURCE MANAGEMENT SYSTEM
(RCS DAEN-CWO-39(R2))

Local Supplementation of this regulation is prohibited.

1. Purpose. The purpose of this regulation is to provide guidance for the use of the Recreation-Resource Management System (RRMS).
2. Applicability. This regulation applies to all field operating agencies having Civil Works responsibilities.
3. References.
 - a. ER 18-1-12
 - b. ER 18-2-1
 - c. ER 1120-2-400
 - d. ER 1130-2-400
 - e. ER 1130-2-404
 - f. ER 1130-2-405
 - g. ER 1130-2-406
4. General. The Recreation Resource Management System is a system designed for collecting and analyzing annual recreation facility and recreation-resource management information for each project having an annual visitation of 5,000 recreation days of use or more. The Office, Chief of Engineers, annually furnishes the Bureau of Outdoor Recreation and the Department of Agriculture information collected by this system for integration into nationwide reports. Data from this system is used in the performance of the Corps' Recreation-Resource Management mission and is provided to other Federal agencies, state and local agencies, members of Congress, organizations, individuals, and the news media. This regulation contains instructions for the preparation and submission of this data to OCE.

This regulation supersedes ER 1130-2-414 dated 1 October 1976.

1 Nov 77

5. Reporting. The Annual Update will be submitted for each project having an annual visitation of 5,000 recreation days of use or more. The reporting period will cover the calendar year 1 January thru 31 December. The update material will be submitted to the respective Division office for review. Corrected reports will then be submitted to HQDA (DAEN-CWO-R) WASH DC 20314 not later than 28 February. Fee data (the data on cards 87-90) will be submitted not later than 31 December. That part of the update pertaining to funding will cover the past fiscal year. The annual update will consist of the following parts:

(a) One copy of each project narrative as described in paragraph 9.

(b) Photographs, as described in paragraph 10.

(c) A cover letter which includes the name and commercial telephone number of each District RRMS coordinator and the name and project number of projects recommended for deletion.

6. Definitions. The definitions of key terms used in this regulation and in the RRMS are provided in Appendix A.

7. Basic Rules. The basic rules for the annual submission of the RRMS report are described in Appendix B.

8. Updating Procedures.

a. General. Updating "access" to the RRMS requires that the following data fields always be entered in every card where a change or addition is made: Engineer Reporting Organization Code (EROC), project number, area code (blank for cards 51-68), card number and transaction type. Card numbers 51-68 represent project data only. Card numbers 80-90 represent area data only and each 80-90 card set can occur 899 times if necessary. Each project in the system must always have one area identified with the area code 001; all other areas may have an area code from 002-899. However, each area set must have a unique area code number.

b. When adding a new project to the system, all information must be furnished pertaining to the project, and relevant data fields on card types, 51, 52, 53, 54, 58, 59, 60, 61, 63, 64, 65, 66, 67, and 68 must be filled-in accordingly. Cards 55, 56, 57 and 62 are optional cards and must be submitted when such data is pertinent for the projects. Cards 80, 81, and 82 must be furnished for recreation areas and cards 83, 84, 85, 86, 87, 88, 89, and 90 must be submitted when such data is pertinent for the recreation area.

c. To change existing data, only those fields where data changes are to be made should be filled out. When existing information is to be eliminated from an alpha or alphanumeric card field, and not replaced by updated information, an asterisk (*) must be entered in each column of the applicable field that is to become blank. This special use of the asterisk symbol applies only to transaction type "C" (change) cards (See page C-2). When existing data is to be eliminated from a numeric card field and not replaced by updated information, a zero must be placed in the right-most column of the field.

d. Supplemental Data Storage. Area code numbers from 900 through 999 will not be used.

9. Narrative. Only significant or non-recurring events will be included in the narrative. The elaboration or highlight of data provided in the remainder of the annual report will be added as necessary. The narrative should consist of short, concise remarks. A suggested narrative outline is presented in Appendix K. Only those parts of the outline that pertain to the project should be reported. Supplementary pages may be added as required. Submit narratives on 8"x10-1/2" paper.

10. Photographs.

a. Each District having recreation activity at water resource development projects will provide photographs of those activities as described below. The photographs will be used in publications, talks, and conferences to illustrate the Corps' Recreation and Natural Resource Programs.

b. Only photographs of good quality and having a distinctive purpose should be submitted. Photographs which are out of focus, hazy, underexposed or overexposed, poorly composed, or have poor color or contrast should not be submitted. Pictures of people participation should include close-up actions of individuals. Photographs which convey moods, esthetic values, and the natural beauty of Corps of Engineers projects will be available for use by newspaper, magazine, and free lance writers interested in writing about these areas. Sequence shots, increased use of filters, framing techniques, double exposures, fisheye, or telephoto zoom techniques are encouraged.

c. Identification. All photographic (prints, negatives, or transparencies) material should be labeled as follows:

- (1) District name
- (2) Project identification

1 Nov 77

- (3) Area identification when appropriate
- (4) Brief subject or purpose identification if not readily apparent.
(use subject heading from Appendix L)
- (5) General date of photograph
- (6) Name of photographer (indicate if Corps or non-Corps). If non-Corps, the District should maintain the releases.
- (7) All identification labels and negatives will be securely attached to the back of the print. Slide identification will appear only on the mount. Alternative methods of identification are undesirable.

d. Two types of photographs are requested.

(1) 35 mm color slides - Each District will provide a minimum of ten (originals) slides. Each slide will be of a different subject.

(2) 8"x10" black and white prints with negatives. Each District will provide at least 5 glossy prints, with negatives, which are suitable for publication. All of these prints should contain appropriate subject matter to provide high contrast and appropriate depth of field.

e. Subject Matter. An outline of suggested subject matter is provided in Appendix L. Photographs should illustrate problem areas and examples of good management practices. The central subject should fill most of the frame and posed photographs are not acceptable.

11. RRMS Output. In addition to the reports on attendance, fee areas, and tree planting furnished to other Federal agencies, a series of printouts are provided by the RRMS for the purpose of providing resource managers at all levels assistance in the management of their programs. A list of the available printouts is found in Appendix M.

12. Submission of Recommendations. All constructive suggestions or recommendations for the improvement of the RRMS are welcomed and should be submitted in writing through normal channels to HQDA (DAEN-CWO-R) WASH DC 20314.

ER 1130-2-414

1 Nov 77

13. Questions. All questions on the RRMS should be directed, either by telephone or in writing, to the respective Division Recreation-Resource Management Branch which will in turn contact DAEN-CWO-R if necessary.

FOR THE CHIEF OF ENGINEERS:

14 Appendixes

APP A - Definitions

APP B - Basic Rules

APP C - Part I, Eng Form 4378

APP D - Part II, Eng Form 4378

APP E - Part III, Eng Form 4378

APP F - Part IV, Eng Form 4378

APP G - Part V, Eng Form 4378

APP H - Part VI, Eng Form 4378

APP I - Part VII, Eng Form 4378

APP J - Key punch Instructions

APP K - Suggested Narrative Outline

APP L - Suggested Photographic Subject Matter

APP M - RRMS Output

APP N - State Codes and Abbreviations

James N. Ellis

Colonel, Corps of Engineers

Executive Director, Engineer Staff

Selected Definitions From
ER 1130-2-414

Activity Day-An activity day is one person's participation in one recreation activity at anytime during a 24-hour period without regard to how long he participates or the number of times he participates in that activity during the 24-hour period. If that person participates in more than one activity, each activity should be counted as a separate activity day even though that person's visit to the project constitutes only one recreation day.

Average Recreation Pool Elevation-The elevation (msl) of the pool storage representative of long term average conditions occurring during the seasonal period of greatest public use.

Camp Area-A contiguous collection of family campsites within a given area.

Camp Site-A site to accommodate one family, and including picnic table, charcoal grill, refuse container, parking pad for vehicle and/or trailer, and landscaping.

Day Use Area-Any part of a recreation area primarily used only during daylight hours. This would not include camp areas.

Maximum Pool Elevation-The elevation (msl) of the pool at full reservoir. This elevation corresponds to storage normally cited as reservoir capacity.

Picnic Area-A collection of family picnic sites within a contiguous area.

Picnic Site-A site designated for use by one family for picnicking purposes.

Recreation Area-A block of land developed and utilized for outdoor recreation purposes and reflected in the project master plan or a block of land covered under a long-term license or lease agreement to a public agency. An unimproved former road used for boat launching or any other minor access site is not considered a recreation area unless the area has been further developed to provide recreation facilities, is managed as an area for outdoor recreation activities, and is designated as a recreation area in the master plan.

Recreation Day of Use-A 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. (Supplement No. 1 to Senate Document 97, issued by the Ad Hoc Water Resources Council, 4 June 1964.) A recreation day does not refer to a specific number of hours and should not be confused with "visitor day." (A visitor day consists of an aggregate of 12 visitor hours by one or more persons for the purpose of engaging in one or more recreation activities.)

Selected Data Entered in RRMS From ENG Form 4378
For Each Water Resource Development Project
Having Attendance of More Than 5000
Recreation Days Per Year

U.S. Army Engineer District
Project Name
Water Resource Region
Authorized Project Purposes
Primary State
Secondary State (if any)
Tertiary State (if any)
Year and Month Impoundment Began
Year and Month of Full Operation
Percent of Boundary Marked
Estimated Cost to Complete Boundary Marking
Shoreline Miles at The Average Recreation Pool Elevation
Number of Shoreline Miles at The Average Recreation Pool Elevation Owned
by The Government in Fee Title
Elevation of the Minimum Pool of the Project
Average Recreation Pool Elevation
Elevation of the Flood Pool or Maximum Pool Elevation
Number of Encroachments on Corps-Administered Lands
Acquisition Policy under Which The Real Estate For The Project was
Acquired
Total Project Area Divided into
River Bed
Flowage Easement
Fee
Total Water Surface of the Average Recreation Pool
Flood Pool Surface
Acres of Fee Land Above the Average Recreation Pool
Number of Quasi-Public Areas leased to or Used by a Special Interest
Group, such as Church Group, Scout Camp.
Visitation to all Quasi-Public Areas
Distance to the Nearest Standard Metropolitan Statistical Area, Name of
SMSA, and population of the SMSA
Recreation Days of Use by Month
Total Recreation Days of Use for the Project By Calendar Year
Activities Engaged in by Visitors
Number of Designated Off-Road Vehicle Areas
Inventory of Recreation Facilities by
Number of Corps-managed picnic sites
Number of picnic sites managed by other than the Corps
Number of Developed Campsites managed by the Corps
Number of Developed Campsites managed by other than the Corps
Number of Boat Launching Lanes
Number of Permitted Private Boat Docks
Number of Community Docks
Number of Other Floating Facilities

Acres of Land Reforested
Date Management Plans and Master Plan were Approved
Staffing
Law Enforcement Activity by
 Number of Permanent Corps employees with Citation Authority
 Number of Warnings Issued
 Number of Citations Issued
 Number of Convictions
 Number of Cases Pending at the End of the Year
Land and Water Management with the Number of Acres Allocated to
 Project Operations
 Recreation-Intensive Use by Managing Agency
 Recreation-Low Density Use by Managing Agency
 Natural Area by Managing Agency
 Wildlife Management by Managing Agency
 Reserve Forest Land by Managing Agency
 Intensive Forest Management by Managing Agency
Details About each Specific Recreation Area, such as
 Name of Area
 State in Which it is Located
 Managing Agency, such as
 Corps of Engineers
 Other Federal Agency
 State Government
 Local Government
 Concessionaire
 All Others
Total acreage allocated in the Master Plan
Number of Acres that are presently developed for intensive recreation
Recreation Days of Use
Budgets
Expenditures
Estimated Sanitation Requirements
Potable Water System
Cost Sharing Information
Facility Inventory
Fee Collection Information

RRMS OUTPUT

The data submitted for the annual RRMS update is available for use by all of the Corps' field operating agencies. Requests for data should be forwarded to HQDA (DAEN-CWO-R) WASH DC 20314.

The following is a list of the most frequently used data reports from the RRMS.

PROJECT AND AREA REPORTS

<u>REPORT NO.</u>	<u>REPORT NAME</u>
A	Summary of the Number of Projects and Recreation Areas with State and Region Locations by District
B	All Projects by State Location
C	All Projects by Water Resource Region Location
E	All Projects With Recreation Areas, States, and Managing Agency by District
F	All Projects and Recreation Areas by Primary State Location
G	All Projects and Recreation Areas by Water Resource Region
H	All Recreation Areas by State Location
D-1	CY Attendance At Corps Projects by Month (District and Division Totals)
D-2	CY Attendance At Corps Projects by Month (Project Totals)
D-3	Rank of Corps Projects by Total Calendar Year Attendance
D-4	CY Attendance at Corps-Managed Recreation Areas and Recreation Areas Managed by Others
D-5	Recreation Use Patterns At Corps Projects--Percent of Activity Use and Attendance on Average Weekend Day During Peak Month
D-6	Top 200 Recreation Areas Ranked by CY Attendance

D-7	Date of Impoundment and Operation, Authorized Project Purposes, Boundary and Land Acquisition Status For Corps Projects
D-8	Land and Water Area at Corps Projects
D-9	The Location of Corps Projects in Relation to Standard Metropolitan Statistical Areas (SMSA)
D-10	Personnel At Corps Projects
D-11	Private Recreation Facilities at Corps Projects
D-12	Law Enforcement Summary At Corps Projects
D-13	Land and Water Management Summary (Division, District, and National Totals)
D-14	Number of Recreation Areas by Managing Agency and Day or Night Areas
D-15	Visitation, Acreage, Capital Improvement, and O&M Expenditures By Managing Agency by Project and Recreation Area
D-16A	Visitation, Acreage, and Expenditures For Corps Recreation Areas
D-16B	Visitation, Acreage, and Expenditures For Other Federal Agency Recreation Areas
D-16C	Visitation, Acreage, and Expenditures For State Recreation Areas
D-16D	Visitation, Acreage, and Expenditures For Local Recreation Areas
D-16E	Visitation, Acreage, and Expenditures For Private Recreation Areas
D-17	Summary of Recreation Facilities At All Corps Projects
D-18A	Summary of Recreation Facilities At Corps-Managed Recreation Areas
D-18B	Summary of Recreation Facilities At Other Federally-Managed Recreation Areas
D-18C	Summary of Recreation Facilities At State-Managed Recreation Areas

D-18D	Summary of Recreation Facilities At Locally-Managed Recreation Areas
D-18E	Summary of Recreation Facilities at Privately-Managed Recreation Areas
D-19A	Concessions at Corps-Managed Recreation Areas
D-19B	Concessions at Recreation Areas Managed by Other Federal Agencies
D-19C	Concession at State-Managed Recreation Areas
D-19D	Concessions at Locally-Managed Recreation Areas
D-19E	Concessions at Privately-Managed Recreation Areas
D-20	Summary of Corps-Managed Use-Fee Areas
D-21	Summary of Project Master Plans and Appendixes with Schedules for Updating
D-22	Status of Encroachments at Corps Projects with Comparative Data on Total Land and Water Area, Acquisition Policy and Percent of Boundary Surveyed

All reports are available upon request. A list of the reports desired by each District should accompany the annual update cover letter.

Requests for reports in addition to those listed in the second paragraph will be filled on a first come-first served basis.

APPENDIX C: LISTING OF CORPS INVOLVEMENT
IN RECREATION AND RELATED NATURAL
RESOURCE ACTIVITIES

1. A listing of Corps elements with significant recreation-related activities, at the District level, was derived from a reading of Division reports.

2. It was determined that the planning element (including environmental resources) should have reliable, verified recreation data for the following activities:

- a. Master planning for completed Water Resource Development Projects (WRDP) for which the Corps retains operational responsibility. Research verified information is needed to:
 - (1) Establish management objectives in a regional context.
 - (2) Allocate project resources to specific uses and classes of operators.
 - (3) Interact with changing values ascribed to other project purposes.
- b. Comprehensive river basin planning where valid recreation information is used to:
 - (1) Compare structural and nonstructural alternatives.
 - (2) Make entries in Principles and Standards accounts.
 - (3) Negotiate with other levels of government.
- c. Special studies where recreation values are important considerations:
 - (1) Urban studies program.
 - (2) Recreation navigation.
 - (3) Local flood protection.
 - (4) Beach and channel stabilization.
- d. Support for permits issuing element in assessing projects for which applications for Section 404 or Section 10 permits have been filed.

3. It was also determined that the recreation-resource management element would benefit from reliable, verified recreation information when:

- a. Branch chiefs and project resource manager:
 - (1) Interact with planning and design teams.
 - (2) Set operating policies to protect visitors and investments in facilities and to protect and manage the resource base.

(3) Prepare program budgets for staffing and operations and maintenance.

- b. Decisions are made with respect to minor facility improvement, rehabilitation, or other investments made in the discretion of project personnel.
- c. Dealing with other public agencies operating facilities on Corps WRDP's.

4. The reading also revealed that the design element badly needs reliable, verified information to:

- a. Correctly size and design specific facilities that will aid in accomplishing the management objectives of a specific project.
- b. Prepare recreation area layouts that are cost-effective and meet with high acceptance from the specific user groups for whom they are intended.

5. It was determined that the policy analysis element depends upon reliable, verified recreation information to evaluate Corps policy in such subject areas as:

- a. Fees and charges.
- b. Cost-sharing with non-Federal entities.
- c. Legislative proposals for national recreation areas.

6. Finally, it was determined that the real estate disposal and management element should have reliable, verified recreation information available when making decisions about:

- a. Concession operators in Corps-operated recreation areas.
- b. Outgrants to private individuals for resource management.
- c. The value of dispersed recreation use on land being considered for classification as excess.

**APPENDIX D: RATIONALE FOR PHYSIOECONOMIC
REGIONAL BOUNDARIES**

1. By simply comparing the maps shown in Plates 1 and 2, adjustments were made in the regional delineations constructed from topographic vegetative consideration. The most notable adjustments occurred in those topographic regions having extensive north-south dimensions, but, with a single exception, the integrity of the external boundaries of the topographic regions were not violated. The exception is that portion of the coastal plains which, by topographic definition, includes the broad, level Mississippi Valley as far north as Cairo, Illinois.* That portion of the coastal plain above a line roughly extending from Laurel, Mississippi, through Natchez, Mississippi, to Alexandria, Louisiana, was included in the central lowlands region. The composite boundaries of regions that have within them homogeneous groupings of resource and population factors associated with the relative attractiveness of Corps projects and the propensity of people to recreate upon them are shown in Plate 4.

2. Some of the major adjustments emphasized vegetative differences while others relied upon economic conditions. The Atlantic Coastal Plain and the Piedmont Plateau were divided into northern and southern portions on social economic grounds: industrial activity, population density, and climate, among other things, in the north dictate a recreation user pattern at variance with the southern and western portions. Morphologic and vegetation distinctions do exist, but they are not readily observed. Thus, the topographic region was divided along the North Carolina-Virginia state border. In the case of the Appalachian complex, the Appalachian Regional Commission, as previously noted, has divided the region into three parts. The economic rationale did not seem sufficiently strong when applied to recreation behavior to warrant a similar split. Again, a sharp north-south schism does exist. The vegetative line distinguishing the northern Appalachian Hardwood region from the

* A legitimate argument can be made for a demarcation in central Florida based on the rationale that user patterns south of the line are not the same as to the north. From the standpoint of the character of Corps projects in Florida, such a line would have little impact upon the selection process.

Southern Appalachian Hardwoods was chosen as the separator of the two parts of the complex.

3. The most difficult adjustments to make involved the topographic definition of the Central highlands and plains. As such, they extend from the Cumberland Plateau province to the Rocky Mountains and from beyond the Canadian border to Mexico. Obviously, there is too much diversity within the region to let it stand as a single stratum. The east-west dimension was divided by relying upon existing and potential vegetation as shown in Plate 1: roughly, the transition from tall grass prairie to short grass prairie. The northeast and southeast regions were defined on the basis of agricultural and industrial patterns and the Ohio River and Ozarkia were chosen as the approximate line dividing the sets of characteristics. There is no totally satisfactory definition for the northwestern and southwestern portions. A purely arbitrary division is provided through the middle of Kansas to distinguish the northern Great Plains from the southern Great Plains. There is vegetative justification for a line much farther south and for four economic divisions. However, the selection process seeks only to deal in very gross ways with resource-user relationships and the two strata separation was judged adequate in scale to the task. The Coastal Range province was divided at the Tehachapi Mountains to distinguish the obvious differences between northern and southern California; a second division was made to match the separation of the Cascade Mountains from the Sierra Nevada Mountains.

4. Not all the strata are relevant to the selection of Corps projects. Some of the regions have little or no Corps activity; others with significant Corps activity are dominated by other resource agencies. Application of this reasoning eliminated the Hudson River, Lake Champlain-St. Lawrence Valley region; the Southern Blue Ridge region; the three Rocky Mountain regions; the Colorado Plateau region; the Great Basin region; and the Central Valley-Willamette-Puget Sound region.

APPENDIX E: DIVISION MEANS BY CLASS AND
REPRESENTATIVE WATER RESOURCE DEVELOPMENT
PROJECTS

Table E1
Lower Mississippi Valley Division*

Class	Project	Water+ Surface acres	Fee Land+ Above Pool acres	Gross+ Project Size acres	Total Shoreline miles	Surface+ Fluctuation ft	Number of Recreation Areas Total	Recreation Areas Managed by Corps		Recreation Areas Managed by Other		Dispersed+ Recreation Use Percent	District	Weighted Class Selection		
								Gross	Per Area	Gross	Per Area					
Conventional reservoirs	Division means 15 projects	20,821	37,161	57,877	183	21.3	17.7	13.2	4.5	1,908,069	1,315,956	97,238	423,067	88,228	8.8	2
	DeGray§§	13,400	18,400	31,800	207	41.0	21.0	19.0	2.0	1,787,100	1,325,265	71,171	461,800	230,900	0	Vicksburg
	Carlisle	26,000	36,489	52,489	83	20.0	15.0	9.0	6.0	2,310,639	1,375,803	153,200	785,863	130,977	6.3	St Louis
	Rand	18,900	21,733	40,633	162	13.0	24.0	15.0	9.0	2,178,456	1,715,996	114,400	384,951	42,772	3.6	St Louis
	Shelbyville§§	29,400	11,100	40,506	172	27.0	19.0	12.0	7.0	2,997,238	1,587,982	132,332	965,932	137,990	14.8	St Louis
Waterways	Wappapello	8,400	35,113	44,636	180	5.0	19.0	12.0	7.0	1,658,631	1,328,976	110,748	272,132	38,876	3.5	Memphis
	Division means 5 projects	13,600	4,145	18,740	208	3.0	9.0	3.4	5.6	1,561,262	255,342	75,101	221,432	39,542	69.5	0
	MWP 26	28,121	11,119	41,400	256	5.0	15.0	1.0	14.0	3,923,884	98,700	98,700	168,895	12,064	3.6	St Louis
	MWP 25	17,480	5,046	23,500	67	4.0	8.0	1.0	7.0	1,390,554	68,190	68,190	30,344	4,775	93.2	St Louis
	Columbia	4,036	0	4,981	222	0	10.0	8.0	2.0	1,491,492	609,977	76,247	881,515	440,758	0	Vicksburg

* Source: Headquarters, Department of the Army (1976).

§§ Corps Water Resource Development Project.

+ Area within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).

++ Area between the exterior boundaries of the project and the contour representing the average recreation pool that is owned in fee simple title by the United States.

‡ Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States is the land area in which the United States owns easements.

§ Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.

§ Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas expressed as a percentage of total project attendance.

§§ Projects tested against the selection criteria strata as "average" class projects in the Division.

Table E2
Missouri River Division^a

Class	Project ^{ee}	Water [†] Surface acres	Fee Land ^{††} Above Pool acres	Gross ^{††} Project Size acres	Total Shoreline miles	Surface [‡] Fluctuation ft.	Number of Recreation Areas		Gross	Attendance Recreation Areas Managed by Corps		Recreation Areas Managed by Others	Dispersed [§] Recreation Use Percent	Weighted Class Selection
							Total	Other		Gross	Per Area	Per Area		
Conventional reservoir	Division means 28 projects	4,821	10,936	15,507	54	14.2	4.3	3.0	1.2	650,466	331,774	110,591	250,504	208,753
	Pomona d'Arre	7,820	12,740	20,560	113	57.0	10.0	7.0	3.0	2,002,400	856,100	122,300	473,300	157,167
	Pomona ^{§§}	4,000	8,301	12,301	52	10.0	10.0	9.0	1.0	924,300	572,200	63,578	229,500	229,500
	Manopolia	3,500	18,600	22,100	33	37.0	4.0	2.0	2.0	701,900	243,800	121,900	313,600	156,800
Missouri River main stem	Division means 6 projects	176,632	137,117	304,249	990	43.0	25.0	18.0	7.0	1,572,467	950,374	54,307	424,346	59,211
	Oahe ^{§§}	313,000	163,875	476,875	2250	68.0	40.0	37.0	3.0	2,004,600	1,168,385	31,578	246,475	82,158
	Sakakava	315,000	178,098	493,098	1340	62.0	30.0	13.0	17.0	786,400	400,100	30,777	318,500	18,735
	Francis Case	79,000	54,047	133,047	540	40.0	20.0	20.0	0	1,568,600	1,133,961	56,698	0	0

^a Source: Headquarters, Department of the Army (1976).

^{ee} Corps Water Resource Development Project.

[†] Areas within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).

^{††} Area between the exterior boundaries of the project and the contour representing the average recreation pool that is owned in fee simple title by the United States.

[‡] Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States is the land area in which the United States owns easements.

^{§§} Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.

[§] Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas expressed as a percentage of total project attendance.

^{§§} Projects listed against the selection criteria strata as "average" class projects in the Division.

Table 23
New England Division*

Class	Projects	Water [†] Fee Land ^{††} Surface Above Pool Acres	Gross Project Site Acres	Total Shoreline Miles	Surfact [‡] Fluctuation ft	Recreation Areas [§] Total CORPS Other	Attendance		Recreation Areas [¶] Managed by Others		Dispersed ^{§§} Recreation Use		Weighted Class Selection
							Gross	Per Area	Gross	Per Area	Percent	District	
Conventional reservoir	Division means 20 projects	218	1566	1784	7	8	119,522	61,295	27,580	55,160	0		1
	No. Marlboro	267	1461	1728	6	35	46,277	33,192	15,085	15,085	0	NE	
	E. Brimfield	350	2397	2717	7	0	213,581	20,023	193,558	96,779	0	NE	
	Townsend	100	1118	1218	3	0	119,043	59,522	0	0	0	NE	
Waterways	Division means 1 project	500	676	1176	15	0	1,880,350	1,332,450	574,900	143,725	--		0
	Cape Cod Canal	500	676	1176	15	0	1,880,350	1,332,450	574,900	143,725	--	NE	
Dry reservoir	Division means 10 projects	NA [§]	4717	4717	NA	2.0	91,412	59,396	45,689	32,016	0		1
	Birch Hills	NA	4649	4649	NA	4.0	189,025	35,580	17,790	153,445	0	NE	
	Franklin PIs	NA	3912	3912	NA	2.0	114,538	57,336	57,336	57,202	0	NE	

* Source: Headquarters, Department of the Army (1976).

** Corps Water Resource Development Project.

† Area within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).

†† Area between the exterior boundaries of the project and the contour representing the average recreation pool that is owned in fee simple title by the United States.

‡ Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States is the land area in which the United States owns easements.

§ Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.

§§ Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas expressed as a percentage of total project attendance.

¶ Projects listed against the selection criteria strata as "average" class projects in the Division.

§ Not applicable.

Table E4
North Atlantic Division*

Class	Project	Water Surface Above Pool Feet	Gross Project Size Acres	Total Shoreline Miles	Surface Fluctuation Feet	Number of Recreation Areas	Attendance		Recreation Areas Managed by Corps		Recreation Areas Managed by Others		Dispersed Recreation Use Percent	Weighted Class Selection
							Gross	Per Area	Gross	Per Area	Gross	Per Area		
Conventional reservoir	Division means 11 projects	1,258	3,471	19	13.2	2.6	295,353	66,472	106,355	66,472	171,966	171,966	5.8	1
	Whitney Point**	1,200	3,378	11	7.0	3.0	200,595	0	0	0	200,595	66,865	0	Baltimore
	P. J. Sayers	1,730	5,848	23	20.0	1.0	292,266	0	0	0	292,266	292,266	0	Baltimore
	Beltzville	947	2,670	20	91.0	2.0	689,117	39,750	39,750	39,750	546,577	546,577	0	Phila- delphia
Waterways	Division means 2 projects	878	6,837	26	0	1.0	0.5	148,143	164,200	164,200	132,086	132,086	27.6	0
	C&D Canal	1,416	12,394	35	0	1.0	1.0	0	164,200	164,200	0	0	0	Phila- delphia
Small craft	A&C Canal	340	1,280	16	0	1.0	0	132,086	0	0	132,086	132,086	55.4	Norfolk
	Shark River**													New York
Beach protect	Wildwood**													Phila- delphia

* Source: Headquarters, Department of the Army (1976).

** Corps Water Resource Development Project.

†† Areas within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).

‡ Areas between the exterior boundaries of the project and the contour representing the average recreation pool that is owned in fee simple title by the United States.

§ Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States is the land area in which the United States owns easements.

|| Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.

¶ Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas expressed as a percentage of total project attendance.

** Projects tested against the selection criteria strata as "average" class projects in the Division.

Table E5
North Central Division*

Class	Project	Water Surface Area Acres	Gross Project Size Acres	Total Shoreline Miles	Surface Fluctuation ft	Number of Recreation Areas			Attendance		Recreation Areas		Dispersed Recreation Use Percent	Weighted Class Selection
						Total	Core	Other	Gross	Per Acre	Gross	Per Acre		
Conventional reservoir	Division means 8 projects	5,723	8,085	20,161	4.1	6.1	4.0	2.0	721,594	425,781	106,445	210,849	105,424	1
	Lac Qui Parle†	11,350	500	21,337	50	2.0	2.0	0	262,000	225,792	112,896	0	0	
	Cornellville	4,900	19,691	34,667	68	14.0	8.0	6.0	3,196,800	1,870,200	233,775	1,243,200	207,200	St. Paul
	Traverse	13,700	1,104	15,041	68	4.0	3.0	1.0	269,300	51,357	17,119	5,300	5,300	Rock Island
Waterways	Division means 29 projects	8,031	1,775	11,202	103	4.2	1.7	2.5	627,849	137,983	83,365	66,670	40,742	St. Paul
	MRP 17†	8,312	7,951	16,324	231	6.0	2.0	4.0	653,429	83,870	41,935	369,060	52,265	1 or 2
	MRP 9	15,408	605	16,110	65	4.0	3.0	1.0	498,200	89,838	29,940	145,000	145,000	Rock Island
	MRP 10	11,905	620	13,869	61	6.0	2.0	4.0	371,400	111,104	55,521	97,100	24,275	St. Paul
Irrigation reservoir	Division means 1 project	NA†	610	41,603	NA	1.0	0	1.0	41,603	0	0	41,603	41,603	St. Paul
	Paradale	NA	610	41,603	NA	1.0	0	1.0	41,603	0	0	41,603	41,603	0
	Division means 6 projects	37,434	302	88,596	124	3.5	2.3	1.2	1,218,317	111,207	47,660	4,068	3,486	Chicago
	Polegum†	15,885	8	81,081	55	1.0	1.0	0	1,150,400	119,846	119,846	0	0	90.5
Natural lakes	Winnabigoishah	66,830	71	147,164	141	1.0	1.0	0	847,900	87,050	87,050	0	0	89.6
	Pine River	13,606	332	31,177	119	2.0	7.0	2.0	2,041,000	250,761	35,823	1,680	840	89.7
	Sturgeon Bay†													St. Paul
	Grand Haven†													Chicago
Small craft														Detroit

* Source: Headquarters, Department of the Army (1976).

† Corps Water Resource Development Project.

‡ Area within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).

§ Difference between the exterior boundaries of the project and the contour representing the average recreation pool that is owned in fee simple title by the United States.

|| Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States is the land area in which the United States owns easements.

¶ Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.

§ Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas expressed as a percentage of total project attendance.

|| Projects tested against the selection criteria strata as "average" class projects in the Division.

¶ Not applicable.

Table B6
North Pacific Division*

Class	Project ^{ee}	Water ^{ee} Surface acres	Fee Land ^{ee} Above Pool acres	Gross ^{ee} Project Size acres	Total Shoreline miles	Surface ^{ee} Fluctuation ft	Number of			Attendance			Recreation Areas		Dispersed ^{ee} Recreation Use percent	Weighted Class Selection
							Total	Corps	Other	Gross	Recreation Areas Managed by Corps	Per Area	Gross	Per Area		
Multireservoirs	Division means ^{ee} 19 projects	5,292	3,323	11,659	46	82	4.0	2.5	1.5	263,454	106,987	42,351	139,362	94,567	6.5	1
	Tern Ridge ^{ee}	8,925	2,975	12,798	32	20	6.0	2.0	4.0	1,464,190	416,603	208,302	965,911	241,478	5.6	Portland
	Chief Joseph	5,200	8,027	17,978	106	16	5.0	4.0	1.0	81,836	##	##	81,836	81,836	0	Seattle
	Lucky Peak	2,128	3,835	7,310	45	150	9.0	5.0	4.0	718,121	294,727	58,946	279,394	69,848	20.0	Walla Walla
Lock and multireservoir	Division means 8 projects	18,643	4,465	29,254	126	4.6	9.6	6.1	3.5	969,287	362,746	59,466	535,625	153,036	7.3	1
	Bonaville ^{ee}	20,600	1,127	24,803	130	3.0	7.0	3.0	4.0	1,171,100	640,546	213,515	470,419	117,605	5.1	Portland
	McMurry	35,922	12,290	53,912	242	5.0	15.0	7.0	8.0	4,301,435	900,162	128,994	2,945,280	368,160	10.6	Walla Walla
	Little Goose	10,025	1,605	16,815	92	5.0	8.0	5.0	3.0	390,742	46,801	9,360	343,941	114,647	0	Walla Walla
Waterways	Division means 1 project	61	28	89	80	1.0	3.0	2.0	1.0	861,179	861,179	430,590	##	##	0	0
	Lake Wash Canal	61	28	89	80	1.0	3.0	2.0	1.0	861,179	861,179	430,590	##	##	0	Seattle
Dry reservoirs	Division means 1 project	NA ^{ee}	569	570	NA	NA	2.0	2.0	0	84,810	84,810	42,405	0	0	0	0
	Wynoochee	NA	569	570	NA	NA	2.0	2.0	0	84,810	84,810	42,405	0	0	0	Seattle

- * Source: Headquarters, Department of the Army (1976).
- ^{ee} Corps Water Resource Development Project.
- ^{ee} Areas within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).
- ^{ee} Area between the exterior boundaries of the project and the contour representing the average recreation pool that is owned in fee simple title by the United States.
- ^{ee} Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States is the land area in which the United States owns easements.
- ^{ee} Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.
- ^{ee} Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas expressed as a percentage of total project attendance.
- ^{ee} Attendance averages do not include attendance at facilities built and managed by U. S. National Forest Service at Upper Willamette Project lakes.
- ^{ee} National Forest System attendance is reported in the Recreation Information Management System of the National Forest Service.
- ^{ee} Projects tested against the selection criteria strata as "average" class projects in the Division.
- ^{ee} Discrepancy not accounted for.
- ^{ee} Not reported.
- ^{ee} Not applicable.

Table 27
Ohio River Division*

Class	Project**	Water† Surface Above Pool acres	Gross Project Size acres	Total Shoreline miles	Surface‡ Fluctuation ft.	Number of Recreation Areas			Attendance		Recreation Areas Managed by Corps		Recreation Areas Managed by Others		Dispersed§ Recreation Use percent	District	Weighted Class Selection
						Total	Corps	Other	Gross	Per Area	Gross	Per Area	Gross	Per Area			
Multireservoirs	Division means 61 projects	4,318	7,195	13,043	87	19.6	6.2	3.0	3.1	1,016,985	314,162	104,721	474,361	153,020	22.5		1
	Shenango§§	3,550	10,994	15,071	44	11.0	6.0	3.0	3.0	1,249,400	905,600	301,867	255,800	81,975	7.0	Pittsburgh	
	Brookville	5,260	11,665	17,407	61	35.0	15.0	2.0	13.0	1,202,212	167,800	83,900	1,034,600	75,585	#	Louisville	
	Delaware	1,300	6,403	10,131	38	5.0	3.0	1.0	2.0	1,064,200	77,600	77,600	986,600	49,330	0	Huntington	
Lock and multi- purpose	Division means 4 projects	24,958	12,771	46,585	562	6.0	28.5	21.0	7.5	3,238,900	1,325,100	63,100	803,975	107,197	34.3		1
	Old Hickory	22,500	5,056	34,189	440	3.0	39.0	22.0	17.0	4,625,000	1,308,300	59,468	962,600	56,624	50.9	Nashville	
	Barkley§§	57,920	29,184	108,600	1004	13.0	44.0	38.0	6.0	4,982,600	1,962,100	51,634	1,684,200	280,700	26.8	Nashville	
	Cordell Hull	11,960	14,846	32,822	381	5.0	14.0	13.0	1.0	1,586,100	1,138,900	87,608	7,500	7,500	27.7	Nashville	
Waterways	Division means 36 projects	6,951	33	8,218	75	0	3.0	2.2	0.8	121,902	50,589	22,995	49,128	61,410	18.2		1
	Raccoon§§	5,300	0	7,536	230	0	2.0	1.0	1.0	132,100	15,400	15,400	113,600	113,600	2.3	Huntington	
	Markland	12,075	0	12,075	BR**	BR	11.0	7.0	4.0	484,600	239,500	34,214	244,900	61,225	<0.1	Louisville	
	Pikes Island	4,940	177	5,701	60	0	5.0	4.0	1.0	64,100	41,400	10,350	2,000	2,000	32.3	Pittsburgh	
Dry reservoirs	Division means 5 projects	NA§	337	10,801	NA	NA	1.2	1.0	0.2	124,640	106,960	106,960	9,680	48,400	6.4		1
	Mohicanville	NA	92	13,768	NA	NA	1.0	1.0	0	9,100	9,100	9,100	0	0	0	Huntington	
	Mohawk§§	NA	251	14,024	NA	NA	2.0	1.0	1.0	205,800	157,400	157,400	48,400	48,400	0	Huntington	
	Bolivar	NA	713	9,023	NA	NA	1.0	1.0	0	101,000	101,000	101,000	0	0	0	Huntington	

* Source: Headquarters, Department of the Army (1976).

** Corps Water Resource Development Project.

† Areas within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).

‡ Area between the exterior boundaries of the project and the contour representing the average recreation pool that is owned in fee simple title by the United States.

§ Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States is the land area in which the United States owns easements.

§§ Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.

§§ Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas expressed as a percentage of total project attendance.

§§ Projects listed against the selection criteria are as "average" class projects in the Division.

Sum of attendance at developed recreation areas exceeds gross attendance.

Not reported.

§ Not applicable.

Table B8
South Atlantic Division*

Class	Project	Water Surface Acres	Fee Land Above Pool Acres	Gross Project Size Acres	Total Shoreline Miles	Surface Fluctuation Ft	Number of			Attendance			Recreation Areas			Dispersed Recreation Use Percent	District	Weighted Class Selection
							Total	Recreation	Other	Gross	Managed by Corps	Per Area	Gross	Managed by Others	Per Area			
Multireservoirs	Division means 10 projects	26,735	25,062	53,845	435	31.1	37.5	29.0	10.5	4,178,933	1,900,059	65,519	889,378	84,703	33.2		1	
	West Point§§	25,900	30,467	58,068	539	15.0	44.0	39.0	5.0	1,069,274	946,707	24,274	122,567	24,513	0	Mobile		
	Sidney Lanier	38,000	19,187	57,906	540	35.0	64.0	46.0	18.0	13,048,837	3,744,869	81,410	2,719,619	151,090	50.4	Mobile		
	Allatoona	12,010	25,747	37,924	270	40.0	37.0	29.0	8.0	7,064,098	2,887,081	99,554	1,302,962	162,870	40.7	Mobile		
	Division means 4 projects	28,048	7,522	52,747	444	1.2	23.8	19.8	4.0	2,579,063	837,405	42,293	438,966	109,742	50.5		1	
Lock and multi- reservoirs	Millers Ferry§§	17,200	0	34,911	516	1.0	21.0	20.0	1.0	2,297,500	784,013	39,201	113,312	113,312	60.9	Mobile		
	Seminole	37,500	15,847	65,306	290	1.0	31.0	23.0	8.0	3,352,046	1,384,381	60,190	1,024,033	128,004	28.2	Mobile		
	Jones Bluff	12,300	0	25,318	368	1.0	16.0	15.0	1.0	230,200	153,720	10,248	6,500	6,500	30.4	Mobile		
	Division means 9 projects	52,469	1,921	70,633	278	1.1	8.6	8.2	0.2	936,122	323,701	39,476	22,812	114,060	63.0		0	
Waterways	Black Warrior	3,215	269	35,200	621	0	6.0	6.0	0	1,404,070	232,141	38,690	0	0	83.5	Mobile		
	Warrior Tum Bigbee	27,000	11,656	113,801	1115	NR#	37.0	36.0	1.0	2,761,200	1,071,011	29,750	205,308	205,308	53.8	Mobile		
	ATW at Cape Canaveral§§															Jackson- ville	2	
Navigation	Proposed Jetty, Oregon Inlet§§															Wilmington		

* Source: Headquarters, Department of the Army (1976).

§§ Corps Water Resource Development Project.

• Areas within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).

•• Areas between the exterior boundaries of the project and the contour representing the average recreation pool that is owned in fee simple title by the United States.

† Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States is the land area in which the United States owns easements.

‡ Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.

§ Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas expressed as a percentage of total project attendance.

§§ Projects tested against the selection criteria strata as "average" class projects in the Division.

0 Not reported.

Table B9
South Pacific Division^a

Class	Protectee	Water ^c Surface acres	Fee Land ^d Above Pool acres	Gross ^e Project Size acres	Total Shoreline miles	Surface ^f Fluctuation ft	Number of			Attendance			Recreation Areas			Dispersed ^g Recreation Use percent	Weighted Class Selection
							Recreation Areas			Managed by Corps			Managed by Others				
							Total	Corps	Other	Gross	Per Area	Gross	Gross	Per Area	Per Area		
Multireservoirs	Division means 12 projects	1918	3560	7,527	20	49.5	5.9	5.3	0.7	517,044	62,815	332,919	178,937	255,624	1.0	1	
	New England ^h	3120	2939	6,153	44	90.0	4.0	4.0	0	194,220	48,545	194,179	0	0	<0.1	Sacramento	
	Black Belt	3128	4946	8,917	23	40.0	6.0	6.0	0	243,240	40,540	243,240	0	0	0	Sacramento	
	Pine Flat	4500	8771	13,284	55	75.0	6.0	5.0	1.0	694,190	86,776	433,880	216,400	216,400	6.3	Sacramento	
Dry reservoirs	Division means 6 projects	NA ⁱ	1603	2,589	NA	NA	1.3	0	1.3	798,517	0	0	798,517	598,888	0	1	
	Sepulveda ^j	NA	2097	2,097	NA	NA	1.0	0	1.0	1,457,500	0	0	1,457,500	1,457,500	0	Los Angeles	
	Whittier Narrows	NA	2702	2,888	NA	NA	2.0	0	2.0	1,209,200	0	0	1,209,200	604,600	0	Los Angeles	
	Carbon Canyon	NA	200	321	NA	NA	1.0	0	1.0	182,500	0	0	182,500	182,500	0	Los Angeles	
Small craft	Crescent City Harbors ^k															San Francisco	

^a Source: Headquarters, Department of the Army (1976).

^b Corps Water Resource Development Project.

^c Areas within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).

^d Areas between the exterior boundaries of the project and the contour representing the average recreation pool that is owned in fee simple title by the United States.

^e Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States is the land area in which the United States owns easements.

^f Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.

^g Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas expressed as a percentage of total project attendance.

^h Projects rated against the selection criteria strata as "average" class projects in the Division.

ⁱ Not applicable.

Table E10
Southwestern Division*

Class	Project	Water Surface Acres	Fee Land** Acres	Total Project Size Acres	Total Shoreline Miles	Surface [†] Fluctuation Ft.	Recreation Areas			Attendance Managed by Corps Gross Per Area	Recreation Areas Managed by Others Gross Per Area		Dispersed [§] Recreation Use Percent	District	Weighted Class Selection
							Total	Core	Other						
Conventional reservoirs	Division means 54 projects	15,785	17,128	30,156	152	25.6	12.2	8.9	3.3	2,029,747	1,198,939	134,712	324,615	98,368	24.9
	La Voss [§]	9,266	16,063	38,126	121	25.0	19.0	19.0	0	1,699,663	1,273,085	67,004	0	0	25.1
	Oologah	29,460	20,690	60,755	209	48.0	13.0	12.0	1.0	1,781,200	1,530,400	127,533	94,300	94,300	8.8
	Beaver	28,200	9,820	40,464	449	43.0	25.0	11.0	14.0	3,842,400	1,622,600	147,509	193,000	13,786	52.7
	Barton	18,948	11,809	32,227	136	12.0	13.0	13.0	0	2,701,323	1,295,229	99,633	0	0	52.0
Lock & multi-reservoirs	Division means 4 projects	13,250	25,286	41,995	110	14.0	9.0	9.0	0	638,100	472,300	52,478	0	0	26.0
	Dardanelle [§]	24,450	14,282	48,195	206	2.0	12.8	10.0	2.8	1,389,200	802,642	80,264	218,478	78,028	26.5
	Robert S. Kerr	34,300	11,528	60,181	315	2.0	19.0	14.0	5.0	2,778,300	1,311,600	93,686	570,500	114,100	32.2
	Quark	42,000	21,445	65,706	250	1.0	12.0	9.0	3.0	1,054,900	764,973	84,997	171,410	57,137	11.2
	Division means 12 projects	10,600	11,703	39,004	165	2.0	11.0	8.0	3.0	860,000	474,200	99,275	132,000	44,000	29.5
Waterways	Division means 12 projects	4,590	2,127	5,769	72	0.3	4.3	4.2	0.2	488,483	350,292	83,403	48,583	242,915	18.3
	West Grinn	1,350	2,750	4,800	77	0	7.0	7.0	0	580,500	543,041	77,577	0	0	6.4
	Lock & Dam No. 3	3,670	430	6,211	36	0	3.0	3.0	0	230,700	222,600	74,200	0	0	3.5
	Division means 5 projects	248	8,630	11,805	MA	MA	1.6	1.4	0.2	136,680	54,580	34,112	82,100	410,500	0
	Abiquiu	MA	3,368	9,481	MA	MA	3.0	3.0	0	110,400	110,400	36,800	0	0	0
Jetties	Addicks	MA	13,722	13,722	MA	MA	1.0	0	1.0	410,500	0	0	410,500	410,500	0
	Port Mansfield														
	Port Aransas [§]														
	Galveston														
	Sabine														

* Source: Headquarters, Department of the Army (1976).

** Corps Water Resource Development Project.

† Area within the contour line representing the average elevation achieved by the reservoir during the recreation season (usually 1 June to 30 September).

§ Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States in the land area.

|| Difference between the gross project size and the sum of water surface and land above average pool held in fee by the United States in the land area.

¶ Value represents the vertical difference between the elevation of the average recreational pool and the minimum elevation to which the reservoir may be lowered.

§ Dispersed recreation attendance is the difference between total project attendance and attendance reported as occurring upon developed recreation areas appraised as a percentage of total project attendance.

¶ Projects rated against the selection criteria status as "average" class projects in the Division.

§ Not applicable.

**APPENDIX F: ENGINEER CIRCULAR ESTABLISHING
METHODOLOGIES FOR SURVEYING AND CALCULATING
ATTENDANCE AT CORPS PROJECTS**

DEPARTMENT OF THE ARMY
Office of the Chief of Engineers
Washington, D.C. 20314

EC 1130-2-175

DAEN-CWO-R

Circular
No. 1130-2-175

1 June 1979

EXPIRES 30 JUNE 1980
Project Operations
RECREATION SURVEYS AND ATTENDANCE
CALCULATION AT CORPS OF ENGINEERS CIVIL
WORKS PROJECTS

1. Purpose: This circular transmits the technical report "A Handbook for Conducting Recreation Surveys and Calculating Attendance at Corps of Engineers Projects" and provides guidance for implementing a standardized methodology for collecting visitation information.
2. Applicability: This circular applies to all divisions and districts having Civil Works responsibility.
3. Background. The handbook at Appendix A was prepared by Midwest Research Institute (MRI) under contract from the Waterways Experiment Station as a part of the Recreation Research Program. A major finding in the handbook is that each Corps district and project essentially had developed its own procedures for collecting visitation data for the Recreation Resource Management System (RRMS). This handbook has been prepared in such a way that the methodology can be used by both divisions and districts that already have developed procedures and guidelines as well as by those that have only recently begun to recognize the importance of recreation information. In essence the handbook incorporates the best of all current methodologies, together with some new ideas provided through MRI's research.
4. Action Required: The methodology contained in the handbook at Appendix A will be used by all divisions and districts to assure a uniform system of recreation attendance data collection and calculation at all Civil Works projects. Additional copies of the handbook may be obtained from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161.

FOR THE CHIEF OF ENGINEERS:

1 Appendix
APP A - Handbook

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APPENDIX G: NOTATION

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AIWW	Atlantic Intracoastal Waterway
ARC	Appalachian Regional Commission
ASCS	Agricultural Stabilization and Conservation Service
BLM	Bureau of Land Management, U. S. Department of the Interior
BuRec	Bureau of Reclamation, U. S. Department of the Interior (currently: WPRS - Water and Power Resource Services)
CERL	Construction Engineering Research Laboratory
CWM	Office of Staffing and Management, Office, Chief of Engineers
EC	Engineering Circular
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EL	Environmental Laboratory
FS	Forest Service, U. S. Department of Agriculture
FWS	Fish and Wildlife Service, U. S. Department of the Interior
FY	Fiscal Year
GREAT	Great River Environmental Assessment Team
HCRS	Heritage Conservation and Recreation Service, U. S. Department of the Interior
HEC	Hydrologic Engineering Center
IPR	In-Process Review
IWR	U. S. Army Engineer Institute for Water Resources
LBL	Land Between the Lakes National Recreation Demonstration Area, Tennessee Valley Authority
LMVD	U. S. Army Engineer Division, Lower Mississippi Valley
MRD	U. S. Army Engineer Division, Missouri River
MRP	Mississippi River Pools
NAD	U. S. Army Engineer Division, North Atlantic
NCD	U. S. Army Engineer Division, North Central
NED	U. S. Army Engineer Division, New England
NPD	U. S. Army Engineer Division, North Pacific
NPS	National Park Service, U. S. Department of the Interior
OBERS	Office of Business Economics-Economic Research Service population and economic data series

OBERS	Office of Business Economics-Economic Research Service population and economic data series
OCE	Office, Chief of Engineers, U. S. Army
ORD	U. S. Army Engineer Division, Ohio River
ORRRC	Outdoor Recreation Resources Review Commission
OWDC	Office of Water Data Coordination, U. S. Geological Survey
R&D	Research and Demonstration
RDO	Research and Development Office, Office, Chief of Engineers
RMA	Recreation Market Area
RNS	Research Needs System
RRDIP	Recreation Research and Demonstration Information Program
RRDS	Recreation Research and Demonstration System
RRDU	Recreation Research and Development Unit
RRMS	Recreation Resource Management System
RRP	Civil Works Recreation Research Program, U. S. Army Corps of Engineers
RUMS	Recreation Use Monitoring Station
SAD	U. S. Army Engineer Division, South Atlantic
SCORP	State Comprehensive Outdoor Recreation Plan
SCS	Soil Conservation Service, U. S. Department of Agriculture
SIRAP	System for Information Retrieval and Analysis for Planners
SMSA	Standard Metropolitan Statistical Area
SPD	U. S. Army Engineer Division, South Pacific
SWD	U. S. Army Engineer Division, Southwestern
TVA	Tennessee Valley Authority
USDA	U. S. Department of Agriculture
USDI	U. S. Department of the Interior
USGS	U. S. Geological Survey
WES	U. S. Army Engineer Waterways Experiment Station

In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Hart, William J.

Recreation research and demonstration system: Its selection, operation, and potential utility : final report / by William J. Hart (Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station) ; prepared for Office, Chief of Engineers, U.S. Army. -- Vicksburg, Miss. : U.S. Army Engineer Waterways Experiment Station ; Springfield, Va. : available from NTIS, 1981.

112, [44] p., [2] leaves of plates : ill. ; 27 cm. -- (Technical report / U.S. Army Engineer Waterways Experiment Station ; R-81-1)

Cover title.

"March 1981."

Bibliography: p. 111-112.

1. Natural resources. 2. Recreation. 3. Recreation areas. 4. Recreation Research and Demonstration System (RRDS). 5. Water resources development. I. United States. Army. Corps of Engineers. Office of the Chief of Engineers. II. United States. Army Engineer Waterways

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TA7.W34 no.R-81-1

