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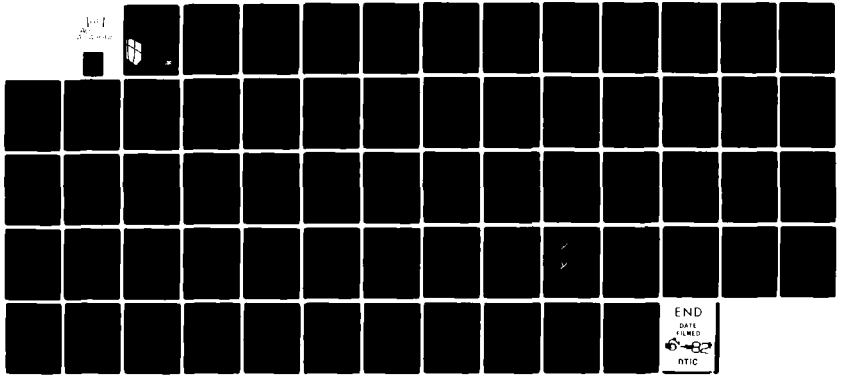

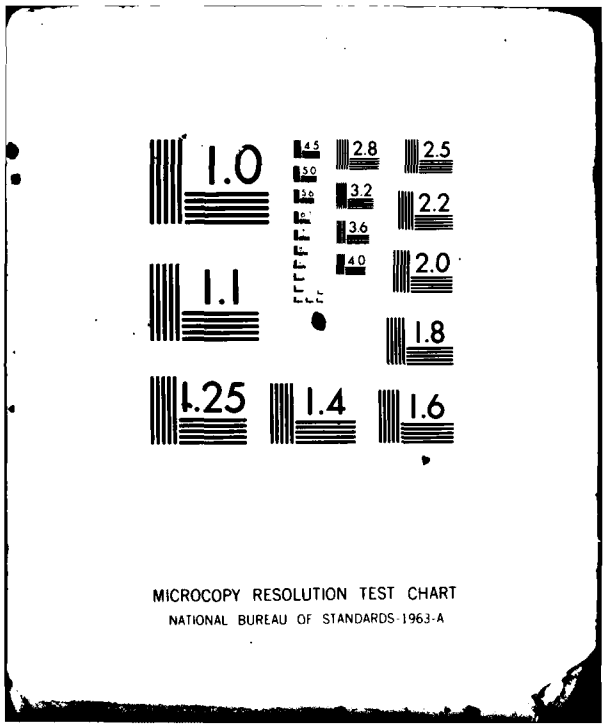
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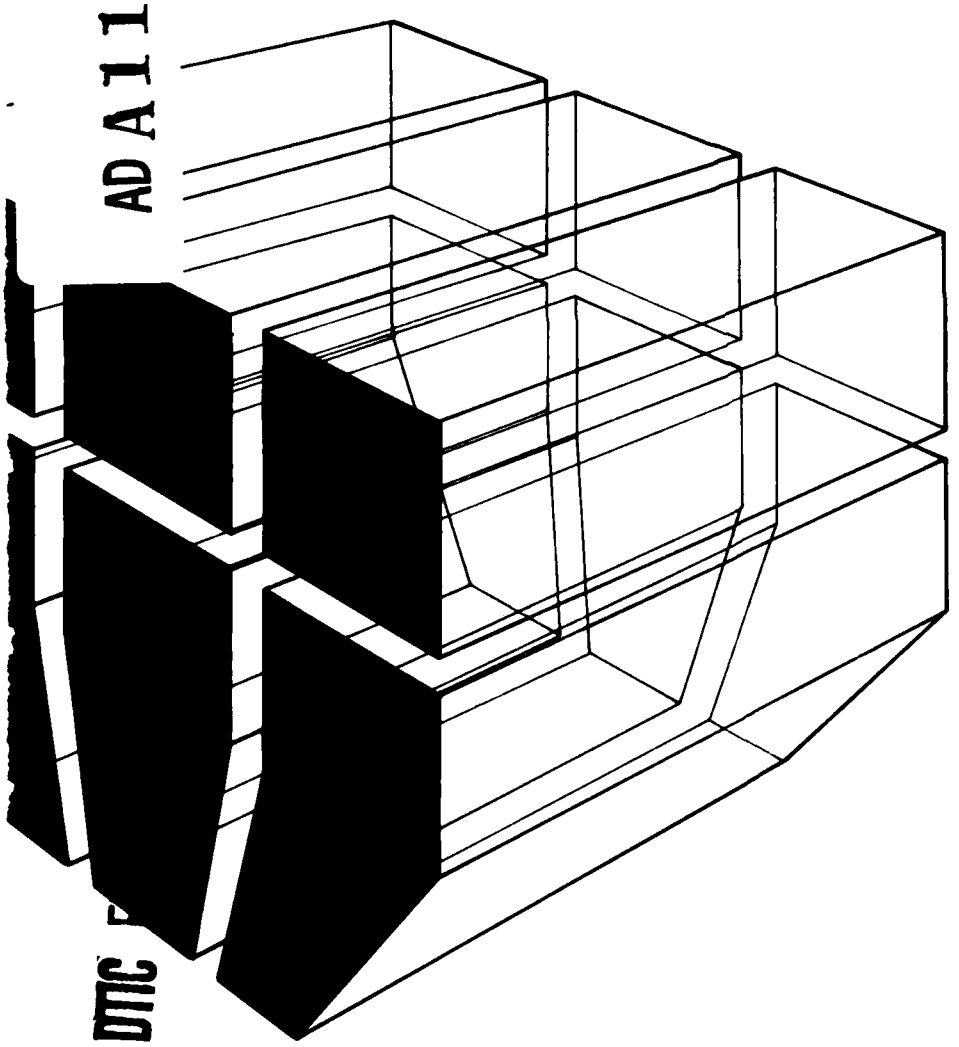
Technical Report N-124
March 1982
Management of Training Area Environments

APPLICATION OF THE RECREATION OPPORTUNITY SPECTRUM FOR OUTDOOR RECREATION PLANNING ON ARMY INSTALLATIONS



by
R. M. Lacey
W. D. Severinghaus

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This report describes the Recreation Opportunity Spectrum (ROS) and its current use in outdoor recreation planning and management. The ROS provides a framework for resources inventory, specification of recreational opportunities, resource capability and suitability analysis, selection of management objectives and practices, and impact assessment. The ROS concept can be used in Army recreation and land management planning. This report describes the →

Block 20 continued.

ROS and the associated planning framework, discusses the application of ROS planning to Army installations, and defines potential benefits.

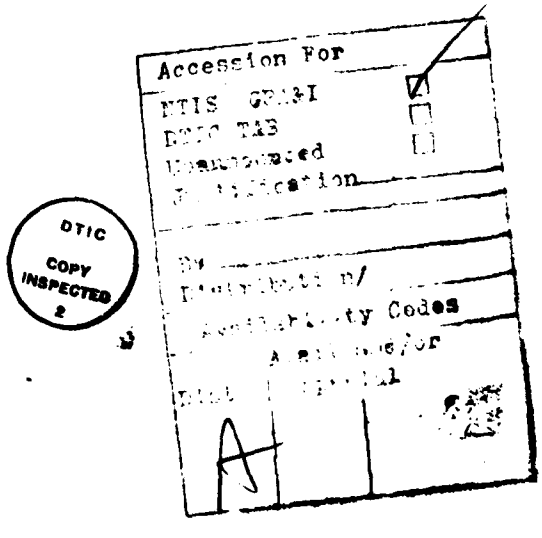
The planning framework described here can generally be used to develop installation Outdoor Recreation Plans. The ROS concept and the planning process can be used to supplement existing technical guidance for site-specific planning and design of outdoor recreation facilities. Since the planning framework provides for resources inventory and for capability and suitability analysis, it can also be used to support integrated resource management of installation lands, particularly unimproved and training area lands.

FOREWORD

This investigation was performed for the Directorate of Military Programs, Office of the Chief of Engineers (OCE), under Project 4A762720A896, "Environmental Quality for Construction and Operation of Military Facilities"; Task B, "Land Use Planning"; Work Unit 036, "Management of Training Area Environments." The applicable QCR is 3.01.001. The OCE Technical Monitor was Mr. Donald Bandel, DAEN-MPO-B.

The investigation was performed by the Environmental Division (EN), U.S. Army Construction Engineering Research Laboratory (CERL). The cooperation of Dr. B. L. Driver, Recreation Research Project Leader of the Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service, Fort Collins, CO, is gratefully acknowledged.

Dr. R. K. Jain is Chief of EN. COL Louis J. Circeo is Commander and Director of CERL, and Dr. L. R. Shaffer is Technical Director.



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APPLICATION OF THE RECREATION OPPORTUNITY SPECTRUM FOR OUTDOOR RECREATION PLANNING ON ARMY INSTALLATIONS

1 INTRODUCTION

Background

Participation in recreational activities has increased significantly in recent years. From 1965 to 1977, visits to U.S. national parks increased from 121.3 million to 262.6 million;[1] visits to Corps of Engineers water resource project recreation areas increased from 169 million to 424 million.[2] Personal expenditures for recreation have also increased. In 1965, individuals and nonprofit institutions spent $25.9 billion, or 6.0 percent of the total U.S. personal expenditures on recreation. In 1977, these figures were $81.0 billion and 6.7 percent, respectively.[3]

Much of this increased participation is in outdoor recreation, both in developed and undeveloped (dispersed) settings. Developed recreational settings are generally small, well-defined areas with convenience facilities and are characterized by a high concentration of visitors (e.g., campgrounds, picnic grounds, observation sites, playgrounds). Dispersed recreational settings are generally large, remote areas with few facilities and low concentrations of visitors.[4]

The increased demand for outdoor recreation has required Federal, State, and local land managers to make a variety of complex decisions about the types of recreational activities they will provide, the types of resources to be allocated for these activities, the capability of those resources, etc. For certain Federal agencies such as the U.S. Department of the Interior (USDI), Bureau of Land Management (BLM), and the U.S. Department of Agriculture (USDA), Forest Service (FS), these decisions are complicated even more by recent legislation requiring integrated land use planning.

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1 Statistical Abstract of the United States: 1980, 101st ed. (U.S. Bureau of the Census, 1980), p 242.

2 1974 Recreation Statistics, EP 1130-2-401 (Department of the Army [DA], Corps of Engineers [COE], Civil Works Directorate, December 1975), p 24; and 1977 Recreation Statistics, EP 1130-2-401 (DA, COE, Civil Works Directorate, April 1979), p 11.

3 Statistical Abstract of the United States: 1980, p 245.

4 Glenn E. Hass, B. L. Driver, and Perry J. Brown, "Measuring Wilderness Recreation Experiences," paper presented at the Wilderness Psychology Conference, Durham, NH, 14-15 August 1980.

To help address these issues, FS and BLM researchers are developing a systematic framework for recreation planning and management.[5] This framework is based on the concept of the Recreation Opportunity Spectrum (ROS) -- a continuum of possible combinations of recreation activities, settings, and experiences -- which is divided into six classes of recreation opportunity (Figure 1). Other agencies and institutions which plan and manage outdoor recreation are also examining and testing ROS concepts.

The ROS concept can also be useful for outdoor recreation planning on Army installations, which are required by AR 28-1[6] to prepare outdoor recreation plans. Given the demands that are placed on installation land and the prospect that little additional public land will be assigned to national defense, the Army has realized a need to examine methods for integrated resource suitability analysis. Improved methods of integrated resource management would benefit both outdoor recreation planning and installation land and training area management in general.

The Army also needs a way to identify factors that are critical to outdoor recreation planning, including the recreation experiences in demand and pattern-of-use factors; the Army also needs to establish acceptable physical, social, and managerial criteria and capacity standards.

Purpose

The purpose of this report is to describe the ROS concept and its application to recreation planning and management of Army installations.

Approach

Researchers examined current literature dealing with outdoor recreation and obtained information from the FS researchers who developed the ROS planning framework. Chapter 2 briefly describes development of the ROS and the resource management issues that it addresses. The ROS concept and planning framework was then applied to Army installation outdoor recreation planning;

Primitive (P)	Semi-Primitive Nonmotorized (SPN)	Semi-Primitive Motorized (SPM)	Roaded Natural (RN)	Rural (R)	Urban (U)

Figure 1. The recreation opportunity spectrum.

[5] Perry J. Brown, B. L. Driver, Donald H. Bruns, and Charles McConnell, "The Outdoor Recreation Opportunity Spectrum in Wildland Recreation Planning: Development and Application," Recreation Planning and Development (American Society of Civil Engineers, 1979), pp 527-538.

[6] Welfare, Recreation, and Morale: Army Morale Support Activities, Army Regulation [AR] 28-1 (Department of the Army [DA], January 1979), pp 5-6.

this application was based on theoretical analysis and synthesis of current planning and land management processes. Chapter 3 provides guidance for and examples of ROS applications. Finally, the research identified several potential benefits of using ROS concepts to supplement the Army's current recreation and resource management activities (Chapter 4).

Scope

The information in this report is intended to be an introduction to applying the ROS planning framework to Army recreation planning and integrated resource management. The planning framework described in this report can help the Army develop outdoor recreation plans and meet requirements for integrated resource management. Although the report provides tables of planning criteria and suggests possible application to Army-unique situations, it is not intended as official guidance.

The information provided here is limited to the planning process for general, installation-wide outdoor recreation plans. Discussion focuses on the "primitive" class of the ROS (see Figure 1). This information can supplement current guidance for site-specific planning of recreation facilities.[7]

Mode of Technology Transfer

After field testing of the evaluation criteria described here, guidance relative to the use of the ROS concept in installation outdoor recreation planning is expected to be developed and incorporated in the TM 5-803 series.

[7] Planning and Design of Outdoor Sports Facilities, Technical Manual (TM) 5-803-10 (DA, October 1975); and Planning and Design of Outdoor Recreation Facilities, TM 5-803-12 (DA, October 1975).

2 THE FOUNDATION FOR ROS PLANNING

Introduction

The concept of an ROS is not entirely new. However, only recently have planners begun to make the concept operational for recreation planning and management.[8] This is primarily due to the establishment of an empirical research base that supports use of the concept in a planning framework (see Figure 2).

The foundation for the ROS planning framework is the resource and recreational opportunity supply inventory and analysis components of the process. These components are currently the most widely used and are supported by the most empirical research.

Early development of the ROS planning framework was based on the need for a truly effective system for supply inventory, analysis, and classification.

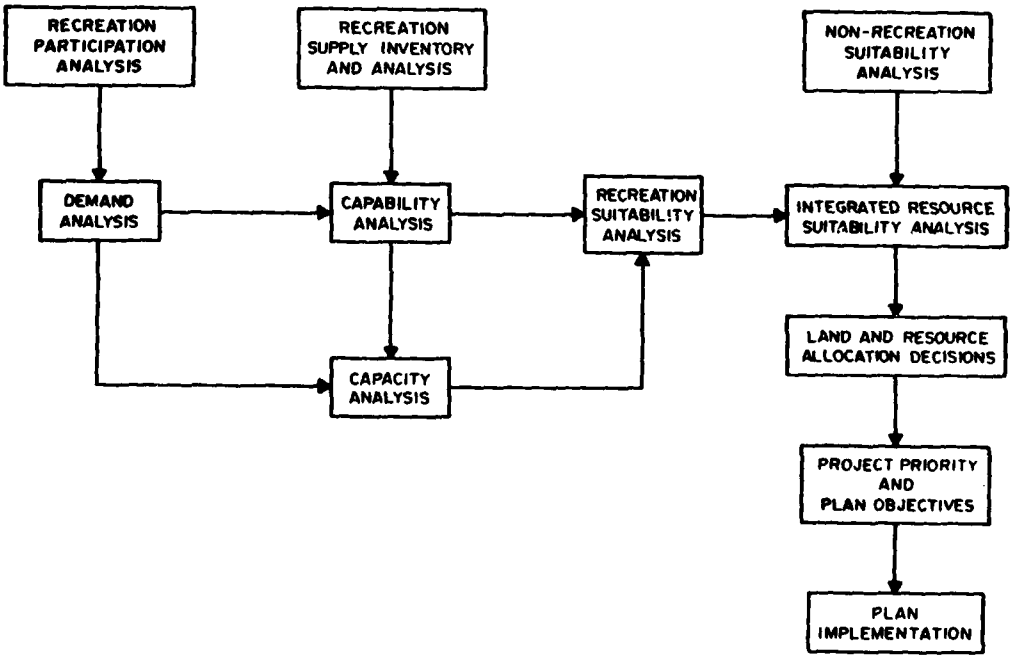

Figure 2. The ROS planning framework.

[8] Perry J. Brown, "The Opportunity Spectrum: Techniques and Implications for Resource Planning and Coordination," Dispersed Recreation and Natural Resource Management, Joan Shaw, ed. (Utah State University, College of Natural Resources, April 1979), p 82.

Additional explicit criteria were that it should:

1. Have intuitive appeal and give relevant, useful results.

2. Be adaptable to the land planning and management processes being used by different agencies.

3. Give consistent results.

4. Provide objective criteria for evaluating the recreation opportunity potential of different types of resources and landscapes.

5. Assure that the total range of outdoor recreation opportunities is covered.

6. Be simple and inexpensive to implement.

7. Be based on tested social and behavioral science theories that are relevant to outdoor recreation choice. Outdoor recreation opportunities must be defined in terms of human as well as physical resources because of the nature of the demand for resources and services.

8. Build upon existing systems.[9]

Analysis of Existing Systems

Development of the ROS planning framework began with an examination of several existing recreation inventory and classification systems. According to Brown, Driver, and McConnell, each system has positive aspects relative to theory, logic, simplicity, and comprehensiveness; however, they also have serious limitations for use in recreation resource inventory and impact assessment. The following briefly describes the major systems examined.*

Area Classification Plan

The Area Classification Plan (ACP), developed by the Bureau of Outdoor Recreation, tries to provide a common framework for classifying recreation resources.** The ACP approach is described as recreation zoning based on

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[9] P. J. Brown, B. L. Driver, and C. McConnell, "The Opportunity Spectrum Concept and Behavioral Information in Outdoor Recreation Resource Supply Inventories: Background and Application," Integrated Inventories of Renewable Natural Resources: Proceedings of the Workshop, General Technical Report RM-55 (U.S. Department of Agriculture [USDA], Forest Service [FS], Rocky Mountain Forest and Range Experiment Station, 1978), pp 73-84.

* The description of these systems was adapted from Brown, Driver, and McConnell, "The Opportunity Spectrum Concept and Behavioral Information in Outdoor Recreation Resource Supply Inventories: Background and Application," pp 76-78.

**The Bureau of Outdoor Recreation became, for a period of years, the Heritage Conservation and Recreation Service, but the responsibilities of the agency have now shifted to the National Park Service, U.S. Department of the Interior.

physical resources and recreation needs; economic and social variables are also considered. It also attempts to specify management requirements for recreation uses relative to the users' physical resource needs and the resources available in an area.

The ACP classification system is designed for large geographic areas. Land with a potential for recreation is classified as: Class I, high-density recreation areas; Class II, general outdoor recreation areas; Class III, natural environmental areas; Class IV, outstanding natural areas; Class V, primitive areas; or Class VI, historic and cultural areas. Area classification is based on area description, types of activity, degree of development, and agency responsibility and management recommendations. When an area is placed in more than one class, the ACP suggests that it be put in the class providing the greatest long-term recreational value.

A serious limitation of the ACP system is that classification criteria are too general and use requires too much subjective judgment by the planners. In addition, the system does not include procedures for capability or suitability analysis; thus, it is not clear whether area classification will reflect recreation potential or what the classifier feels the area can or should provide.

Recreation Opportunity Inventory and Evaluation

The Recreation Opportunity Inventory and Evaluation (ROIE) classification system was developed in Region 1 of the USDA, FS. This system identifies both potential recreation uses and recreation opportunities. The basis for the inventory and evaluation are activity preferences. Preferences are grouped into five preference types: active-appreciative; active-extractive; passive-appreciative; sociable-learning; and active-expressive.

The ROIE approach inventories the area's physical features which relate to each preference type. Then, the area is classified according to its capability to provide one or more recreational opportunity types. This system measures recreation opportunity by preference type for each unit of land being examined. Then, several kinds of quantitative data are combined to determine social visitation capacities for the land units.

The ROIE focuses on inventorying opportunities which meet user preferences, attempts to relate environmental features to preference types, and uses capacity estimation; therefore, it is basically a good system for recreation and resource inventory and classification. However, ROIE has certain limitations. First, the groups of preference types and the physical features of land associated with them were subjectively produced and are supported by only limited empirical research. Second, certain mathematical syntheses which must be used with the system are both costly and complex. Finally, the system involves frequent use of subjective ratings and is limited to application in mountainous terrain.

Recreation Inventory Instructions

The Recreation Inventory Instructions (RII) system* specifies and describes the physical resources of forest land in terms of kind, quality, and amount of recreation use which can be supported without unacceptable impacts. Quality and quantity are measured for three phases of the recreation resource: the dispersed phase; the intensive phase; and the visual phase. Quality indexes are produced for each phase (or type of use); the higher the index, the higher the land quality for providing the recreational oppportunities within each phase. The system also provides a basis for developing capacity estimates for the lands it classifies.

The RII system provides a solid approach to resource and recreation inventory. It relates the area's physical resources to recreation experiences and provides for estimating its capacity. It also attempts to interface with other recreation planning and management systems. However, as with many other systems, it is not based on empirical research. In addition, some of its processes implicitly put a premimum on primitive and natural environment types of recreation, and it is not easy to implement in its entirety.

Canadian Land Inventory

The Canadian Land Inventory (CLI) system is a straightforward means of determining recreational capability, giving an overview of the quality, quantity, and distribution of recreational resources. Its basic unit of inventory is landform, or the homogeneity of physical features used to designate a recreation or land use unit. This system, which is based on a predetermined set of physical features relating to recreation activity subclasses, measures a landform's capability to provide recreational opportunities in each subclass. Land areas are then ranked or classified in terms of these capabilities, which range from very high to very low.

The CLI system is easy to implement. Its results can be easily adapted to planning and management processes. However, the system uses only activity classes and subclasses; it does not identify overall experience opportunities or incorporate suitability analysis or capacity estimates, all of which are necessary for outdoor recreation planning and management.

Focus of the ROS System

As stated by Clark and Stankey, "the basic assumption underlying the ROS is that quality recreational experiences are best assured by providing a diverse set of recreation opportunities."[10] Brown, Driver, and Berry define a recreation opportunity as, "the chance to engage in a recreation activity in a

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* This system is included in Sections 2303.1 and 2331.22c of the Forest Service Manual (USDA).

[10] Roger N. Clark and George H. Stankey, The Recreation Opportunity Spectrum: A Framework for Planning, Management and Research, General Technical Report PNW-98 (USDA, FS, Pacific Northwest Forest and Range Experiment Station, December 1979), p 4.

specific setting to realize a desired recreation experience."[11] In terms of this assumption and definition, the ROS planning framework provides for inventory and analysis of the physical, social, and managerial settings that can provide recreational experiences. It identifies the current and potential types, amounts, and quality of recreation opportunities available, which allows the planner to determine the types and amounts of recreation activities that can or should be provided.

The ROS planning framework is based on the positive aspects of the inventory and analysis procedures described earlier. Like the ROIE system, it is behaviorally based with regard to user perferences and demand. Like the CLI system, it incorporates capability analysis of land and water resources. Like both the ROIE and RII systems, the ROS process provides a framework for estimating capacity. However, unlike the other systems, it also considers resource suitability.

The ROS planning framework focuses on identifying resources and recreation oppportunities. However, its process is not fundamentally different from that of other types of resource planning. Therefore, it is useful for integrated resource planning and can play a major role in total land management planning. Integrated management requires the following activities:[12]

1. Estimate the demand for specific recreation opportunities.

2. Conduct a capability analysis of lands and waters to determine the resources' potential to provide recreational oppportunities.

3. Identify recreation opportunities currently provided in the planning area.

4. Conduct a suitability analysis to determine where and how recreation opportunities should be provided.

5. Integrate recommendations for recreation opportunities with recommendations for other resource uses (e.g., timber or training).

6. Develop alternative plans for resource allocation.

7. Identify the most desirable allocation of resources. (For land management planning on military installations, the military mission gives significant input in this selection.)

8. Develop activity and project plans consistent with the selected resource allocation.

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[11] Brown, Driver, and Berry, "Use of the Recreation Opportunity Planning System."

[12] Perry J. Brown, B. L. Driver, Donald H. Bruns, and Charles McConnell, "The Outdoor Recreation Opportunity Spectrum in Wildland Recreation Planning: Development and Application," Recreation Planning and Development (American Society of Civil Engineers, 1979), pp 527-538.

ROS Application

Test Application

Although use of the ROS in a planning and management framework is relatively new, researchers and land managers in many areas are currently applying the ROS planning framework under field conditions to gather empirical data to support and improve the system. Research is being done or planned for the following: Rawah, Weminuche, and Eagles Nest Wilderness areas,[13] the Flat Tops Wilderness area and Indian Peaks backcountry,[14] the Arapaho-Roosevelt, Sante Fe, Sierra, and Duschutes National Forests,[15] and the Grand Junction, Vernal, and Folsom districts of the BLM.[16] Much of the ROS planning research has been so successful that the USDI, BLM, and USDA, FS are drafting manuals and handbooks describing its application to BLM and FS lands.[17]

Brown, Driver, Bruns, and McConnell give additional reasons why the ROS inventory and management process is being tested widely:

1. More professional recreation planners and managers are interested in the ROS concept.

2. Many newly hired recreation planners and managers are trained in the ROS concept and the social science concepts on which it is based.

3. Much literature supporting the ROS concept was developed during the 1960s and 1970s.

4. Managers have become interested in a system that is easier and cheaper to use.

5. Managers want more objective recreation planning systems that accurately describe the management inputs needed to deliver the most valued products and services.

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[13]Glenn E. Haas, B. L. Driver, and Perry J. Brown, "Measuring Wilderness Recreation Experiences," paper presented at the Wilderness Psychology Conference, Durham, NH, 14-15 August 1980.

[14]P. J. Brown, B. L. Driver, and C. McConnell, "The Opportunity Spectrum Concept and Behavioral Information in Outdoor Recreation Resource Supply Inventories: Background and Application, Integrated Inventories of Renewable Natural Resources: Proceedings of the Workshop, General Technical Report RM -55 (USDA, FS, Rocky Mountain Forest and Range Experiment Station, 1978), pp 73-84.

[15]Perry J. Brown, B. L. Driver, Donald H. Bruns, and Charles McConnell, "The Outdoor Recreation Opportunity Spectrum in Wildland Recreation Planning: Development and Application," Recreation Planning and Development (American Society of Civil Engineers, 1979), pp 527-538.

[16]Perry J. Brown, "The Opportunity Spectrum: Techniques and Implications for Resource Planning and Coordination," Dispersed Recreation and Natural Resource Management, Joan Shaw, ed. (Utah State University, College of Natural Resources, April 1979), pp 82-87.

[17]Brown, Driver, Bruns, and McConnell, p 528.

6. Researchers and managers are working together to develop such a planning system.

7. Various agencies want to develop and use a common system.[18]

Framework Application

The ROS planning framework has numerous other benefits. (Chapter 4 discusses Army-specific benefits.) These benefits are inherent in the various management issues for which the framework can be used and in its ease of application.

Clark and Stankey indicate that the ROS continuum is useful for dealing with a wide range of value-related management issues, such as carrying capacity, depreciative behavior, and recreation impacts.[19] Brown, Driver, and Berry have found that once a planner adopts the logic of the framework, it is relatively easy and efficient to use, whether used in a temperate or arid climate.[20] In addition, they also acknowledge the following findings.

1. It is easily adaptable to the needs of different agencies and thus helps establish a common recreation planning and management language.

2. The logic of the planning system is intuitively acceptable to both resource planners and the public.

3. The system improves the bases and means for evaluating the impacts of different management activities on the type, quantity, and quality of potential recreation opportunities.

4. The ROS concepts used in recreation opportunity planning can also be guidelines for recreation resource management.[21]

Brown also describes the ROS planning framework as useful for several activities of interest to recreation planners and managers. He describes it as, "a tool for specifying more clearly the recreational opportunities demanded. It is a tool to guide resource inventory for conducting a recreation suitability analysis. It is a tool for meshing recreation opportunity analysis into integrated resource suitabilities. And it is a tool for impact

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[18]Brown, Driver, Bruns, and McConnell, p 528.

[19]Roger N. Clark and George H. Stankey, "Determining the Acceptability of Recreational Impacts: An Application of the Outdoor Recreation Opportunity Spectrum," Dispersed Recreation and Natural Resource Management, Joan Shaw, ed. (Utah State University, College of Natural Resources, April 1979), p 70.

[20]Perry J. Brown, B. L. Driver, and Joseph K. Berry, "Use of the Recreation Opportunity Planning System to Inventory Recreation Opportunities of Arid Lands," a presentation made at the workshop on Arid Land Resources Inventories: Developing Cost-Efficient Methods, La Paz, Mexico, December 1980.

[21]Brown, Driver, and Berry, "Use of the Recreation Opportunity Planning System."

assessment, such as defining the impact of recreation allocation on other resource outputs or defining impact of other resource uses on recreation opportunities."[22]

[22]Perry J. Brown, "The Opportunity Spectrum: Techniques and Implications for Resource Planning and Coordination," Dispersed Recreation and Natural Resource Management, Joan Shaw, ed. (Utah State University, College of Natural Resources, April 1979), p 85.

3 THE ROS PLANNING PROCESS

Introduction

This chapter discusses the planning process associated with the overall ROS framework and describes its application to outdoor recreation planning on Army installations. Included are methods for identifying recreation demand, supply, and opportunities and techniques for analyzing recreation and integrated resource suitability.

There are several reasons why the ROS planning process can be useful for developing installation outdoor recreation plans. First, the process will allow Army recreation planners to identify and specify the demand for recreation opportunities more clearly and effectively. Second, the process can be used to guide resources inventory, especially for identifying a land area's attractiveness and capacity. It can also be used to integrate recreation resource allocation with other resource uses and assess any potentially compatible uses or the need for resource trade-offs. Finally, use of the process can insure some consistency between resource allocation, on-going and proposed activities, and project planning. (Chapter 4 discusses the generic benefits of using the process and preparing effective plans.)

Several hypothetical examples are given to help describe the process and the results that can be obtained, and tables of criteria that can be used in the process are provided. The user of this report is responsible for adapting this information to a specific situation; where appropriate, suggestions for making certain adaptions are provided.

Recreation Demand

The outdoor recreation planning process is similar to that used for any type of land use planning. The initial question is what the demand for outdoor recreation is. In an ROS context there are four hierarchical levels of recreation opportunity demand; these are demand for activities, settings, experience, and benefits.[23]

Activity opportunities are easily identifiable recreation activities such as camping, hiking, horseback riding, hunting, and fishing. Settings are the natural, social, and managerial environments in which recreation occurs. Experience opportunities include physical exercise, enjoying nature, being

[23] B. L. Driver and Perry J. Brown, "The Opportunity Spectrum Concept and Behavioral Information in Outdoor Recreation Resource Supply Inventories: A Rationale," Integrated Inventories of Renewable Natural Resources: Proceedings of the Workshop, General Technical Report RM-55 (USDA, FS, Rocky Mountain Forest and Range Experiment Station, 1978), pp 24-31.

with friends, solitude, and a change from everyday life. Benefit opportunities are the favorable results obtained from recreation, including family solidarity, improved mental and physical health, and increased work productivity.[24]

Generally, it becomes more difficult to measure demand as one moves from the activity to the benefit levels of the hierarchy. There are two primary reasons for this. First, users are generally more aware of their own activity and setting preferences than they are of the experiences and benefits they will obtain. Second, techniques that measure recreation demand have been based on measurement of actual participation in activities. However, improvements in demand analysis for use with ROS specifications are likely.[25] Meanwhile, less complex methods of identifying the demand for recreation opportunities on installations are adequate.

Before these methods are discussed, it is necessary to further define three of the opportunity levels which make up recreation demand and illustrate their relationship to the ROS (see Figure 1). Table 1 lists various activity opportunities and their relative classification within the ROS. Table 2 provides descriptive summaries of the setting opportunities most likely to be associated with the six recreation classifications of the ROS continuum. Table 3 summarizes the likely experience opportunities available for the six recreation classifications and setting opportunities. Since benefit opportunities are defined subjectively and may occur along the entire ROS, they are not listed in a table.

Table 1 shows that many activity opportunities occur along the entire ROS and are not easily assigned to a specific class. To understand the rationale for this, consider the recreation activity of fishing. An experienced trout angler will most likely prefer to fish in a setting that is predominantly natural or natural-appearing and where user interaction is low. He/she may expect to experience isolation and practice self-reliance, e.g., use of woodsman skills. On the other hand, couples with small children may prefer fishing in a setting where user interaction is moderate to high and convenience facilities are provided; the appearance of the environment may be relatively unimportant. They would also probably prefer affiliation with other individuals and freedom from risk-taking.

Considering these different demand factors when estimating recreation demand may be very difficult. However, one must first understand these various levels of opportunity demand in order to understand other components of outdoor recreation plan development (see p 49).

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[24]Glenn E. Haas, B. L. Driver, and Perry J. Brown, "Measuring Wilderness Recreation Experiences," paper presented at the Wilderness Psychology Conference, Durham, NH, 14-15 August 1980.

[25]Perry J. Brown, B. L. Driver, Donald H. Bruns, and Charles McConnell, "The Outdoor Recreation Opportunity Spectrum in Wildland Recreation Planning: Development and Application," Recreation Planning and Development (American Society of Civil Engineers, 1979), pp 527-538.

Table 1

Activity Opportunities Along the Recreation Opportunity Spectrum*

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
Viewing Scenery		Viewing Scenery	Viewing Scenery	Viewing Scenery	
Hiking		Hiking	Hiking	Hiking	
Cross-Country Skiing		Cross-Country Skiing	Cross-Country Skiing	Cross-Country Skiing	
Snowshoeing		Snowshoeing	Snowshoeing	Snowshoeing	
Horseback Riding		Horseback Riding	Horseback Riding	Horseback Riding	
Canoeing		Canoeing	Canoeing	Canoeing	
Sailing		Sailing	Sailing	Sailing	
Other Nonmotorized Watercraft Use		Other Nonmotorized Watercraft Use	Other Nonmotorized Watercraft Use	Other Nonmotorized Watercraft Use	
Swimming		Swimming	Swimming	Swimming	
Diving (Skin or Scuba)		Diving (Skin or Scuba)	Diving (Skin or Scuba)	Diving (Skin or Scuba)	
Fishing		Fishing	Fishing	Fishing	
Photography		Photography	Photography	Photography	
Camping (Tent, General Day)		Camping (Tent, General Day)	Camping (Tent, General Day, Auto, Trailer, Organization)	Camping (Tent, General Day, Auto, Trailer, Organization)	
Snowplay		Snowplay	Snowplay	Snowplay	
Hunting (Big, Small Game; Upland Birds and Waterfowl)		Hunting (Big, Small Game; Upland Birds and Waterfowl)	Hunting (Big, Small Game; Upland Birds and Waterfowl)	Hunting (Big, Small Game; Upland Birds and Waterfowl)	
Nature Study		Nature Study	Nature Study	Nature Study	
Unguided Walking		Unguided Walking	Unguided Walking	Unguided Walking	
General Information		General Information	General Information	General Information	
		Motor-Driven Ice and Snowcraft	Motor-Driven Ice and Snowcraft	Motor-Driven Ice and Snowcraft	
		ORV Touring	ORV Touring	ORV Touring	
		Power Boating	Power Boating	Power Boating	
				Picnicking	
				Gathering Forest Products	
				Downhill Skiing	
				Water Skiing and Other Water Sports	
				Viewing Interpretive Signs	
				Resort and Commercial Public Services	
				Resort Lodging	
				Competition Games	
				Ice Skating	
				Scooter-Motorcycle Use	
				Bicycling	

* The activities listed are provided for illustrative purposes only. Additions and deletions from these lists should be considered based on installation-specific conditions and Outdoor Recreation Program objectives.

Table 2

Setting Opportunities Along the Recreation Opportunity Spectrum*

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
Characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted. No facilities for comfort or convenience of the user are provided.	Characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is not permitted. Facilities may be provided for the protection of resource values and user safety. On-site materials are used where possible.	Characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is permitted. Facilities may be provided for the protection of resource values or user safety. On-site materials are used where possible.	Characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.	Characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.	Characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

*This table is for descriptive purposes only. More detailed setting criteria for recreation area classification are provided in subsequent tables.

Table 3

Experience Opportunities Along the Recreation Opportunity Spectrum*

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
Extremely high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquillity, and self-reliance through the application of woodsman and outdoor skills in an environment that offers a high degree of challenge and risk.	High, but not extremely high, probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquillity, and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk.	Moderate probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquillity, and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk. Opportunity to have a high degree of interaction with the natural environment. Opportunity to use motorized equipment while in the area.	About equal probability to experience affiliation with other user groups and for isolation from sights and sound of humans. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities associated with more primitive type of recreation are not very important. Practice and testing of outdoor skills might be important. Opportunities for both motorized and non-motorized forms of recreation are possible.	Probability for experiencing affiliation with individuals and groups is prevalent, as is the convenience of sites and opportunities. These factors are generally more important than the setting of the physical environment. Opportunities for wildland challenges, risk-taking, and testing of outdoor skills are generally unimportant except for specific activities like downhill skiing, for which challenge and risk-taking are important elements.	Probability for experiencing affiliation with individuals and groups is prevalent, as is the convenience of sites and opportunities. Experiencing natural environments, having challenges and risks afforded by the natural environment, and the use of outdoor skills are relatively unimportant. Opportunities for competitive and spectator sports and for passive uses of highly human-influenced parks and open spaces are common.

*These experiences are most likely outcomes from recreation participation in the settings described in Table 2.

In basic form, recreation demand estimates project current participation and are based on historical trends and subjective analysis. Information relevant to current participation and demand for recreation opportunities is available from several sources. The primary sources for military participation and demand information are the Quarterly Sample Surveys of Military Personnel (QSSMP) and installation Morale Support Activity (MSA) surveys.

In compliance with AR 28-1, QSSMP surveys periodically sample recreation demand and needs. These surveys should provide general information about recreation demand. However, the best source for installation-specific information may be the MSA surveys, which are conducted biannually, in the even-numbered years.[26] In fact, it is possible that future MSA surveys can be structured to identify at least the first two and perhaps the third hierarchical levels of outdoor recreation demand.

Since both military and civilian personnel take part in recreation activities on installations, other sources of information may be consulted. These include National Park Service (NPS) projections, State Comprehensive Outdoor Recreation Plan (SCORP) projections, and any local survey data. However, analysis of demand should rely heavily on data obtained from surveys conducted in compliance with AR 28-1. This is because off-post personnel can use installation recreation facilities only if military personnel are not using the facilities and areas to capacity.

Demand data obtained from many of the surveys and projections listed above will be presented in terms of the number of persons participating, or expected to participate in specific activities. For further use in outdoor recreation plan development, the data should be converted to recreation visitor days (RVDs) for each activity. An RVD represents one person visiting a recreation area for 12 hours or some combination of visitors and hours that when multiplied equals 12. If the average number of hours that a person or persons visit a recreation area is unknown or is not stated in the survey data, RVDs can be estimated based on local knowledge or experience. For example, experience may indicate that the average length of stay at a picnic area is 6 hours. Therefore, a family of four spending an average day picnicking will contribute two RVDs to picnic activity participation.

Once participation for specific recreation activities is identified in terms of RVDs, activities should be classified according to the ROS by using the descriptive summaries of setting and experience opportunities given in Tables 2 and 3. Classification will vary by installation and should be based on local knowledge and experience. For example, consider the two fishing settings and experiences described earlier and the following hypothetical assumptions:

1. Based on their 1980 MSA surveys, planners on installations A and B found that there were 600 RVDs spent fishing on each installation.

2. Installation A has an active rod and gun club composed primarily of single members. The installation also has several remote trout streams with

[26] Welfare, Recreation, and Morale: Army Morale Support Activities, AR 28-1 (DA, January 1979), pp 1-9.

no motorized access or facilities. There are no convenience facilities at stocked ponds or streams.

3. Installation B has no remote streams, but has several stocked ponds which are used for fishing. Convenience facilities such as restrooms are provided. Based on the MSA survey, most persons expected to use these ponds live in on-post family housing.

Based on these assumptions, planners at Installation A would classify fishing as a semi-primitive nonmotorized recreation activity. Planners at Installation B might classify fishing as a rural recreation activity.

This example is very general and the assumptions represent two very different conditions. However, it does illustrate ROS classification. Often, an activity can be classified in two or more categories, based on installation-specific conditions. When this occurs, RVD participation in an activity should be divided among the appropriate ROS classifications.

Once RVDs of use (demand) for each outdoor recreation activity have been identified and the activities classified into ROS categories, a table illustrating RVDs per ROS category can be constructed. Figure 3 is a simple example of such a table. This table illustrates demand and will also be used to identify surpluses and deficiencies in recreation area capacity and in development of the final outdoor recreation plan (p 49). If participation varies seasonally, it may be necessary to develop individual tables for each season of use. Similarly, if decisions to allow off-post civilian use of the installation must be made, separate and combined tables for military and civilian demand may be necessary.

Since the table will be used as a planning tool, it should also be constructed to reflect future demand. Generally, two future projections (Figure 3), based on 5-year planning increments, will be enough. The methods used to make these projections are often complex, but most outdoor recreation planners have experience using at least one method. If not, the NPS or the appropriate State or local agency can usually help project current demand. Often, SCORPs also describe methods for making these projections.

If local knowledge or assistance is unavailable, a simple stepdown ratio method, similar to that used in population analysis, might be applied. U.S. Bureau of Census projections, the NPS, SCORPs, and local projections can provide the information needed to complete the stepdown ratio method. This method involves identifying the total percentage of participation within one area that can be attributed to participation within a smaller area. This percentage is then applied to project future demand in the smaller area, given future demand in the larger area. Figure 4 provides a simple example.

Recreation Supply

Once demand for opportunities along the ROS have been identified, the next step in the generic planning process is to examine recreational supply -- both present and potential. The supply component of the ROS planning framework is basically an inventory and analysis process involving several levels of information synthesis. Information about physical, social, and managerial

Recreational Demand for Recreation Opportunity in Recreation Visitor Days)*

Recreation Activity	Demand Along the Recreation Opportunity Spectrum: Primitive			Semi-Primitive Nonmotorized			Semi-Primitive Motorized			Roaded Natural			Rural			Urban		
	Current	1985	1990	Current	1985	1990	Current	1985	1990	Current	1985	1990	Current	1985	1990	Current	1985	1990
Hiking	100	150	200	600	650	800	1000	1000	1500	1800	2000	2200	2000	2500	3000	--	--	-
Cross-Country Skiing	300	350	375	400	450	500	--	--	--	--	--	--	--	--	--	--	--	-
Horseback Riding	--	--	--	1000	1200	1300	--	--	--	500	550	600	--	--	--	--	--	-
Camping	--	--	--	--	--	--	1200	1400	1600	3000	3500	4000	--	--	--	--	--	-
Fishing	200	250	275	450	500	550	500	550	600	1200	1300	1400	600	800	900	--	--	-
Hunting	300	350	350	250	300	350	250	300	350	--	--	--	--	--	--	--	--	-
ORV Touring	--	--	--	--	--	--	2000	3000	4500	3000	3000	4000	4000	5500	6000	--	--	-
Picnicking	--	--	--	50	100	200	6000	6500	7000	10000	11000	12000	12000	14000	17000	8000	9000	1000
Competition Games	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13000	14000	1500
Bicycling	--	--	--	--	--	--	--	--	--	--	--	--	350	500	600	800	850	90
Total Demand	900	1100	1200	2750	3200	3700	10950	12750	15550	19500	21350	24200	18950	23300	27500	21800	23850	2590

* A recreation Visitor Day (RVD) represents one person visiting a recreation area for 12 hours, or some combination of visitors and hours that when multiplied equals 12.

Figure 3. Simplified recreation demand table.

Recreation Participation		Participation Projection	
Current U.S. participation in activity X is	14,000,000	Projected U.S. participation in activity X (according to the Bureau of the Census) is:	15,000,000
Current state participation in activity X is:	60,000 or 4.3% of U.S.	Projected state participation in activity X is:	4.3% of U.S. or 645,000
Current local participation in activity X is:	35,000 or 5.8% of state	Projected local participation in activity X is:	5.8% of state or 37,410
Current installation participation in activity X is:	8,000 or 22.9% of local	Projected installation participation in activity X is:	22.9% of local or 8,567

Figure 4. Simple step-down ratio projection method.

conditions is gathered and analyzed. Analysis of this information indicates an installation's capability to provide recreation opportunities. Capability is ultimately expressed in terms of the number and type of recreation opportunity areas available, the attractiveness of these areas, and the capacity of various land areas or units for providing these opportunities.

Experience Opportunities

The first step or level of synthesis in the supply analysis process is to determine what recreation experience opportunities (EOs) are available within installation boundaries. Brown lists 13 items that should be inventoried for this initial analysis:

1. Roads, trails, and other transportation features.
2. Buildings and other man-made features.
3. Sources of man-made sound.
4. Irreversible evidences of man.
5. Renewable resource modification.
6. Vegetation patterns and types.
7. Soil types.
8. Topography.
9. Water courses and bodies.
10. Wildlife numbers and patterns.

11. Recreational features.
12. User numbers, densities, and behaviors.
13. Recreation management activities being practiced.[27]

To make the inventory and analysis applicable to military installations, the following may be added to this list:

1. Impact areas.
2. Explosive storage.
3. Active training areas.

Maps and plans in the various sections of the FE's office and the Office of the Directorate of Plans and Training (DPT) can provide the information needed to conduct this inventory.

Once the inventory is completed, the installation's land and water areas are mapped according to their potential to provide certain EOs along the ROS. Maps or map overlays are prepared using specific criteria such as remoteness, size, user density, etc., to represent the installation's physical, social, and managerial conditions. These maps are then combined to produce the EO map.

Guidance for preparing the appropriate maps is described below. Note that it may be necessary to extend analysis of certain criteria (e.g., remoteness) into land adjacent to the installation boundaries in order to identify EO areas accurately.

Physical Conditions. Remoteness, size, evidence of humans, and military mission are the criteria used to produce a map or map overlay relating physical conditions to potential EOs. For convenience in preparing a planning overview, all maps should have the same scale. Initial working maps are drawn on existing installation maps. Overlays are produced on transparent material and placed over an installation map.

For military installations, the military mission is the first criterion or EO indicator examined. All land and water areas that are required for or are sensitive to the installation mission are identified, based on previous inventory. These areas include secure areas, impact areas, active training areas, and/or any area that may not be used for recreation because of the military mission. These areas are shown as off-limits to recreation activity by an appropriate symbol on the map or overlay, e.g., horizontal hash lines. Figure 5 is a simple illustration of this procedure.

A certain degree of flexibility may be exercised when examining mission requirements. For example, certain training areas may only be used occasionally. Thus, to maximize recreation opportunity and integrated resource and multiple use management, it may not be necessary to show these areas as entirely off-limits. If other criteria for recreation opportunity can be met and recreational use vs. military use can be appropriately scheduled, these

[27] Perry J. Brown, "The Opportunity Spectrum: Techniques and Implications for Resource Planning and Coordination," Dispersed Recreation and Natural Resource Management, Joan Shaw, ed. (Utah State University, College of Natural Resources, April 1979), p 83.

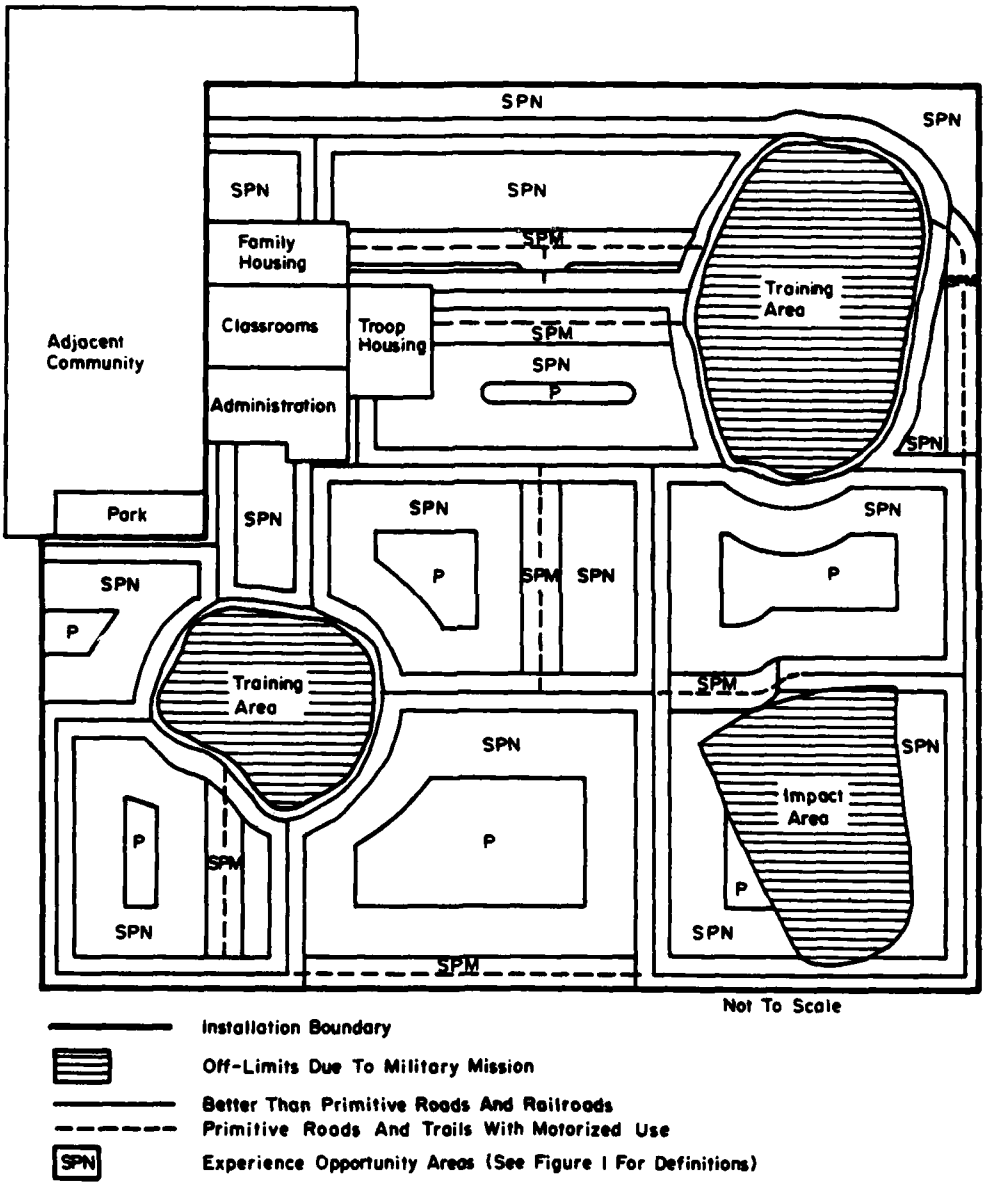

Figure 5. Base map identification of experience opportunities.

areas may can be analyzed relative to providing EOs. Such decisions must be made only after coordination between planners in the appropriate FE and DPT offices.

To examine the EO indicator of remoteness, identify all existing roads, railroads, and trails (i.e., travel routes) on the installation and along the installation boundary and illustrate them on the base map (see Figure 5). Roads are divided into two categories: primitive and better than primitive. Better-than-primitive roads can be used by highway vehicles having more than two wheels. Primitive roads may be maintained only rarely and are used primarily by vehicles not usually driven on highways. Trails with motorized use are included in the primitive road category. Any significant air or motorized water travel routes should also be identified and treated as better-than-primitive roadways.

Most existing roads, railroads, etc., should be illustrated on the base map. However, in areas where route patterns are dense (e.g., greater than 4 miles of linear distance within 1 square mile), it will be necessary to identify only the routes along the edge of the densely routed area. The same EO relative to remoteness criteria will be provided automatically within areas having route patterns of this density.

Once travel routes are mapped, the relationship between remoteness and EOs can be mapped by following the steps listed below and using the remoteness criteria in Table 4. (The user should note that these criteria were developed for forest conditions and are provided only as general guidance.) Research indicates that remoteness criteria should vary with different terrain and within different physiographic regions.[28] For example, flat terrain with low vegetative cover (e.g., grasslands and deserts) may require greater distances, possibly as great as 5 to 6 miles, to provide the remoteness needed for primitive recreation. (Most installations will not have enough truly remote area to provide primitive recreation opportunities.) Deep canyons or heavily wooded terrain might require less distance. Experience and knowledge of local conditions may be used to modify the criteria for installation-specific use.

Step One. To begin mapping EOs relative to remoteness criteria, it is easiest to draw lines identifying the Roaded Natural (RN) category. This divides the ROS; areas on one side are Primitive (P) or Semi-Primitive (SP), and areas on the other are RN, Rural (R), or Urban (U). These lines are drawn according to the RN remoteness criteria in Table 4 (see Figure 5). (Note that the RN, R, and U categories cannot be further separated by remoteness criteria, but rather by evidence of humans.)

Step Two. The next step is to draw lines identifying areas of EO that are in the Semi-Primitive Motorized (SPM) category. These lines are also drawn according to the SPM remoteness criteria in Table 4 (see Figure 5).

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[28]Perry J. Brown, B. L. Driver, and Joseph K. Berry, "Use of the Recreation Opportunity Planning System to Inventory Recreation Opportunities of Arid Lands," a presentation made at the workshop on Arid Land Resource Inventories: Developing Cost-Effective Methods, La Paz, Mexico, December 1980.

Table 4

Experience Opportunity Remoteness Criteria*

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
An area designated by a line which is 3 miles from all roads, railroads, or trails with motorized use.	An area designated by a line which is 1/2 mile from all roads, railroads, or trails with motorized use; can include primitive roads and trails if usually closed to motorized use.	An area designated by a line which is 1/2 mile from primitive roads or trails used by motor vehicles; greater than 1/2 mile from roads that are better than primitive.	An area designated by a line which is 1/2 mile from roads that are better than primitive and railroads.	No distance criteria.	No distance criteria.

* These criteria apply to forest conditions. They can be modified to conform to natural barriers and screening, or other relevant features of local topographic relief and vegetative cover.

Step Three. The final step is to separate P-category EO areas from Semi-Primitive Nonmotorized (SPN) areas by drawing a line according to the remoteness criteria described in Table 4 (see Figure 5).

These lines indicate areas available for recreation EO relative to the physical indicators military mission and remoteness. All installation lands are now tentatively classified as either off-limits to recreation or available for P, SPN, SPM, or some combination of RN, R, or U recreation opportunities.

The next physical EO indicator to be examined is size of available areas. Table 5 lists size criteria. These criteria are provided only as general guidance. (Few installations have enough acreage remote enough to provide truly primitive opportunities.) Sometimes, an area identified as remote enough for an EO may be able to provide this class of recreation opportunity, even if it does not meet size criteria. For example, an area identified as SPN may be smaller than 2500 acres. However, it may be used for recreation if most of it is adjacent to an off-limits training area where training seldom occurs adjacent to the boundary. In this case, a smaller area may still be appropriate for SPN recreation, since the actual experiences of vastness and remoteness are not affected by the adjacent location of unimproved and seldom used training area lands.

Table 5

Experience Opportunity Size Criteria

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
5,000 acres*	2,500 acres**	2,500 acres	No size criteria	No size criteria	No size criteria

*May be smaller if contiguous to Semi-Primitive Nonmotorized Class.
**May be smaller if contiguous to Primitive Class.

Size criteria may require additional consideration when an area can provide a particular EO and is surrounded by land area which can provide the next most remote EO. For example, suppose an area can provide P experiences, in terms of remoteness, but is somewhat smaller than the size suggested for P experiences. Also suppose that this area is completely surrounded by land which can provide SPN experiences and that this area does meet minimum size criteria. In this case, the P experience area may still be able to provide this type of EO, since it may still be able to provide the required experiences of remoteness and vastness.

If such unique conditions do not exist, the size criteria provided in Table 5 are applied. They are applied by adjusting the lines on the remoteness map or map overlay to incorporate areas of insufficient size into the next appropriate EO category. Figure 6, which shows the same hypothetical installation as Figure 5, illustrates the results of this action. Some areas identified as P categories have been absorbed into SPN categories, since they did not meet size criteria. Some areas identified as SPN have also been absorbed into SPM categories. Some SPN categories have also been absorbed.

The final physical EO indicator to be examined is evidence of humans. Table 6 lists the criteria for this examination. These criteria have been adapted directly from those being developed by the USDA, FS. These criteria allow the user to identify the varying degrees of human influence or modification that are considered acceptable for each EO along the ROS.

Identifying these degrees of influence or modification can require considerable effort or knowledge of local conditions. Visual surveys should be conducted when possible and appropriate. This is especially true if the local conditions in a specific part of the installation are completely unknown or if there is any uneasiness about a major change in any EO area boundary because the criteria were used.

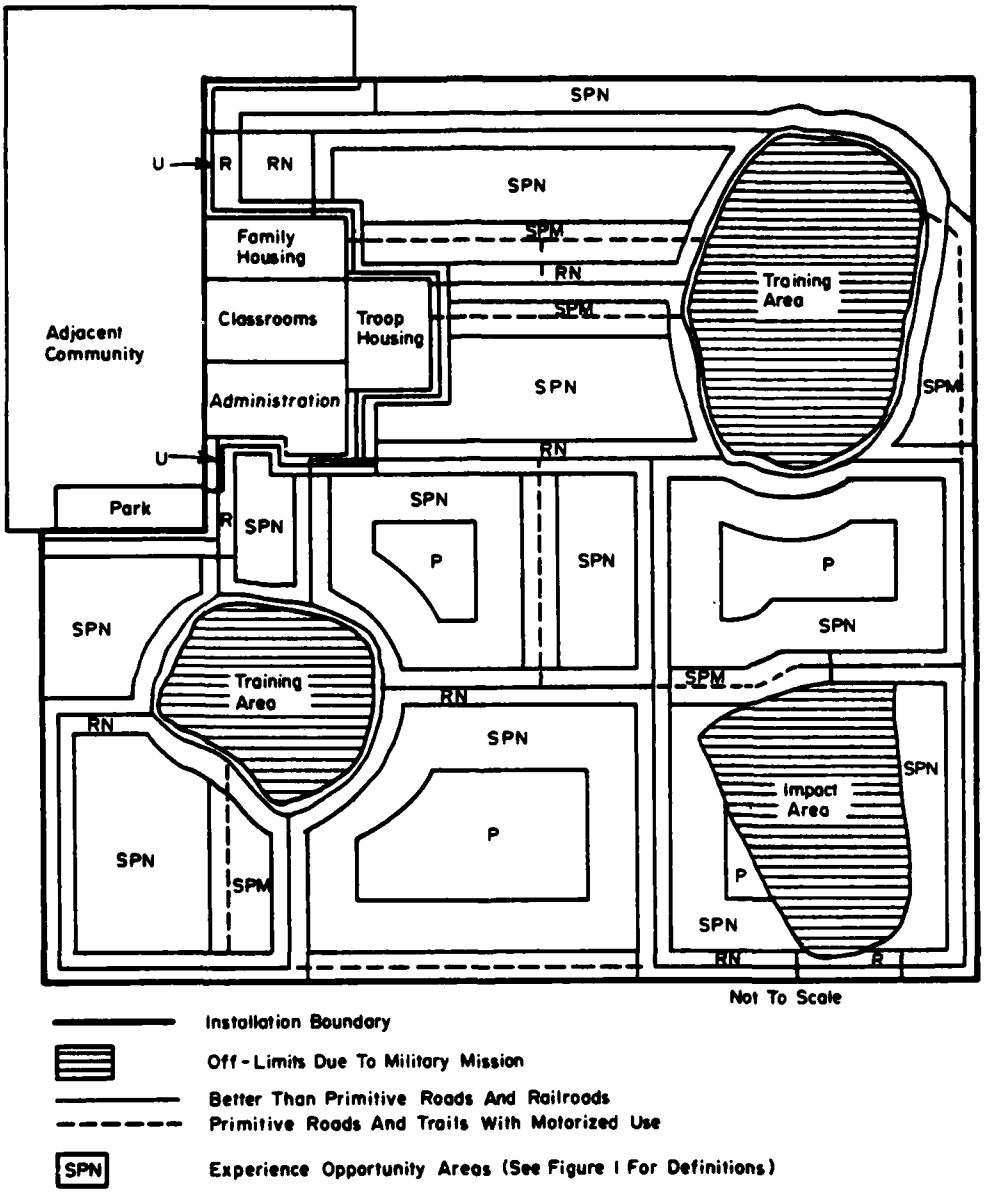

Figure 6. Base map identification of experience opportunities after applying physical condition criteria.

Table 6

Experience Opportunity Evidence of Humans Criteria*

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
Setting is essentially an unmodified natural environment. Evidence of humans would be unnoticed by an observer wandering through the area.	Natural* setting may have subtle modifications that would be noticed but not draw the attention of an observer wandering through the area.	Natural* setting may have moderately dominant alterations but would not draw the attention of motorized observers on trails and primitive roads within the area.	Natural* setting may have modifications which range from being easily noticed to strongly dominant to observers within the area. However, from travel routes and use areas, these alterations would remain unnoticed or visually subordinate.	Natural* setting is culturally modified to the point that it is dominant to the travel route observer. May include pastoral, agricultural, intensively managed wildland resource landscapes, or utility corridors. Pedestrian or other slow-moving observers are constantly within view of culturally changed landscape.	Setting is strongly structure dominated. Natural or natural-appearing elements may play an important role but be visually subordinate. Pedestrian and other slow-moving observers are constantly within view of artificial enclosure of spaces.
Evidence of trails is acceptable, but should not exceed standard to carry expected use.	Little or no evidence of primitive roads and the motorized use of trails and primitive roads.	Strong evidence of primitive roads and the motorized use of trails and primitive roads.	Strong evidence of designed roads and/or highways.	Strong evidence of designed roads and/or highways.	Strong evidence of designed roads and/or highways and streets.
Structures are extremely rare.	Structures are rare and isolated.	Structures are rare and isolated.	Structures are generally scattered, remaining visually subordinate or unnoticed to the travel route observer. Structures may include power lines, microwave installations, and so on.	Structures are readily apparent and may range from scattered to small dominant clusters, including power lines, microwave installations, local ski areas, minor resorts, and recreation sites.	Structures and structure complexes are dominant, and may include major resorts and marinas, national and regional ski areas, towns, industrial sites, condominiums, or second home developments.

*In many southern and eastern forests, what seem to be natural landscapes may actually have been strongly influenced by humans. The term "natural-appearing" may be more appropriate in these cases.

To apply the criteria, simply compare what is acceptable for each ROS category to what exists the EO areas identified earlier. If human influence exceeds the amount allowed for a particular ROS category, EO area boundaries are adjusted accordingly. If EO area boundaries change greatly, size criteria may have to be reapplied. Figure 6 illustrates the hypothetical results of boundary adjustment due to size; it also shows what results may occur when evidence of human criteria is applied (i.e., EO areas and boundaries located close to human activity may require moderate to significant adjustment).

After the EO area boundaries have been adjusted to account for evidence of humans, the map or map overlay showing the relationship of physical conditions to potential EOs is complete. (Figure 6 is an example.) The next overlay or map to be prepared will reflect the relationship of social conditions.

Social Conditions. User density is the criterion used to produce a map or map overlay that illustrates the relationship of social conditions to the potential availability of recreation EOs. Application of this criterion involves analyzing the potential contact among recreationists and between recreationists and persons involved in non-recreation activities. Table 7 gives the user density criteria for social condition analysis. As indicated, it will be necessary to develop installation-specific criteria for the SPM, RN, R, and U categories. Development of these criteria will be highly subjective, and will require experience and knowledge of local conditions. If questions about user density can be incorporated into MSA surveys, the survey results can be used to help develop these criteria.

Table 7

Experience Opportunity User Density Criteria*

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
Usually less than six parties per day encountered on trails and fewer than three parties visible at campsite.	Usually six to 15 parties per day encountered on trails and six or fewer parties visible at campsite.	Low to moderate contact frequency.**	Frequency of contact is:** moderate to high on roads; low to moderate on trails and away from roads.	Frequency of contact is:** moderate to high in developed sites, on roads and trails, and water surfaces; moderate away from developed sites.	Large numbers of users onsite and in nearby areas.

*These criteria apply during the typical recreation use season. Peak days may exceed these limits.
**Specific numbers must be developed to meet installation or local conditions.

Once developed, these criteria are applied to recreation areas and uses now on the installation, e.g., family camps and hunting areas, and areas not currently used for recreation. An overlay map is then prepared by outlining and labeling available user density EOs. Often, it will be easiest to document this information on the physical condition overlay. This allows comparisons of available user density with physical conditions that are needed. If the same overlay is used, EO areas identified from social conditions data should be marked clearly. Minor discrepancies between the user density EO categories and the EO categories that should be available due to physical conditions can be resolved when the final EO map is developed. Major discrepancies will require special consideration (see p 38).

Managerial Conditions. Managerial condition criteria (see Table 8) generally are applied only to existing recreation areas and uses. The managerial conditions affecting EOs are related to the existence of user controls and how noticeable they are. Controls can be physical (e.g., a fence around a stocked fishing pond) or regulatory (e.g., the use of permits to allow hunting only in certain areas).

Table 8

Experience Opportunity Managerial Criteria

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
On-site regimentation is low with controls* primarily off-site.	On-site regimentation and controls* present but subtle.	On-site regimentation and controls* present but subtle.	On-site regimentation and controls* are noticeable, but harmonize with the natural environment.	Regimentation and controls* obvious and numerous, largely in harmony with the man-made environment.	Regimentation and controls* obvious and numerous.

*Controls can be physical (such as barriers) or regulatory (such as permits).

On most installations, use of controls to manage recreation in primitive areas (except for hunting and fishing permits) is fairly limited. This is mostly because recreation use at this end of the ROS is small. However, managerial condition analysis is discussed here because use of controls can be a tool for future planning and resource allocation and management.

To apply the criteria, compare managerial descriptions of each EO with conditions in areas now used for recreation. Next, an overlay outlining existing recreation areas is prepared and labeled in terms of the applicable managerial EOs. As with social analysis, this mapping can be done on the physical condition overlay. This allows comparison of the actual managerial setting with potential physical condition EOs. If the same overlay is used, the EO areas identified from the managerial condition analysis should be marked clearly.

Minor discrepancies noted between the managerial and physical EOs can be handled when the final EO map is prepared. Major discrepancies deserve special consideration (see p 38).

The EO Map

After the physical, social, and managerial conditions have been analyzed, a final EO map or map overlay can be developed. This map is prepared by combining the results of earlier analyses. First, the location, boundary, and classification of the EO areas identified for each condition are examined. If separate overlays were prepared for each condition, the EO area boundaries and classification are examined using an overlay technique.

After the results of the separate analyses are examined, the final map is prepared by adjusting and redrawing the boundaries of the identified EO areas. Adjustments reflect potential EO areas relative to a combination of physical, social, and managerial conditions identified from the analysis. For example, assume that a 70-acre area was classified as RN due to social and managerial conditions. Also assume that all but 10 acres of this area is within a 90-acre area classified as RN due to physical conditions. On the final EO map, a boundary might be drawn to show that 100 acres are available for RN recreation; i.e., 90 acres classified as RN due to physical conditions plus 10 acres adjacent to this area classified as RN due to social and managerial conditions.

Figure 7 is a simple illustration of a final EO map. A modification of Figure 6, it is based on the social and managerial analysis, a synthesis of physical, social, and managerial condition information, and boundary adjustment.

When information is combined and boundaries are adjusted to produce an EO map, care should be taken to insure that the resulting EO areas still meet, or at least almost meet, the appropriate criteria for all three setting conditions. Generally, this will require minimal effort since the criteria for the different setting conditions are somewhat related. However, in some cases, there may be discrepancies in area classification among different conditions. If the discrepancies are major, the following considerations should be applied to determine the final ROS classification.

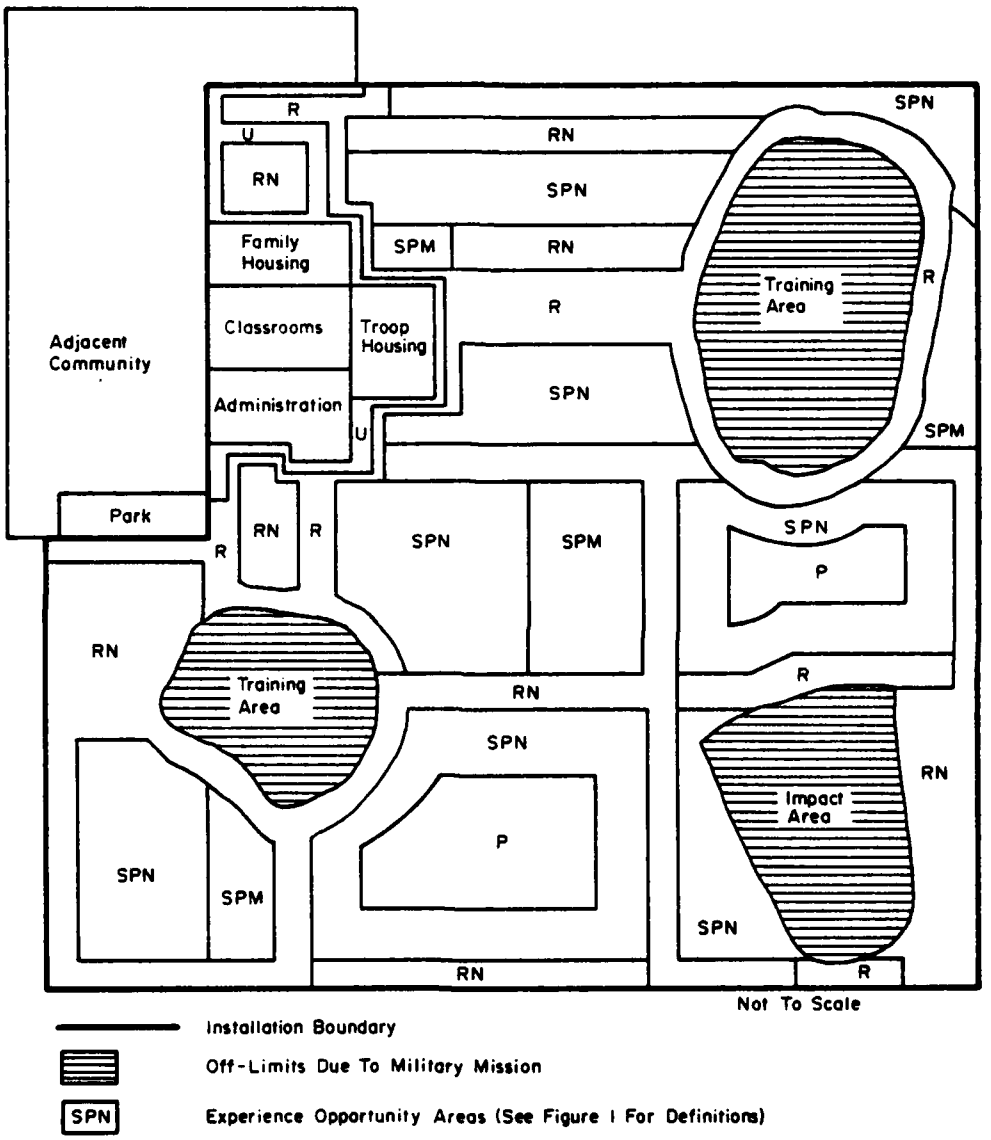

Figure 7. Simplified final EO map.

Major Discrepancies in EO Boundaries

EO classification discrepancies generally occur when the physical, social, or managerial condition classifications for one area differ significantly. For example, an area's social and managerial conditions might classify it as having potential for SPM recreation, but its physical conditions might put it in the RN category. To handle discrepancies of this type and determine the ROS classification, use these general considerations: (1) areas should be classified in the ROS category that best reflects the long-term management objectives for the land and (2) the military mission is a primary consideration.

Coordination and information exchange among the installation offices responsible for land use and management will be necessary to determine the proper classification. In the example above, the area with physical potential for RN recreation may also have potential for timber harvest or use as a training area. If timber harvest or training area is determined to be the best possible long-term future use for the area, it should be classified as having SPM recreation potential. This will include the area in current outdoor recreation plan development. Since many SPM recreation opportunities and activities cause little change to the natural environment, the area's long-term potential for timber harvest or training will not be reduced.

If coordination does not identify long-term objectives adequately, the following approach might be used. The military mission should still be a primary consideration.

Step One. Generally use a classification that reflects physical conditions, because it often represents a more permanent (or less easily changed) situation. Social and managerial conditions can be altered in less time if it becomes necessary to change the land use from recreational to military.

Step Two. An emphasis on physical conditions may be unrealistic in terms of the outdoor recreation development objectives; if so, choose a classification which is an average of the physical, social, and managerial conditions.

Step Three. If averaging is necessary, consider that it is easier to shift from a P to a U direction along the ROS. Once recreation development or human modification occurs, it is usually infeasible to shift toward more P-type conditions.

Recreation Capability, Capacity, and Suitability

The EO map indicates potential EO areas. These areas are then analyzed to obtain more detail for outdoor recreation plan development. This analysis involves determining area capability, capacity, and suitability, much of which will involve subjective analysis and professional judgment. The following sections briefly describe how the analysis is done.

Recreation Capability

The final EO map gives a general indication of the recreational capability of installation lands; however, a better indication is given by identifying the attractiveness and the potential activity opportunities (AOs) of the areas. In final plan development, those areas with a higher attractiveness rating and which can actually provide AOs that are in demand will provide better recreational opportunity.

Area Attractiveness. Landscapes and areas with the greatest variety and diversity of landforms and vegetation will generally be the most attractive in terms of recreational use and enjoyment. An attractiveness rating scheme can be used to compare areas having the same EO potential. The USDA, FS has developed a scheme[29] which identifies three landscape classes for rating attractiveness: Class A - Distinctive; Class B - Common; and Class C - Minimal.

Class A - Distinctive refers to areas whose landform features, vegetation patterns, water forms, and rock formations have unusual or outstanding visual quality. They are usually not common relative to features of the surrounding area. Class B - Common refers to areas whose features have variety in form, lines, color, and texture, but which tend to be common throughout the surrounding area and are not outstanding in visual quality. Class C - Minimal refers to features having little change in form, line, color, and texture. They include areas not found in Classes A and B.

Based on local and/or regional landscape features, the installation planner can prepare a table or chart which divides landforms, vegetation patterns, waters, and rock formations into three similar classes. (Figure 8 is an example prepared by the FS for steep mountain slope landscape.) This type of table can be used to compare the attractiveness of various EO areas with areas having the same potential.

Activity Opportunities. The earlier discussion of recreation demand (p 18) described a subjective method for placing demanded recreation activities into the various ROS categories. Figure 3 was an example of a table that could be developed to identify or describe the relationship of demanded activities to the ROS. Using the demand table developed for his/her installation, the Army recreation planner can examine the identified EO areas and subjectively determine which ones are most capable of providing AOs. The premise behind this examination is that the preferred EO areas must be capable of providing and sustaining the impact of the AOs demanded.*

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[29] National Forest Landscape Management, Volume 2: Chapter 1, The Visual Management System, Agricultural Handbook Number 462 (USDA, FS, April 1974), p 12.

* CERL Technical Report N-121/ADA109720, Establishing Priorities for Acquiring Natural Resources Data Parameters, by W. D. Severinghaus, R. G. Goettel, and L. L. Radke (1981), provides information about the type of data that may be required for this examination. It is suggested that this report be consulted, not only for activity opportunity analysis, but also for the carrying capacity analysis that is described later.

	CLASS A	CLASS B	CLASS C
	DISTINCTIVE	COMMON	MINIMAL
Landform	Over 60 percent slopes which are dissected, uneven, sharp exposed ridges or large domin ant features.	30-60 percent slopes which are moderately dissected or rolling.	0-30 percent slopes which have little variety. No dissection and no dominant features.
Rock Form	Features stand out on landform. Unusual or outstanding avalanche chutes, talus slopes, outcrops, etc., in size, shape, and location.	Features obvious but do not stand out. Common but not outstanding avalanche chutes, talus slopes, boulders and rock outcrops.	Small to nonexistent features. No avalanche chutes, talus slopes, boulders and rock outcrops.
Vegetation	High degree of patterns in vegetation. Large old-growth timber. Unusual or outstanding diversity in plant species.	Continuous vegetative cover with interspersed patterns. Mature but not outstanding old growth. Common diversity in plant species.	Continuous vegetative cover with little or no pattern. No understory, overstory or ground cover.
Water Forms, Lakes	50 acres or larger. Those smaller than 50 acres with one or more of the following: (1) Unusual or outstanding shoreline configuration. (2) major features (3) islands, (4) Class A shoreline vegetation or rock forms.	5 to 50 acres. Some shoreline irregularity. Minor reflections only. Class B shoreline vegetation.	Less than 5 acres. No irregularity or reflection.
Water Forms, Streams	Drainage with numerous or unusual changing flow characteristics, falls, rapids, pools and meanders or large volume.	Drainage with common meandering and flow characteristics.	Intermittent streams or small perennial streams with little or no fluctuation in flow or falls, rapids, or meandering.

Figure 8. Attractiveness classes for steep mountain slope terrain (From National Forest Landscape Management, Volume 2: Chapter 1, The Visual Management System, Agricultural Handbook Number 462 [U.S. Department of Agriculture, Forest Service, April 1974], p 13.)

For example, consider the recreation activity of fishing. Assume that an installation planner has determined that there is significant demand for fishing. Also assume that demand analysis indicates that most potential users prefer to fish in SPM EO areas. Using this information, the planner can subjectively examine all land areas identified on the final EO map as being available for SPM EOs. He/she should identify the EO areas whose natural resources can best provide this type of fishing experience (i.e., the areas containing ponds or streams). The planner should also examine these areas in terms of their ability to sustain the impact of fishing (e.g., whether the streams or ponds are well stocked or populated). The entire EO area should be included in this analysis. Sometimes, only a portion (e.g., 70 percent) of an identified area can truly provide AOs; this will affect overall capability.

Based on this examination, the planner should be able to identify EO areas which can best provide good fishing AOs. Areas can then be ranked or rated relative to their capability to provide recreation opportunity. In the final analysis, this ranking should not discount the other AOs in demand. For example, off-road recreational vehicle (ORRV) use may be in greater demand than fishing. Even though an area may have poor fishing resources, it may have very good resources for ORRV touring. In this case, the EO area being examined would receive a higher rating than if only fishing AOs were in demand.

During AO analysis, special consideration should be given to EO areas currently being used for recreation, especially those with developed facilities. Such areas should receive relatively high ratings. This will insure that developed sites receive primary consideration during plan development and will avoid any inclination to abandon existing sites and/or unnecessarily duplicate facilities. This ultimately preserves resources and land areas for future activities and uses.

Capability Analysis. Although identification of area attractiveness and AO capability is subjective, it can provide much information for plan development. This information will eventually be used to develop a table which lists EO areas, their attractiveness class, their AO rating, and the AOs which each area can provide. The table is used in plan development to match recreation activity demand to the areas which can best provide activity and recreation opportunities. Preparation of this table completes the generic analysis of recreation capability.

Recreation Capacity

Recreation capacity (also referred to as carrying capacity) is a measure of the maximum number of persons who can have recreation experiences in a particular EO area. Factors that affect capacity are the physical, social, and managerial conditions, are attractiveness, and AO capability.* Capacity is a function of how well an existing combination of these factors interacts to absorb the sights and sound of human activity and actual physical use.

* CERL Technical Report N-121/ADA109720, Establishing Priorities for Acquiring Natural Resources Data Parameters, by W. D. Severinghaus, R. G. Goettel, and L. L. Radke (1981), describes many of the physical data parameters that affect outdoor recreation capacity and the carrying capacity of land.

Generally, areas with lower capacities have open landscapes (little vegetative screening and flat topography) and fragile soil and vegetation. Areas with higher capacities have closed landscapes and have resistance to physical use. Similarly, areas which are available for and provide P recreation have lower capacities, and areas which provide U recreation have higher capaciities; i.e., capacities generally increase toward the U end of the ROS.

Carrying capacity estimates for EO areas on Army installations can be established by first developing capacity standards for demanded activities, i.e., picnickers per acre per hour. These standards can be used to derive an area's expected carrying capacity in terms of RVDs. Activities and capacities in existing recreation areas and capacities of potential areas can then be compared with demand. This comparison is a major factor for planning additional activities and developing available areas.

Developing capacity standards for recreation activities on Army installations requires considerable effort and professional judgment. Input and assistance for this task can be obtained from QSSMP and MSA surveys, FS or NPS personnel, and estimates of preferred user density criteria from the social conditions analysis (p 34). (Note that user density preferences and carrying capacity figures can vary.)

Several things must be considered when developing carrying capacity standards. First, capacity standards must eventually be expressed in terms of RVDs. Second, capacity is the capability of land units to provide and sustain recreation activities; therefore, standards should be in terms of users per acre per hour. Third, capacity standards will ultimately be used to determine carrying capacity relative to the ROS categories. Fourth, various activities can occur along several ROS segments. Thus, sets of capacity standards may need to be developed for some activities. For example, a fishing capacity standard for an SPN area may be two persons per 20 acres per hour, while the standard for an RN area may be 12 persons per 5 acres per hour. Finally, if the installation has several distinct ecological regions, capacity standards may be needed for each type (e.g., grassland versus coniferous forest). Appendix A gives an example.

For easy application, it is suggested that capacity standards initially be expressed in terms of persons at one time (PAOT). Such capacities are easiest to develop. For example, a capacity standard for fishing in an SPM area might be two PAOT per 20 acres (0.1 PAOT per acre). This would be the maximum capacity at which fishermen could obtain SPM recreation experiences. A hunting capacity for the same area might be two PAOT per 40 acres (0.05 PAOT per acre).

Once capacity standards or sets of standards for activities are developed, they are adjusted to derive carrying capacity coefficients for each ROS category. For example, suppose that fishing, hunting, and hiking are the only demanded activities for SPM areas. Assume that standards developed for hunting and fishing are those described above. Also assume that the standard for hiking is two PAOT per 25 acres or 0.08 PAOT per acre. Considering this, a capacity coefficient for SPM areas might be derived by one of two methods. The first averages the PAOT standards; e.g., 0.1 plus 0.05 plus 0.08 equals 0.23 divided by 3 standards equals 0.08 PAOT per acre. Then, the average is adjusted to reflect user preferences. If fishing and hiking are expected to

be the main uses, the standard might be adjusted upward to 0.09 PAOT per acre. The second method is applied if all activities are expected to occur at the same time. In this case, the capacity standards for each activity are simply added to determine the carrying capacity coefficient.

After PAOT capacity coefficients are developed for each ROS category, they should be presented in a table. This table should illustrate the standard coefficient as well as the range of possible capacities from which the coefficient was developed. (Note that different capacities may be required for different ecological regions. Refer to Appendix A.) Figure 9 is an example of such a table. It was adapted from one developed by FS from numerous forest settings. Since the area available for recreation on installations will generally be much smaller than in national forests, the actual coefficients may need to be adjusted slightly upward from those shown in Figure 9. However, this adjustment should not be made at the expense of potential damage to natural resources.

Once PAOT capacity coefficients are developed, they should be converted to RVDs of capacity by the following formula:

$$RVD = \frac{PAOT \times MS \times PU \times LOS}{12}$$

Capacity Coefficient Ranges*
(in PAOT/Acre)

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
Adjusted:	.020	.070	.080	2.5006.000	N/A
Range					
High:	.025	.083	.083	2.5007.500	N/A
Low:	.002	.008	.008	.083.830	N/A

*Specific ranges must be developed to meet installation conditions.

Figure 9. Sample capacity coefficients.

where:

MS = Season of use, in days.

PU = Pattern of use, or the relationship between the average weekend use and average weekday use of areas.

LOS = Average length of time that use per person occurs.

12 = The constant of 12 hours for an RVD.

The following discussion illustrates the use of this formula.

Assume that the installation planner wants to measure the carrying capacity for SPM EO areas. Fishing, hunting, and hiking are the only demanded activities expected for these areas. Use of SPM areas for hiking is expected from March through September. Demand estimates indicate that the average time spent by hikers in SPM areas is 6 hours. Use of the fishing areas is also expected from March through September, at an average fishing time per user of 8 hours. The installation hunting season is during October and November; the average time expected to be spent is 8 hours per visit. For each of these three activities, the planner expects use to be four times greater on weekends than on weekdays. In earlier analyses, the planner established an adjusted capacity coefficient of 0.08 for SPM EO areas.

All of these variables fit into the RVD formula as follows:

$$RVD = \frac{0.08 \times 275 \times .45 \times 7.3}{12}$$

where:

PAOT = 0.08. (This is the adjusted capacity coefficient for SPM recreation areas.)

MS = 275 (the number of days in the anticipated season of use, i.e., March through November).

PU = .45 (a pattern of use adjustment factor obtained from the guide in Table 9).

LOS = 7.3 (The anticipated length of visits to the area by hikers, fishermen, and hunters are 6, 8, and 8 hours, respectively; therefore, the average length of stay for all users is 7.3 hours).

By solving the equation, the planner determines the carrying capacity for SPM EO areas to be 6 RVDs per acre.

After carrying capacity estimates in terms of RVDs per acre are established for each ROS category, a table should be developed to illustrate these capacities. (Figure 10 is a sample table.)

Table 9

Pattern-of-Use Adjustment Factors
(Source: Dr. B. L. Driver, Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service.)

Pattern	Factor
Weekday:Weekend*	
1:1	1.00
1:1-1/2	.80
1:2	.65
1:3	.50
1:4	.45
1:5	.43
1:6	.40
1:7	.38
1:8	.37
1:9	.36
1:10	.35

*The same pattern of use on weekends as weekdays is a 1:1 ratio, two times as much use on weekends as on weekdays is a 1:2 ratio.

Carrying Capacities by ROS Category
(RVDs/Acre)

Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
1.05	2.40	6.00	15.0	Capacities for Rural and Urban are generally based on design capacity.	

Figure 10. Sample carrying capacities.

Recreation Suitability

The goal of the recreation suitability analysis component of the ROS planning framework is to determine the best allocation of land and water resources in order to provide recreation opportunities. In essence, suitability measures the appropriateness of land use and estimates the manageability of these uses. Terms such as "best," "appropriateness," and "manageability" indicate that suitability analysis requires subjective judgment and decision-making. Judgments and decisions are primarily based on recreation demand and supply and on several management factors.

There are no simple formulas or criteria for determining suitability. If anything, it is appropriate to employ the logic used in capability analysis; however, in doing so, greater weight is placed on installation-specific management factors, such as budgets, technology, installation mission and policy, and personnel levels.

The first step in suitability analysis is to compare recreation demand to supply. Any unmet demand is used as an indicator of needed changes in supply or opportunities offered. The next major step is to examine available EO areas and their attractiveness and capability. This identifies the areas which can best provide needed opportunities. Next, carrying capacity estimates are analyzed to find how much land resource should be allocated for needed recreation opportunities. Finally, management factors are considered to determine where and how much land resource will actually be allocated to recreation.

Installation management factors can vary greatly (e.g., the military mission and policy toward providing recreation opportunities). Since management factors are major considerations in suitability analysis, further detailed discussion and guidance pertaining to resource allocation is neither appropriate nor possible. However, to help the user with certain aspects of suitability analysis, the following provides a generic discussion and an example of the use of demand, supply, and capacity figures. This discussion is considered generic because it addresses entire ROS categories. However, for actual plan development on installations, analysis can and should be used to identify need and resource allocation at both the activity and the ROS levels.

The first suitability analysis step (comparing demand and supply) can be accomplished by using the recreation demand table developed as part of demand analysis (Figure 3), the final EO map (Figure 7), information on the acreage currently allocated for recreation, and carrying capacity figures (Figure 10). For example, suppose that the current acreage assigned to SPM recreation is 1600 acres and that the 1985 projected demand for SPM recreation opportunities is 12,750 RVDs. Also assume that earlier analysis determined the carrying capacity for SPM EO areas to be 6 RVDs per acre. Dividing projected demand by carrying capacity shows that 2125 acres of SPM recreation area will be needed by 1985. This is 525 acres more than is currently provided.

The next major step is analyzing the final EO map (Figure 7) and the table developed from the capability analysis (p 41). This information identifies all available SPM areas and those that can best provide additional SPM EOs. The detailed analysis performed by the user must identify areas which can provide the AOs that are actually in demand. (This is why the capability table was developed.)

Once these areas are identified, they are re-evaluated to insure that they meet carrying capacity and acreage requirements and all other criteria related to SPM recreation areas. This re-evaluation may eliminate certain areas from consideration. The remaining alternative areas can then be evaluated for future development and inclusion into the Outdoor Recreation Program. This evaluation is based on installation-specific management factors and policy toward allocating land and water resources for recreation.

Integrated Resource Management

The last major ROS planning process component that precedes actual plan development is integrated resource suitability analysis. Because of its potential value in integrated resource management, this analysis is one of the most positive aspects of applying the ROS planning framework to Army installations. This is especially significant since outdoor recreation is considered a legitimate use of installation land.[30]

Although specific procedures and processes are not yet fully developed, integrated resource suitability analysis is similar to recreation suitability analysis, except that more land uses are considered. Use of map overlays is the simplest analysis technique; however, this can become quite complex and cumbersome if several resource uses are being analyzed. Computer-based analysis procedures will probably be used in the future.[31] In either case, integrated analysis can be performed only if the demand, supply, and resource needs of nonrecreation land uses have been examined.

The goal of integrated resource suitability analysis is to help develop alternative resource allocation or land management plans. To do this, the planner must determine how different resource uses affect one another. Since identification of recreation EO areas using the ROS planning framework considered many physical conditions (e.g., remoteness, size, and evidence of humans), the effect of other resource uses (e.g., timber harvesting) on these conditions can be used to identify effects on recreation EO areas.

Figure 11 is a classic example of identifying the effect of another resource on EO areas. The top part of Figure 11 shows a portion of a hypothetical EO map; the bottom part shows the effect that proposed construction of a logging road might have on EOs. This effect is primarily a result of remoteness criteria; i.e., SPN recreation EOs should be located 1/2 mile from primitive and better-than-primitive roads (p 30). If the logging road is constructed, the size of SPN and RN EO areas, their carrying capacity, and even their attractiveness and capability might be changed.

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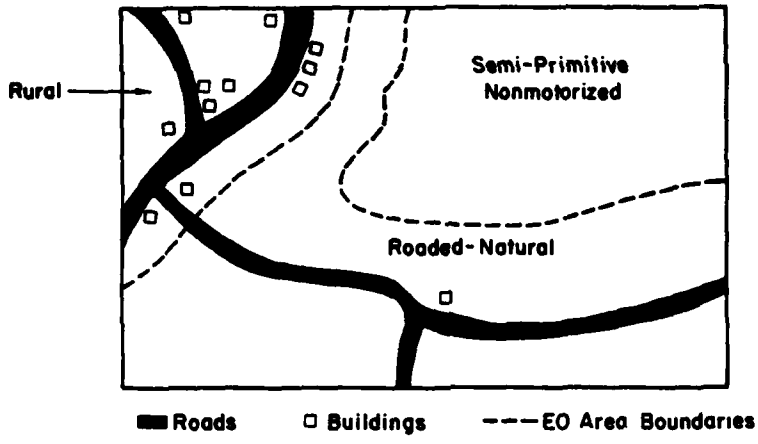
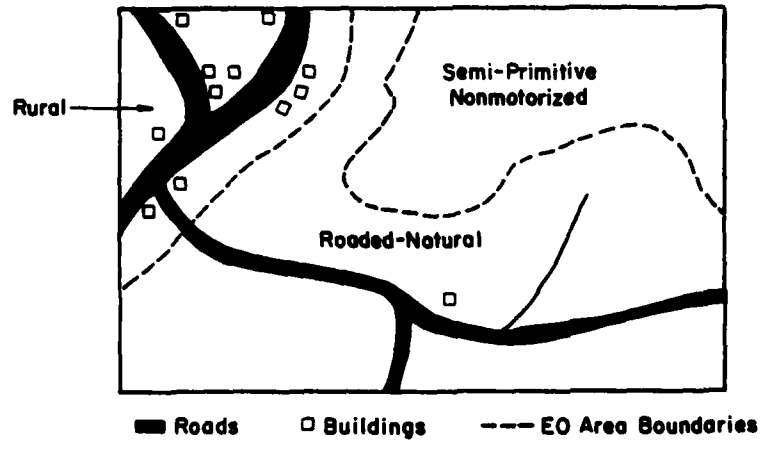
[30] Master Planning for Army Installations, AR 210-20 (DA, 26 January 1976), p, 3-1; Natural Resources -- Land, Forest and Wildlife Management, AR 420-74 (DA, 1 July 1977), p 7-1; and Welfare, Recreation, and Morale -- Army Morale Support Activities, AR 28-1 (DA, 15 February 1979), p 5-4.

[31] Perry J. Brown, "The Opportunity Spectrum: Techniques and Implications for Resource Planning and Coordination," Dispersed Recreation and Natural Resource Management, Joan Shaw, ed. (Utah State University, College of Natural Resources, April 1979), p 85.



Hypothetical Experience Opportunities



Potential Change in EOs Due to Proposed Construction of a Logging Road

Figure 11. Sample effects of nonrecreation resource use on recreation EOs. [(Source: Perry J. Brown, B. L. Driver, Donald H. Bruns, and Charles McConnell, "The Outdoor Recreation Opportunity Spectrum in Wildland Recreation Planning: Development and Application," Recreation Planning and Development (American Society of Civil engineers, 1979), pp 527-538.]

It may be harder to identify the effect of recreation on other resource uses. This will depend on the needs of other resource uses and the criteria used to determine an area's potential and suitability for other uses. Generally, land allocated to recreation cannot be used for other activities (e.g., timber harvest). Thus, the best measure of how recreation will affect other uses may be a measure of the potential output that is lost.

Any measures or output estimates associated with alternative land use will help the planner make allocation decisions. Even output measured in non-common units (e.g., timber is generally measured in terms of money and volume of fiber; recreation is measured in terms of acres provided and demand that can be met) will give decision-makers a better idea of gains and losses associated with alternative land allocation.

Once the alternative output potential of land is known, integrated resource suitability analysis is actually an analysis of the output trade-off that would occur because of alternative uses. Allocation decisions are based on the most suitable trade-offs relative to installation policy and mission.

The Outdoor Recreation Plan

A final map can be prepared after the integrated resource suitability analysis is complete and the land and water resources that will be allocated to recreation are identified. This map should show the recreation EO areas which are allocated to and will be considered for outdoor recreation development. These areas can now be considered and referred to as recreation opportunity (RO) areas. Figure 12 -- a continuation of the sample base maps in Figures 5, 6 and 7 -- is a hypothetical example of the final map. This final map is a working base map for preparing the Outdoor Recreation Program Plan Map.* It does not show the actual location of recreation activities and facilities (if required), but it can be used to help determine their location.

During demand analysis, individual recreation activities were placed in their respective ROS categories. Recreation supply and capability analysis determined the EO areas that were available and the areas best suited to handle demanded activities. The suitability analysis should have indicated any deficiencies in current supply and the carrying capacity of EO areas.

Using the results of all these analyses, subjective judgment can then be applied to determine both the priority of and a more specific location for the activities to be provided. Basically, the recreation activities expected to be in high demand should be given initial priority. An even greater degree of priority should be given if current supply does not meet current demand. Once this initial priority is established, final priorities become a function of land allocation, the AO capability of the final RO areas, and the carrying capacities of these areas.

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* The actual Outdoor Recreation Plan and Outdoor Recreation Program Map should be prepared in accordance with AR 210-20, Master Planning for Army Installations, and other Master Planning regulations and guidance.

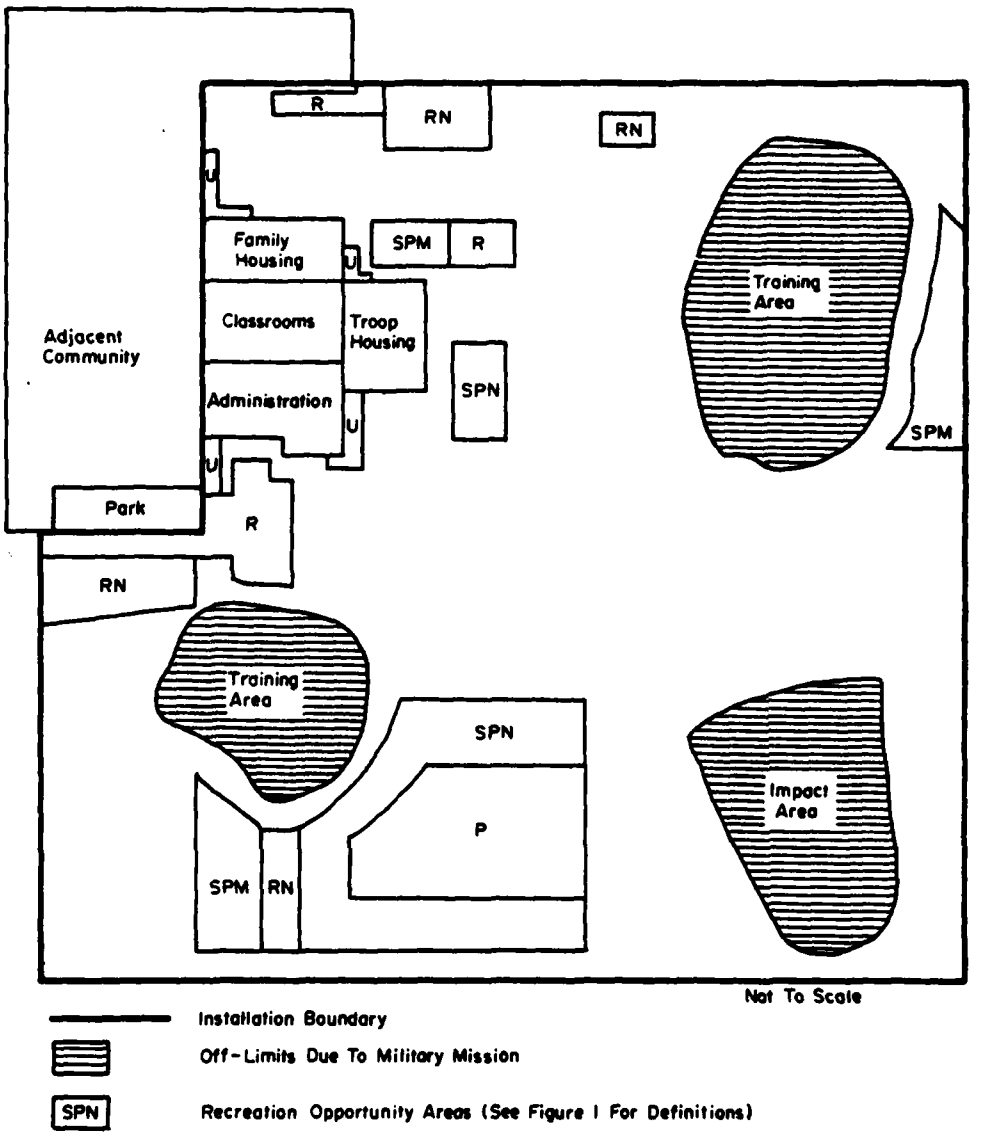

Figure 12. Sample RO capability map.

For example, suppose that fishing and bicycling are projected to be the recreation activities with the greatest future demand; thus, they should receive the highest initial priority for development. Also assume that demand analysis has determined that the fishing and bicycling experiences that are demanded fall into the SPM and R categories of the ROS, respectively. To determine the final priorities for development, the planner should examine the SPM and R RO areas on the final map. All information developed in earlier analysis and directly related to these areas should be considered. If this examination indicates that the SPM areas allocated do not have a high capability of providing fishing AOs and that the carrying capacities of these areas is not enough to handle demand, then the short-term development priority would be given to bicycling activities. Long-term priority might be given to reallocating land so that better RO areas for fishing AOs can be provided.

Once priorities are established, development locations can be determined. The general location of activities and associated facilities is determined directly from the RO map and is a function of the type of experience demanded. For example, the bicycling activities described in the example above should be located in areas marked R on the RO map. Generally, it is best to site facilities within the appropriate RO area; thus, if there are any changes in managerial conditions or the military mission, the facilities will not have to be razed. TMs 5-803-10 and 5-803-12[32] give more detailed design and orientation criteria for facilities.

Once development priorities and location are determined, it should be easy to incorporate this information into the Outdoor Recreation Program portion of the Master Planning process. After this information has been incorporated, management objectives should be drawn up for each RO area to be developed to make plan implementation easier. These objectives should state the types and quantities of recreation activities that should be provided in each RO area. They should also identify the physical, social, and managerial conditions necessary to provide the EOs associated with each area.

[32] Planning and Design of Outdoor Sports Facilities, TM 5-803-10 (DA, October 1975); and Planning and Design of Outdoor Recreation Facilities, TM 5-803-12 (DA, October 1975).

4 BENEFITS OF ARMY APPLICATION

Introduction

Applying the ROS planning framework to outdoor recreation planning on Army installations has several potential benefits. Many are inherent to the framework and are directly related to recreation planning; others are more subtle.

Many of the benefits described below may be obtained from direct application of the ROS planning process; however, further research into adapting current standards and criteria to Army-unique conditions would produce greater benefits. Chapter 5 identifies several research efforts that could ultimately improve application of the planning framework to Army installations.

Benefits

The ROS planning framework is a reliable method for generic outdoor recreation planning and development. Since the method is generic, it is easily adopted, regardless of geography and physiography. It also fills a gap within the Army's current guidance for outdoor recreation planning.

Current Army guidance provides many excellent techniques and criteria for site-specific planning and facility design, facilities operation, and activity management. However, there is limited guidance for identifying recreation demand and making decisions about the general location of demanded outdoor recreation activities.

The ROS planning framework is behaviorally based with respect to preference for activities and experience opportunities (i.e., demand), and recreation demand analysis is an integral part of the process. Also, the framework considers several general location factors (e.g., access, size, and evidence of humans) and the general relationship of recreation activity experience opportunities to other recreation opportunities and non-recreation activities. These factors enable the process to both complement and supplement current guidance without modifying it.

Use of the ROS planning framework allows Army recreation planners to incorporate state-of-the-art information and techniques into their planning efforts. This incorporation takes advantage of the large amount of research that went into developing the framework. Also, using ROS, installation outdoor recreation planning can be done in a similar way to the planning being done by other Federal agencies that are adopting the framework. Use of common techniques and language improves planning coordination and information exchange.

The more subtle benefits of applying th ROS planning framework are training area maintenance and training realism. The supply analysis component of the framework uses existing physical, social, and managerial conditions as a basis for identifying and classifying potential recreation experience areas. Once areas are classified, the capability, capacity, and suitability analysis generally insures that any recreation development will be consistent with

experience opportunities. Thus, primitive settings will generally remain primitive, semi-primitive settings will remain semi-primitive, etc.

This, combined with the ability to incorporate recreation criteria into integrated resource suitability analysis, will minimize conflicts between recreation and training area requirements. For example, any unimproved land subject to recreation supply analysis will tend to be classified toward the primitive end of the spectrum. If this land is allocated to recreation, the activity opportunities to be provided will also reflect the primitive end; e.g., few, if any, facilities will be constructed and user densities will be low, etc. Thus, the land will virtually retain its natural appearance even though it is providing recreation opportunities. Then, if a future mission needs the land for training, it will still provide a realistic natural setting for this training. In fact, in a few cases, it may be possible to alternately allocate the land to training and recreation, if scheduling can be publicized.

Similar logic applies for other potential conflicts. For example, remote areas tend to be classified toward the primitive end of the spectrum, and any recreation opportunities provided will have low user densities. Thus, certain conflicts with training activities (e.g., heavy traffic along routes to training areas) will be minimized.

Another benefit relates to the fourth level of hierarchical demand (pp 18-19). The Army can benefit by providing appropriate recreation opportunities, since recreation leads to personal benefits (e.g., enhanced work performance and health-related benefits). (These are fourth level recreation demands.) When military personnel receive these benefits, morale and productivity increase. This can improve military capability and readiness for mobilization and/or national defense. The rationale for Army Morale Support Activities supports the probability of this benefit.

5 SUMMARY AND RECOMMENDATIONS

Summary

Participation in outdoor recreation activities has increased steadily in recent years, and the trend is expected to continue. Current outdoor recreation planning and development theory suggests that the pursuit of recreation is based on demand for settings, experiences, and benefits, as well as demand for specific activities. In view of this theory, one particular planning concept has become a major factor in outdoor recreation planning research -- the concept of Recreation Opportunity Spectrum and the ROS planning framework.

The ROS planning framework is based on the positive aspects of several land inventory and classification systems. Its focus is recreation supply inventory and analysis based on existing physical, social, and managerial conditions. Once existing conditions are identified and land is classified relative to the ROS continuum, recreation opportunity capability, capacity, and suitability analyses are performed. The results of these analyses are used in integrated resource suitability analysis to develop alternative land allocation plans.

This report has described the application of this planning process to outdoor recreation planning on Army installations. Use of the ROS planning framework should give Army recreation planners a tool to analyze and meet certain recreation demands, and still consider integrated resource management and future training area requirements. This tool supplements existing Army guidance for design of outdoor recreation facilities.

This research produced the following information relative to outdoor recreation planning and integrated resource management on Army installations:

1. A description of the ROS and the management issues it addresses.

2. A description of the application of ROS planning to Army installations.

3. Definition of the benefits, both inherent and subtle, to be obtained by applying the ROS planning framework to recreation and resource management on Army installations.

Recommendations

The ROS planning framework and its application are considered to be the state of the art in outdoor recreation planning (see Bibliography). The theoretical analysis used for this report suggests that the framework can be applied to outdoor recreation planning on Army installations.

It is recommended that the planning process discussed in this report be field-tested. This test could examine unique conditions which might require Army-specific modifications.

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LIST OF ACRONYMS

ACP	Area Classification Plan
AO	Active Opportunity
BLM	Bureau of Land Management
CLI	Canadian Land Inventory
DPT	Directorate of Plans and Training
EO	Experience Opportunity
FS	Forest Service
MSA	Morale Support Activity
NPS	National Park Service
ORRV	Off-Road Recreational Vehicle
P	Primitive
PAOT	Persons at One Time
QSSMP	Quarterly Sample Surveys of Military Personnel
R	Rural
RII	Recreational Inventory Instructions
RN	Roaded Natural
RO	Recreation Opportunity
ROIE	Recreation Opportunity Inventory and Evaluation
ROS	Recreation Opportunity Spectrum
RVD	Recreation Visitor Day
SCOPR	State Comprehensive Outdoor Recreation Plan
SPM	Semi-Primitive Motorized
SPN	Semi-Primitive Nonmotorized
U	Urban
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior

APPENDIX:

DEVELOPMENT OF CARRYING CAPACITIES FOR VARIOUS ECOLOGICAL UNITS

Acceptable recreation user density or capacity is a function of how existing combinations of physical, social, and managerial conditions interact to absorb the sights, sounds, and activities of humans. In the absence of stringent managerial conditions, physical conditions are perhaps the best determinant of capacity. Capacities are generally lower where landscapes are open and soil and vegetation are fragile; capacities are generally higher where landscapes are closed and resistant to use.

Significant differences in either the physical conditions or the ecological units that exist should be considered when establishing capacity standards for recreation activities on Army installations. These differences may generate a need for a set of capacity standards (one standard for each activity for each ecological unit). Differences in ecological units should also be considered when adjusting capacity standards to develop carrying capacities for ROS categories. Sets of carrying capacities coefficients may also have to be developed.

Specific criteria for developing of sets of standards are not available at this time. Subjective and professional judgment are the only inputs that can be suggested. Once standards are developed, capacity coefficients and carrying capacities for ROS categories can be derived by making adjustments similar to those described in Chapter 3, p 42.

Although no criteria for activity capacity standards are available, Table A1 provides a sample set of carrying capacity coefficients for ROS categories. This table was adapted from coefficients developed by the Forest Service for the Southwestern Region. It may be used as a guide for developing installation-specific coefficients. If used cautiously, the table may also be used to identify possible relationships between category carrying capacity coefficients and activity capacity standards.

Table A1

Sample Carrying Capacity Coefficients by ROS Category
and Ecological Unit
(From U.S. Department of Agriculture, Forest Service, Southwestern Region.)

Ecological Unit	Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
Tundra	.45	1.05	2.4	6.0	Coefficients for Rural and Urban are based on design capacity.	
Coniferous Forest	1.05	2.40	6.0	15.0		
Coniferous Woodland	.75	1.72	4.2	10.5		
Evergreen Woodland	.75	1.72	4.2	10.5		
Deciduous Forest	.75	1.72	4.2	10.5		
Grassland	.45	1.05	2.4	6.0		
Desert Shrub	.45	1.05	2.4	6.0		
Lava Flow & Gypsum	.45	1.05	2.4	6.0		
Riparian	1.05	2.40	6.0	15.0		
Range	.45-1.05	1.05-2.40	2.4-6.0	6.0-15.0		

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