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ABSTRACT

This reference catalog describes 371 current or completed environmental and outdoor recreation research projects. The projects are summarized and indexed according to subject, investigator, contracting agency, and supporting agency. The compilation is designed to assist scientists, administrators, planners, and students by facilitating the exchange of information and research results. Selection of projects was based on the relationship of the research to the field of outdoor recreation and environmental quality aspects of recreation resources. (BB)

Outdoor Recreation Research

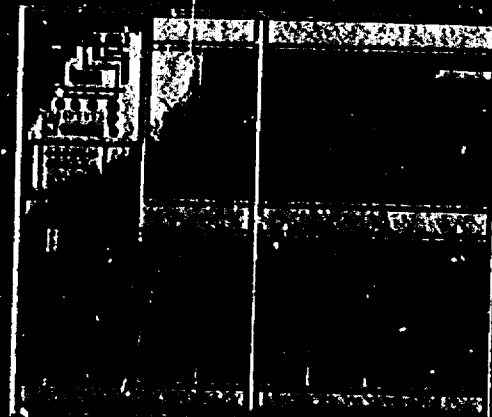
A Reference Catalog • 1969



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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
FORT HARRIS, ARIZONA
FEDERAL BUREAU OF INVESTIGATION

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OUTDOOR RECREATION RESEARCH

A REFERENCE CATALOG • 1969

Number 3

Published January 1970

**DEPARTMENT OF THE INTERIOR
Bureau of Outdoor Recreation
and
Smithsonian Institution
Science Information Exchange**

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FOREWORD

This third catalog of Outdoor Recreation Research assembles in one volume brief descriptions of 371 currently active or recently completed outdoor recreation and related environmental research projects. The catalog is published periodically by the Bureau of Outdoor Recreation as part of its responsibility "to promote the coordination and development of effective programs relating to outdoor recreation," as declared in Public Law 88-29.

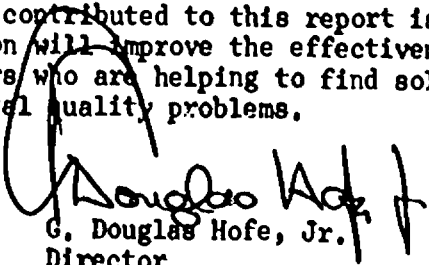
The catalog series was initiated in 1966, and has been prepared in cooperation with the Science Information Exchange of the Smithsonian Institution. This document is an important part of the Bureau's programs of sponsoring, performing, and assisting research relating to outdoor recreation matters, and compiling information of value to outdoor recreation programs and educational institutions.

Selection of projects was based on the relationship of the research to the field of outdoor recreation and environmental quality aspects of recreation resources.

Where interim or preliminary reports or other helpful prepared releases were reported by the principal investigators, the information is included with the research summary. The compilation is designed to assist scientists, administrators, planners and students by facilitating the exchange of information and research results.

Despite conscientious and extended efforts to encourage institutions, organizations and individual researchers to submit materials for inclusion in this catalog, certain eligible projects may not have been listed. It is possible that a few projects are repeated due to multiple support, revision of summaries by researchers, change of principal investigator and the like. We hope these deficiencies are minor compared with the large number of important and promising projects that are reported.

The assistance of all who contributed to this report is appreciated. It is hoped that its publication will improve the effectiveness of the combined effort of investigators who are helping to find solutions to many recreation and environmental quality problems.


G. Douglas Hoge, Jr.
Director

Editor's Note

The third volume of the Outdoor Recreation Research Catalog has been prepared by the Science Information Exchange of the Smithsonian Institution under support from the Bureau of Outdoor Recreation.

Along with the summaries of the projects, the catalog contains the following indexes: Subject Index, Investigator Index, Contracting Agency Index, and Supporting Agency Index. The information which appears in the summaries and the indexes was taken directly from the project record as received by the Science Information Exchange.

The Subject Index is a hierarchical arrangement of index items, indicating relationships between broader and narrower concepts. The index term is followed by the project title, and the chapter identification number of the project. As a further aid in locating subject areas, the first high-level hierarchical term to appear on a left-hand page will be shown in the upper left-hand corner of that page, and the last high-level term to appear on the right-hand will appear in the upper right-hand corner of that page, in dictionary fashion. It is suggested that the reader first check the Index Outline which immediately precedes the Subject Index.

The Investigator Index is an alphabetical listing of the investigators listed on the project record. An asterisk designates the principal investigator. Unless specified, the first name listed on the project record was selected as the principal investigator. In several instances it is apparent that the "investigator" denoted on the source document is, in fact, a program manager, who may not be at the institution or location listed with the project record or displayed with the other indexes.

The Supporting Agency Index (indicating funding sources) and the Contracting Agency Index (indicating performing organizations) are single alphabetical listings.

All of the Indexes in this catalog were generated by means of a computer, necessitating a limitation on the number of characters available for index terms and captions. Thus, in some instances, abbreviations had to be used.

In order to insure publication of this current research catalog within the year 1969 it was necessary to declare July 1, 1969, as the latest date for inclusion of Notices of Research Projects in this volume.

In instances in which investigators were unable to meet this date or research was registered with the Exchange after July 1, 1969, the projects were not included in this volume, but hopefully will appear in a subsequent publication of this scope.

This catalog is published and distributed by the Bureau of Outdoor Recreation. Single copies may be obtained on request from the Bureau as long as supplies last. The Bureau of Outdoor Recreation also publishes an INDEX OF SELECTED OUTDOOR RECREATION LITERATURE, containing information on recently published research and technical writings. The Bureau invites and welcomes submission of research reports and related publications on outdoor recreation for annotated listing in future editions of the INDEX.

It is our desire that the users of this catalog further acquaint themselves with the services of the Smithsonian's Science Information Exchange. As a National Registry of Research in Progress, the Exchange receives 100,000 summaries of on-going research each year defining Who is planning What research, Where and How supported. We invite your questions and registration of your current research efforts. For additional information, write Science Information Exchange, Smithsonian Institution, 1730 M Street, N.W., Washington, D. C., 20036.

Readers are requested to advise the Science Information Exchange of any errors of omission or commission that have been made. Also, critiques of this volume are encouraged so that future editions may present research information in a manner most convenient and acceptable to the user.

Monroe E. Freeman

Monroe E. Freeman, Director
Science Information Exchange

**NOTICE OF RESEARCH PROJECT
SCIENCE INFORMATION EXCHANGE
SMITHSONIAN INSTITUTION**

NOT FOR PUBLICATION OR
PUBLICATION REFERENCE

SIE NO.

AGENCY NO.

SUPPORTING AGENCY:

TITLE OF PROJECT:

Give names, departments, and official titles of PRINCIPAL INVESTIGATORS and ALL OTHER PROFESSIONAL PERSONNEL engaged on the project.

NAME AND ADDRESS OF INSTITUTION:

SUMMARY OF PROPOSED WORK – (200 words or less.) – In the Science Information Exchange summaries of work in progress are exchanged with government and private agencies supporting research, and are forwarded to investigators who request such information. Your summary is to be used for these purposes.

SIGNATURE OF
PRINCIPAL INVESTIGATOR _____

PROFESSIONAL SCHOOL
(medical, graduate, etc.) _____

SI-SIE-78
8-64

GUIDELINES FOR COMPLETING FORM ARE GIVEN IN THE DOTTED BLOCKS

**NOTICE OF RESEARCH PROJECT
SCIENCE INFORMATION EXCHANGE**

SMITHSONIAN INSTITUTION

NOT FOR PUBLICATION OR
PUBLICATION REFERENCE

SIE NO.

AGENCY NO.

SUPPORTING AGENCY:

NAME OF THE SUPPORTING AGENCY
NAME OF THE SUPPORTING BUREAU OR OFFICE, IF KNOWN
IF MULTIPPLY FUNDED, NAME OF CO-SPONSOR(S)

UNIQUE IDENTIFICATION NUMBER
(TASK & OR SYMBOL)

TITLE OF PROJECT:

TITLE SHOULD BE AS SPECIFIC AS POSSIBLE

Give names, departments, and official titles of **PRINCIPAL INVESTIGATORS** and **ALL OTHER PROFESSIONAL PERSONNEL** engaged on the project.

1. INDICATE WHO IS THE PRINCIPAL INVESTIGATOR IF MORE THAN ONE NAME APPEARS.
2. IF INVESTIGATORS ARE ASSOCIATED WITH UNIVERSITIES, INCLUDE THEIR SCHOOL AND DEPARTMENT AFFILIATIONS. FOR OTHER TYPES OF ORGANIZATIONS, INCLUDE CORRESPONDING DIVISIONAL AND UNIT DESIGNATIONS.

NAME AND ADDRESS OF INSTITUTION:

TO WHICH THE TASK WAS AWARDED

SUMMARY OF PROPOSED WORK - (200 words or less.) - In the Science Information Exchange summaries of work in progress are exchanged with government and private agencies supporting research, and are forwarded to investigators who request such information. Your summary is to be used for these purposes.

THE SUMMARY IS USED AS A MEANS OF COMMUNICATION AND IS PREFERABLY WRITTEN BY A SCIENTIST OR ENGINEER WHO IS FAMILIAR AND CLOSELY ASSOCIATED WITH THE RESEARCH TASK. THIS SUMMARY SHOULD NOT CONTAIN INFORMATION THAT CANNOT BE GIVEN OTHER RESEARCH SCIENTISTS AND ENGINEERS. IT PROVIDES INFORMATION ON RESEARCH WORK NOT YET PUBLISHED AND NOT OTHERWISE AVAILABLE. THE SUMMARY SHOULD DESCRIBE THE PROBLEM CLEARLY, SHOW RELATIONSHIPS TO OTHER ASPECTS OR TO BROADER AREAS OF RESEARCH, AND SHOULD IDENTIFY PLAN OF PROCEDURE, TECHNIQUES, INSTRUMENTS AND SPECIAL MATERIALS, ORGANISMS OR OTHER BIOLOGICAL PREPARATIONS USED, SPECIAL ENVIRONMENTS, ETC. EACH RECORD SHOULD SUMMARIZE A SINGLE RESEARCH TASK OR A SMALL DISCRETE UNIT OF RESEARCH SO THAT IT MAY BE ANALYZED AND INDEXED IN TECHNICAL DEPTH AND DETAIL FOR EFFECTIVE USE.

IF WORK IS BEING PERFORMED ELSEWHERE THAN AT LOCATION OF RECIPIENT'S INSTITUTE, INDICATE WHERE

THE LAST SENTENCE OF THE PROJECT DESCRIPTION SHOULD STATE THE FISCAL YEAR IN WHICH THE PROJECT WAS STARTED AND THE FISCAL YEAR IN WHICH IT IS ANTICIPATED THAT IT WILL BE COMPLETED.

CURRENCY OF REPORTING -

THIS FORM SHOULD BE:

- (1) SUBMITTED AT THE START OF EACH SFM PROJECT
- (2) REVIEWED AND REVISED ANNUALLY THEREAFTER, OR
- (3) WHENEVER DURING THE COURSE OF A FISCAL YEAR A PROJECT IS SUBSTANTIALLY CHANGED.

PLEASE DO NOT REGISTER A RESEARCH PROJECT SUPPORTED BY A FEDERAL AGENCY, FOUNDATION, OR FUND RAISING AGENCY, IF YOU HAVE ALREADY REGISTERED SUCH A PROGRAM AT SIE DURING THE CURRENT FISCAL YEAR.

SIGNATURE OF
PRINCIPAL INVESTIGATOR _____

PROFESSIONAL SCHOOL
(medical, graduate, etc.) _____

- (A) DATE OF CURRENT PROJECT SUBMISSION (FISCAL YEAR, OR MONTH/YEAR TO MONTH/YEAR)
- (B) ANNUAL LEVEL OF EFFORT IN DOLLARS, IF SPECIFIED
- (C) IF MULTIPPLY FUNDED, THE ANNUAL DOLLAR SUPPORT BY EACH SPONSOR

NOTE: FUNDING INFORMATION IS NOT RELEASED EXCEPT WITH APPROVAL OF SUPPORTING AGENCY, OR TO AUTHORIZED REVIEWING BODIES.

INDEX OUTLINE

This Index Outline is a guide to the arrangement of the material in the Subject Index

AESTHETIC EFFECT

AGRONOMY

- Range
- Turf
- Weeds
- Wildlife Habitats

BOATING

BUILDING RES. & LAND DEVELOP.

CAMPING

DEMAND ANALYSIS

ECONOMICS

- Agricultural Economics
- Benefit-Cost Analysis
- Commodities
- Economic Efficiency
- Economic Impact
- Income Analysis
 - Savings and Investment
- Industry
- International Economics
- Losses or Benefits
- Manufacturing
- Methods & Measures
 - Budgeting-Analysis
 - Input - Output Analysis
 - Program-Planning-Budgeting
 - Simulation
 - Survey Techniques
 - Trends, Projections
- Microeconomics
 - Costs
 - Price & Value
- Natural Resources
- Real Estate
- Regional Economics
- Retail
- Service

Theory
Water Costs
Welfare Economics

EDUCATION AND TRAINING

ENTOMOLOGY, PHYSIOLOGY

ENVIRONMENT & ECOLOGY - ANIMAL

Aquatic
 Fresh Water
Habitat Studies
Life History Studies
Population dynamics
Productivity - Food Chain
Succession

ENVIRONMENT & ECOLOGY - HUMAN

ENVIRONMENT & ECOLOGY - PLANT

Contamination, Pollution - Air
Ecosystems
Soil Studies
Vascular Plants & Vertebrates

ENVIRONMENT - GEOLOGY

FAMILY HOUSING

FARM RECREATION

FISH & WILDLIFE BIOLOGY

Birds
 Censusing
 Game Reserves & Preserves
 Management
 Mark, Tag or Capture
Fish & Shellfish
 Censusing
 Commercial Fishing
 Fisheries Conservation
 Food Supply
 Management
 Mark, Tag or Capture
Land Use or Modification
Mammals
 Censusing

Endangered Species
Food Supply
Game Reserves & Preserves
Management
Mark, Tag or Capture
Soil (Wildlife) Cover
Spawn or Nesting Sites

FISHING

FOREIGN URBAN STUDIES

FORESTRY

Breeding and Genetics
Dendrochronology
Fire
Forest Recreation
Lumbering
Management
Policy - Business Methods
Silviculture

GENERAL

GEOLOGICAL STUDIES

Snow Studies
Snow-General

HIKING

HORTICULTURE

HOSPITAL & MEDICAL STUDIES

Nursing Home
Toxicology

HUNTING

HYDRAULICS

INFORMATION CENTERS & SERVICES

INVERTEBRATE PHYSIOLOGY

IRRIGATION

LEGISLATION AND REGULATIONS

LITERATURE SURVEYS

LOSS AND DAMAGES

MECHANICS OF FLUIDS

METEOROLOGY

METHODOLOGY

Behavioral

Mathematical

Algorithms

Data Reduction Analysis

Economic Theory

Information Systems

Mathematical Models

Surveying

METROPOLITAN AREAS

OCEANOGRAPHY

Marine Science Research

Ocean Engineering Studies

PARKS

PEST CONTROL MEASURES

Aliphatic Organophosphorous

Cultural Control of Insects

Cyclic Organic Halogenated

Factors Affecting Insect Pop.

Insecticide - Acaricide

Aliphatic Phosphorothioate CPD

Methods of Appl & Placement

Plant Application

Mode of Action & Effects

Mode of Action - Animal

PICNICKING

PLANNING

POVERTY

Services for Poverty Groups

PRIVATE ENTERPRISE

PSYCHOLOGICAL STUDIES

Affective Disorders
Attitudes & Attitude Change
Communication
Decision Making
Group Behavior
Juvenile & Adult Offenders
Personal Space
Personality & Motivation
Physical Disorders
Social Perception
Therapy

PUBLIC HEALTH

PUBLICATIONS

Bibliography
Dictionaries, Thesauri
Handbooks
Indexes
Tables, Compilations, Catalogs

RESOURCES

RESOURCES-ACCESS

RESOURCES-ACQUISITION

RESOURCES-INVENTORY

RIDING

ROADSIDE RECREATION

RURAL RECREATION

SAFETY

SKIING

SOCIAL SCIENCE STUDIES

Anthropology
Community Participation
Control and Protection
Demography
Government & Law

Interorganizational Relations
Management and Administration
Manpower
Methodology
Multiple-Purpose Projects
Political Processes & Systems
Projections and Estimations
Science Technology
Social Change
Social Structure
Stratification
Water - Alternative Uses
Water Demand
Water Resources Development

SOCIAL SERVICES

SOIL SCIENCE

Classification, Soil Genesis
Fertility
Management and Reclamation
Physical Properties

SPELUNKING

STANDARDS

SURVEY

SWIMMING

TOURING

TRAINING GRANTS, FELLOWSHIPS

TRANSPORTATION ENGINEERING

Administration & Management
Construction
Design
Highway Classification
Landscaping & Roadside Dev.
 Beautification
 Rest Areas
Maintenance
Materials
Planning

Right-of-Way
Road User
Roadway
Surveying
Traffic Engineering
 Traffic Forecasting
Transportation Surveys
 Interviews
 Origin-Destination Studies

TRAVEL-TIME STUDIES

URBAN RESEARCH

Architecture and Design
Beautification
Demography
Government
Housing
Land Use, Value, Land Planning
Planning
Renewal
Services
Transportation
Urbanization

USER CHARACTERISTICS

Age
Athletes
Drivers
Ethnic and Social
Expenditures
Factory Workers
Handicapped Persons
Movement
Performance
Physical
Residence
Sex
Socio-Economic Class
User Patterns
Young-Adults

VERTEBRATE PHYSIOLOGY

WASTE WATER DISPOSAL

WATER QUALITY

- Eutrophication
- Pollutant Identification
- Pollution - Effects of
- Pollution Sources
- Potable Water
- Water Properties
- Water Quality Control

WATER RECREATION ENVIRONMENTS

- Aquifers
- Bays
- Channels
- Estuaries
- Farm Pond
- Floodplains
- Harbors
- Lakes
- Marinas
- Ocean Environment
- Ponds
- Pre-Impoundment Sites
- Reservoirs and Impoundments
- River Basins
- Soil Environment
- Spoil Banks
- Streams
- Swamps-Marshes
- Wild Rivers

WILDERNESS RECREATION

DESCRIPTION OF RESEARCH TASKS

1. RESOURCES

Land, Water, Human and Animal Assets to Outdoor Recreation and The Related Environments

1.0001, DEVELOPMENT AND USE OF PHYSICAL AND HUMAN RESOURCES IN SOUTHERN APPALACHIA
L.S. DIRSCOLL, Auburn University, Agricultural Experiment Sta., Auburn, Alabama 36830 (ALA-01-0033)

OBJECTIVE: Inventory and evaluate the current use and productivity of physical and human resources in selected areas of Appalachian Region. Identify physical and human resource use possibilities and adjustment problems in these areas. Develop and initiate programs and services to stimulate and guide needed changes and adjustments in the productivity and efficiency of physical and human resources. Identify and develop appropriate methods for reaching residents with varying levels of income.

APPROACH: Determine feasibility of promoting the development of recreational growth centers, and analyze the potential demand for such centers. Seek to promote the growth of larger volumes of more valuable timber. Obtain statistical information on all existing commercial recreation enterprises based on hunting, fishing, and other wildlife. Examine the motives for holding rural land and the activities for future use. Collect information on a sample basis, study legal structure, interview persons in decision-making positions to develop needed changes. Seek to maintain communication channels between people of the region and personnel of the project.

PROGRESS: An inventory of human and physical resources in four northeast Alabama counties was completed and revealed promising areas for economic development. Two of the most promising were development of outdoor recreation and upgrading of human resources. Tourism-recreation developments in the area can be expanded significantly as revealed by patronage evaluation surveys. Guntersville Reservoir is a focal point for expansion. An evaluation of educational and occupational goals of 2,140 high school juniors and seniors in the area revealed the need for more job counseling and vocational guidance. A survey of consumer credit in the four-county area indicated that true annual interest rates were approximately 16% for bank loans and 22% for dealers.

SUPPORTED BY U.S. Dept. of Agriculture

1.0002, INVESTIGATION OF PUBLIC FISHING ACCESS REQUIREMENTS
J.L. BERGSTRAND, State Dept. of Fish & Game, Juneau, Alaska 99801

Physically examine recreational fishing areas and make an evaluation of each potential area for public access requirements. Determinations obtained by: a) studying the nature of the existing fishery or biological potential present b) anticipating future angler use as determined by current use, public works projects and accessibility.

Make recommendations to various state, federal and local land managing public agencies for the withdrawal or classification of lands for access sites or rights-of-ways. Conduct inter-agency field investigations and take an active role in land planning activities.

Create and maintain a statewide water catalog which will include information on Township, Range and Section, Management

region, watershed, U. S. G. S. map location, access site acreage, land agency case number, water quality, type of drainage, surface acres and fisheries. This material prepared in such a manner that it could be stored on magnetic tape for retrieval by data processing techniques.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0003, SALT WATER SPORT FISH HARVEST STUDIES IN SOUTHEAST ALASKA

L. HECKART, State Dept. of Fish & Game, Juneau, Alaska 99801

Objectives: (1) To compile an annual estimate of the number and species, by area, of the recreational harvest of salt water fishes. (2) To compile indexes to size and age group with emphasis on salmonids.

Procedures: (1) Sport fish harvest data will be obtained from a continuation of established creel census studies currently being conducted. a. Boat landings and areas of intensive angling will be censused in a manner that will produce the maximum number of the angler interviews. Boat counts will be made by skiff and aerial surveys. Interviews will be made at selected landing areas. b. The area location of each catch will be determined insofar as possible and recorded with other pertinent information on fishing techniques and gear used as part of each interview. (2) Lengths, weights, scale samples and other biological information will be collected as required. (3) Compilation of fish harvest data will be by population and geographical districts as follows: Juneau, Sitka, Petersburg and Ketchikan areas.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0004, EVALUATION OF RESEARCH ON ROADSIDE DEVELOPMENT

W.O. EARLEY, Western States Landscape Asso., Phoenix, Arizona

Past and present research on roadside development is being reviewed, interpreted, and evaluated, areas described where additional or continued research is needed, and procedures recommended for resolving these needs. The study will include, but not be limited to, consideration of the relationship of roadside development and (1) highway location and design, (2) vegetation (planning, establishment, and management by plant growth zones in consideration of erosion control and roadside plantings), (3) resource conservation, (4) rest areas, scenic turnouts, and overlooks, (5) safety, and (6) right-of-way, scenic areas, and adjacent land use. Recognition will be given to research under way or accomplished in legal authority, but it will not be evaluated in this project. During the initial period of research, major emphasis has been on project organization and the listing of available information of roadside development research. A questionnaire is being prepared for circularization of state highway departments, research agencies, and educational institutions to obtain additional information on research and experience in this area.

SUPPORTED BY U.S. Dept. of Transportation - Public Rds.

1.0005, EFFECTS OF ENVIRONMENTAL FACTORS ON STANDING CROP AND HARVEST OF FISHES IN U. S. RESERVOIRS

R.M. JENKINS, U.S. Dept. of Interior, Natl. Reservoir Res. Prog., Fayetteville, Arkansas 72701

1. RESOURCES

Exploratory multivariate analysis has been completed on effects of nine environmental factors (reservoir area, mean depth, total dissolved solids, storage ratio, shore development, age, fluctuation, outlet depth and growing season) on fish standing crop and sport commercial harvest. In this new study, standing crop and harvest estimates on about 250 reservoirs will be subdivided by fish species (involving up to 80 species) in relation to environmental factors. Sport fish harvests will also be examined in relation to fishing pressure and success rate. Calculations will be performed on IBM 7040 computer, with programming by Dr. Dunn.

Interim reports are available from: R.M. Jenkins, 113 South East Street, Fayetteville, Arkansas 72701.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0006, BEAUTIFICATION - LOCAL LEGISLATIVE APPROACHES IN SMALLER CITIES (UNDER 100,000)
W.S. BONNER, Univ. of Arkansas, Graduate School, Fayetteville, Arkansas 72701

In two publications, the project examines the relationship between municipal codes and urban appearance. The first report presents a review of literature on codes and beautification; case studies of three cities; and conclusions on the relationship between codes and community appearance; and recommendations for further study.

The second publication, a manual for municipal officials, is intended as a handbook for local beautification and improvement programs. It recommends model codes and administrative and enforcement procedures.

Both publications concentrate on non-structural problems--weeds and rubbish; landscaping; utilities and utility equipment; and outdoor storage.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

1.0007, ECOLOGICAL AND BIOLOGICAL CONTROL OF TICKS AND CHIGGERS IN RECREATIONAL AREAS
J.L. LANCASTER, Univ. of Arkansas, Agricultural Experiment Sta., Fayetteville, Arkansas 72701

Objective: To determine the tick and chigger species of importance in recreational areas. To determine the host relationships for the species found. To search for biological control agents in the environment. To determine the ecological basis for the presence of the species found. Attempt to utilize biological agents and/or ecological factors to provide control.

Description of work proposed: Collection of the ticks and chiggers found in specific recreational sites will be made to determine the species. Live trapping of the animal host or possible hosts will be conducted. Such animals will be thoroughly examined and species recovered from them. Samples will be taken in search for parasitic and predaceous agents including nematodes, arachnids, insects, and fungi. Species of ticks and chiggers under study may be contained in the environment to invite attack by those agents under conditions existing. Ground cover affects ecological situation by altering moisture, air movement, and temperature. Different types of cover will be studied to determine which situation yields the least infestation. Attempts will be made to utilize the information gained by altering the environment or introduction of biological control agents. Project initiated 7-1-67. Scheduled completion date 7-1-70. Interim reports available from principal investigator.

SUPPORTED BY U.S. Dept. of Agriculture

1.0008, SELECTION OF WOODY PLANTS TO BE USED FOR HIGHWAY LANDSCAPING AND EROSION CONTROL
A.W. TENNILLE, Arkansas State College, Undergraduate School, Jonesboro, Arkansas 72401

The types of woody plants best adapted to erosion control and landscaping are being determined, and practices necessary to establish and maintain them are being developed. An index of existing plants on highway rights-of-way including plants found naturally in all areas of Arkansas are being made in order to determine which native plants might be used effectively. The different methods of propagation are being studied in the green-

house. Designs of plants are being considered for ability to check erosion, screens and beautification, and other safety factors.

SUPPORTED BY U.S. Dept. of Transportation - Public Rds.

1.0009, A PRE-IMPOUNDMENT INVESTIGATION OF THE STRAWBERRY RIVER
G.L. HARP, Arkansas State University, Graduate School, State College, Arkansas 72467

This study provides a record of the pre-impoundment limnological characteristics of the Strawberry River, a habitat-type which has had little investigation to date. Limnological procedures were standard.

The Strawberry River was characterized by high alkalinity and pH, low carbon dioxide and turbidity, and adequate oxygen values.

Plankton was characterized by limited numbers of Staurastrum, Rotatoria, and Gomphonema. Pool-riffle communities were ill-defined. Chironomidae, Oligochaeta and Ephemeroptera were dominant pool benthic macroinvertebrates among the 13 taxa collected. Of the 20 taxa collected in riffles, Trichoptera, Ephemeroptera, Simuliidae and Chironomidae were the most numerous. Longitudinal zonation was characterized by an increase in species and numbers of pool benthic macrofauna from headwater to downstream areas. Seasonal numerical maximum standing crop was recorded for pools on 8 June 1968 and riffles on 30 September 1967. A total of 1,979 fishes constituting 48 species were taken in this study. Station I and II pools yielded 604 and 463 fishes/acre respectively, *Dorosoma cepedianum* and *Moxostoma erythrurum* being the dominant forms. The substantial populations of *Dorosoma cepedianum* seemingly are supported by debris and allochthonous materials and not on the sparse plankton present. Station I and II riffles yielded 8,740 and 2,769 fishes/acre respectively, *Etheostoma caeruleum* and *Percina caprodes* being most numerous. Longitudinal zonation was characterized by a decrease in number/acre and species present from headwater to downstream areas.

SUPPORTED BY Arkansas State University

1.0010, A COMPARATIVE STUDY OF THE NET PLANKTON OF CRAIGHEAD LAKE
G.L. HARP, Arkansas State University, Graduate School, State College, Arkansas 72467

Craighead Lake was initially developed as a recreational area with emphasis upon swimming, boating and water skiing. In 1963, the lake was dredged and enlarged to three times its initial surface area, and, in addition, is now an important fishing area.

The purposes of this study are to describe the horizontal, vertical and seasonal variation qualitatively and quantitatively of net plankton in Craighead Lake and the co-existing physico-chemical conditions. Further, this information will be compared qualitatively with the results obtained by Barton's (1963) initial study to report any changes in the plankton composition. Reversal of succession is to be anticipated, due to the dredging and enlargement of Craighead Lake in 1963.

SUPPORTED BY Arkansas State University

1.0011, FREQUENCY COMPUTATIONS FOR VISUAL ANALYSIS STUDIES
G.H. ELSNER, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California

To review procedure for computer delineation of visible areas and design and test a procedure for computing the frequency with which terrain cells are visible from a road.

SUPPORTED BY U.S. Dept. of Agriculture

1.0012, SYSTEMS ANALYSIS OF WINTER SPORTS SITE UTILIZATION
G.H. ELSNER, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California

To develop an initial management simulator useful in exploring the effects of alternative decisions upon winter sports site utilization on Federal lands in California.

1. RESOURCES

SUPPORTED BY U.S. Dept. of Agriculture

1.0013, CHALLIS NATIONAL FOREST VISUAL ANALYSIS (LITTLE CASINO CREEK AREA)
R.B. LITTON, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California

Development of a nonrouted or area inventory of landscape resources to which visual alternatives of timber cutting blocks and timber access roads may be related.

Techniques for recording visual landscape elements in related small areas (4500 acres) are to be developed.

This is a visually sensitive area, being adjacent to part of the boundary of the proposed Sawtooth Recreation Area.

SUPPORTED BY U.S. Dept. of Agriculture

1.0014, TETON NATIONAL FOREST VISUAL ANALYSIS
R.B. LITTON, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California

1. To test the concept and application of landscape control points (LCP's), a framework of permanently established observation points from which the broad forest landscape may be recorded and from which proposed alterations may be studied. Visual alternatives are to be examined, leading to recommendations for those relationships which are most compatible to surrounding landscape.

2. To compare the results of direct visual mapping with the computer technique VIEWIT, using the same LCP's.

SUPPORTED BY U.S. Dept. of Agriculture

1.0015, VEGETATION MONITORING AT MINERAL KING
A.W. MAGILL, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California

To record vegetation and soil conditions prior to the development of a recreation area, proposed for intensive use, as a basis for evaluating habitat changes and suggesting protective and corrective management through periodic monitoring of habitat conditions.

SUPPORTED BY U.S. Dept. of Agriculture

1.0016, PHOTOGRAPHIC CHRONOLOGY OF RECREATIONAL IMPACT
A.W. MAGILL, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California

To record changes of soil, vegetation, and facility conditions on recreation sites in the National Forests in California by using permanent camera points and to determine if changes are severe enough to merit more intensive investigation.

SUPPORTED BY U.S. Dept. of Agriculture

1.0017, CAMPGROUND ECOLOGY
A.W. MAGILL, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California

To determine the environmental condition of sites where campgrounds are located or planned; to determine the direction of ecological change; and to identify the causes responsible for any changes.

SUPPORTED BY U.S. Dept. of Agriculture

1.0018, FOREST LANDSCAPE EVALUATION--LAKE TAHOE
R.H. TWISS, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., Berkeley, California

Phase I: 1. Review literature, develop bibliography; 2. Assembly of existing mapped data for entire Lake Tahoe Basin, developing a set at a common scale depicting geology, soils, vegetation, climate, land use history; 3. Summarize interrelationships and development and conservations implications. 4. Conduct visual/spatial evaluations using topographic maps by limited field observations. 5. Summarize data at basin scale.

SUPPORTED BY U.S. Dept. of Agriculture

1.0019, THE SPATIAL DISTRIBUTION OF LOCAL PUBLIC SERVICES
C.S. BENSON, Univ. of California, Inst. of Governmental Studies, Berkeley, California 94720

The aim of this project is to investigate the distribution of local services among the 'neighborhoods' of large municipalities. Local services are divided into six categories: education, protection, health and welfare, libraries, recreation, and inspection. 'Neighborhoods' are small numbers of contiguous census tracts, grouped according to homogeneity of socio-economic variables (household income, education of adults, occupation) and according to land use. The areas under investigation in this pilot study are in Berkeley. The intent of the study is to test the actual distribution of services against stated or assumed criteria of distribution and to provide an empirical base for the further investigation of the interdependence of participation in different types of services in neighborhoods strongly distinguished by socio-economic characteristics. The study was started during fiscal 1965-1966 and completed in February, 1969.

SUPPORTED BY University of California

1.0020, INFLUENCE OF CHEMICAL PESTICIDES ON FOREST COMMUNITIES
D.L. DAHLSTEN, Univ. of California, School of Agriculture, Berkeley, California 94720

A long term research project has been initiated in a white fir-pine forest in northeastern California to determine the immediate and long term effects of pesticides in a forest ecosystem. Permanent study plots have been established in areas that have never been sprayed and in areas variously treated with DDT and malathion.

The biologies, natural enemies and population dynamics of two defoliators and a bark beetle will be studied. Basic ecological studies on faunal and floral diversity and community stability will be initiated. An examination of the movement of pesticides through food chains will also be undertaken with special emphasis on two invertebrates (a predacious bug and a ladybird beetle) and several vertebrate (bark-foraging segment of the avifauna) predators. Analyses of pesticide residues in various life stages of the mountain chickadee and of stomach contents of several insectivorous birds will be undertaken in the laboratory. Basic studies on the effects of sublethal doses of pesticides on avian behavior are proposed.

The severity of chemical pesticide-induced disruption will be evaluated with respect to basic problems such as pollination, reduction of public aesthetic and recreational values and possible permanent damage to components of a multiple-use natural resource.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - P.H.S.

1.0021, GOVERNMENT AND CIVIC DESIGN - AN ARCHITECTURAL VIEW
G. ECKBO, Univ. of California, Inst. of Governmental Studies, Berkeley, California 94720

This is a review of recent developments in civic and institutional design, including governmental complexes and civic centers, urban redevelopment and renewal projects, and college and university campuses. The intent is to make a visual survey of a representative cross-section of such developments, either in San Francisco Bay area or perhaps expanding to Southern California. On the basis of such a survey the report will endeavor to develop as a constructive critique of current land and site planning, architectural, and landscape architectural attitudes, theories, practices, processes and results. It is hoped that the critique will make a substantial and influential contribution to developing planning and design theory and practice in these areas. This study was started during the 1965-1966 fiscal year and should be completed during 1969.

1. RESOURCES

SUPPORTED BY University of California

1.0022, MANAGEMENT OF FOREST ROADSIDES

H.J. VAUX, Univ. of California, Agricultural Experiment Sta., Berkeley, California 94720

Techniques for management planning of visual features of forest roadsides. 1) To identify and define visual characteristics of roadside zone forest in the mixed conifer type which are significant for judging management impacts on landscape quality. 2) To use these characteristics in planning management of selected roadside areas. 3) To measure the marginal costs of management treatments designed to enhance aesthetic characteristics. 4) To test the extent to which changes in aesthetic quality of the roadside zone are correlated with changes in the visual characteristics identified in objective 1. 5) To observe direction and extent of changes in visual characteristics which take place during 1 year, 5-year, and 10-year post-treatment periods, on the areas treated under objective 4.

A. A single classification of visual elements in the forest will be developed which will identify these elements in terms relevant for vegetative manipulation. B. Approximately 1/2 mile of roadside zone at Blodgett Research Forest will be inventoried by this classification to produce a series of contour/vegetation maps and perspective drawings. C. On the basis of this inventory, four alternate plans of managing the roadside zone, reflecting different degrees or ways of recognizing aesthetic features, will be prepared. D. Each of the four plans will be demonstrated on selected portions of the zone. E. The quality of aesthetic change and the economic cost associated with each plan will be measured.

SUPPORTED BY California State Government

1.0023, VEGETATION MANAGEMENT

R.W. HARRIS, Univ. of California, School of Agriculture, Davis, California 95616

To study and develop horticultural methods for planting, managing, and enhancing vegetation on outdoor recreation sites, and to include selection and screening of ecotypes of native and exotic tree and shrub species as a major part of the study.

SUPPORTED BY U.S. Dept. of Agriculture

1.0024, THE DESIGN OF A REGIONAL INFORMATION SYSTEM (DORIS)

W.Z. HIRSCH, Univ. of California, Inst. of Govt. & Pub. Affairs, Los Angeles - U.C.L.A., California 90024

A project designed to facilitate public program planning and policy formulation. It is concerned with specifying the kinds of information required to identify emerging problems and opportunities likely to face state governments and to identify (and seek) appropriate alternative solutions to the problems. DORIS is based on the concept that information is primarily a part of the decision making process; thus, DORIS is problem oriented. Each problem area required specific information which cannot be readily developed in advance but must be developed in the course of the problem solving process. Although the design strategy used in DORIS and the strategy of collecting potentially useful information for storage and retrieval differ in many respects, they complement each other and should both be pursued. The important objective of DORIS is to identify information needed to improve specific types of decisions and to organize this information in a manner that will facilitate its usefulness; emphasis is placed on information for state and regional decisions about water, recreation, housing, education and transportation.

SUPPORTED BY University of California

1.0025, THE RECREATION PLANNING PROCESS (TITLE OF MASTERS THESIS)

A.B. BIGLER, Sacramento State College, Graduate School, Sacramento, California 95819

Statement of problem: The objective of this thesis is to present a systematic definition of the recreation planning process. The purpose is to provide the recreation planner a general methodology for the conduct of recreation planning founded on basic principles and philosophy of recreation and planning theory. It is intended to be useful in meeting the needs of a variety of clients, whether in the form of a political body, individual, or corporate group. Additionally, the methodology may be applied within any type of environment- recreation area, park, or the mall of a commercial shopping center designed to encourage leisurely experience in daily urban activities.

SUPPORTED BY No Formal Support Reported

1.0026, PLAN FORMULATION AND EVALUATION STUDIES - RECREATION DESIGN CRITERIA AND DEMAND

D.A. CRANE, U.S. Army, Engineer District, Sacramento, California 95814

Project will be accomplished essentially in the following three phases. Phase I - Establish standardized procedures for collection and analysis of recreation-use data at selected Corps reservoirs through a pilot program with six other Districts. Contemplated accomplishments during this phase include (a) improvement of recreation-use survey design to provide an economically efficient method for the collection of standardized, reliable recreation-use data; (b) preliminary analysis of such data; and (c) development of recreation planning guidelines to aid recreation planners in evaluating the recreation potential of proposed projects. Phase II - Develop and refine standardized procedures for estimating and projecting recreation-use and recreation facility design load. Anticipated accomplishments during this phase include (a) development of recreation-use prediction models and (b) development of standardized recreation facility design load criteria. Phase III - Apply the above procedures to a statistically reliable mathematical model suitable for automatic data processing of those factors influencing recreation benefits and cost determinations.

Phase I (a) is essentially completed; a recommendation for a Corps-wide recreation-use survey has been made. Work is continuing on items (b) and (c), Phase I, and also the investigations scheduled under Phases II and III. Interim results of preliminary analysis will be published periodically. Some final results of detailed analysis are scheduled for completion in FY 1970.

SUPPORTED BY U.S. Dept. of Defense - Army

1.0027, APPLIED MARINE ENGINEERING PROGRAM AT SCRIPPS INSTITUTION OF OCEANOGRAPHY

W.A. NIERENBERG, Univ. of California, Graduate School, San Diego - La Jolla, California 92038

Scripps Institution of Oceanography will initiate a graduate research and education program in applied marine science and engineering. The new applied program will involve the Departments of Earth Sciences, Marine Biology and Oceanography, with engineering support from the Departments of Engineering, University of California at San Diego. The program will initiate activities in such fields as support of ocean industry in the concept, research and design of transport, harbors, mining production, recreational facilities, beach control, fisheries and disposal; and development of the technological base in delineation and appraisal of marine resources; analysis of limiting conditions, currents, effects of organisms on man-made structures, etc.

SUPPORTED BY U.S. National Science Foundation

1.0028, A SURVEY OF POLICIES AND PRACTICES IN RECREATION AND LEISURE SERVICE TO DISADVANTAGED AND INNER-CITY GROUPS

P.D. BROWN, San Jose State College, Graduate School, San Jose, California 95114

There are two basic research needs to which this project will address itself in the organization and provision of recreation and leisure service for disadvantaged and inner-city groups. First, there is a basic need to identify programs and activities that have proved successful. Second, there is a basic need to formally enunciate and verify principles of service that are emerging.

1. RESOURCES

The research methodology to be employed will be a descriptive survey. Based on the evidence obtained through survey, guidelines will be developed by the research team which may be considered by recreation and leisure service personnel in starting or developing a program for disadvantaged inner-city groups.

The scope of the survey will be national. Respondents will include municipal recreation departments in those cities studied in preparation of the Kerner (1) and Kraus (2) reports as well as other communities to be selected based on their experience with the matter under study. Responses will be sought also from a selected number of national headquarters of voluntary and private leisure service organizations such as the Young Men's Christian Association, Boys Club, etc. In general, the research team enjoys some degree of relationship with many of the potential respondents. Cooperation and assistance will be sought from organizations such as the National Recreation and Parks Association and its Office of Urban Affairs which deals directly with this area of concern.

Limited research related to the primary aims of this project has been undertaken. There are two projects of particular interest. 'Public Recreation and the Negro: A Study of Participation and Administration Practices'. Kraus dealt with data gathered from New Jersey, Connecticut and the five boroughs of New York City. 'Determining Neighborhood Recreation Priorities: An Instrument' by Staley. The instrument was used in the 'Study of Recreation Needs and Services - South Central Los Angeles', completed in 1968. The researchers are currently considering the preparation of a textbook on recreation and leisure service for disadvantaged and inner-city groups. The findings would be used in this project.

SUPPORTED BY San Jose State College

1.0019, RENOVATION OF WASTE EFFLUENT FOR RECREATION AND POTABLE WATER SUPPLY USES E.W. HOUSER, Santee County Water District, Santee, California 92071

The immediate objectives of the project are to demonstrate that the effluent from a recently constructed activated sludge plant can be treated through biological, mechanical, and chemical means so that the resulting effluents can then be safely used for body contact sports and other recreational activities. It will also demonstrate the elimination of bacteria and viruses. The value of this project is enhanced by the environmental characteristics of the area. Santee is an arid region, having high rates of evaporation and a water supply shortage. At present, shortage is met by importing water. With increasing populations and rising costs of imported water, Santee and other similar communities must develop supplemental water supplies for potable and recreational uses. Treated sewage effluents, when filtered through natural ground aquifers can be reused in lakes for body-contact sports and other recreational activities, based on purification standards and of general public acceptance. By cautiously approaching this acceptance and using the most advanced treatment techniques this project can demonstrate that man-made processes can achieve the same acceptance and purity requirements.

SUPPORTED BY U.S. Dept. of Interior - F. Wtr. Pol. Ctl.

1.0030, ENVIRONMENTAL STUDY AREA PROGRAM DEVELOPMENT M.M. MENESINI, Educ. Consultant Services, Walnut Creek, California 94598

The contractor will provide a system for the development of a programmatic approach to organizing the Environmental Study Areas in the National Park Service. The project will include the following steps: 1. A statement of potential educational objectives for Environmental Study Areas. 2. A description of the potential types of Environmental Study Areas based on a survey of the types and/or combinations of types. 3. The development of a system for identifying additional Environmental Study Areas. 4. The development of procedures for establishing Environmental Study Areas and putting ESA programs into action. 5. The development of prototype teaching materials keyed to basic educational objectives.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0031, TOURISM AND OUTDOOR RECREATION PLAN FOR ONTARIO P. KLOPCHIC, Kates Peat Marwick & Company, Toronto - Ontario, Canada

1. A master Tourist and Outdoor Recreation plan for Ontario will be developed. The Plan will include the evaluation of tourist and outdoor recreation needs and resources of Ontario and recommended policies and action programs. The plan will be prepared in accordance with the following policy guidelines. 2. The objective of this Master Tourism and Outdoor Recreation Plan is to provide the Government of Ontario with guidelines for the use of provincial resources-natural, human, and financial - in order to serve the growing recreation and tourist facilities requirements of the people of Ontario and of visitors to the province.

Interim Reports are available from Dr. Peter Klopchic.

SUPPORTED BY Ontario Provincial Government

1.0032, NATIONAL AND ENVIRONMENTAL HAZARDS, DISORDERS, ENVIRONMENTAL QUALITY J. BURTON, Univ. of Toronto, Toronto - Ontario, Canada

Several projects on various agents of human response to environment, forestry, and environmental quality and stressful elements in the environment studies on the following topics: Snow hazard in urban areas. Perception of hazards. The hazardousness of a place. Pollution and outdoor recreation, including beach use on the Great Lakes, and water pollution as a hazard to health of swimmers.

Selected work on floods, droughts, earthquakes, tornadoes is being performed at Clark University, Worcester, Mass. (R. W. Kates), University of Chicago (G. F. White) and Southern Illinois University, Carbondale, Illinois (Duane Bauman).

SUPPORTED BY U.S. National Science Foundation

1.0033, HAZARDS AS A CONSTRAINT UPON COASTAL RECREATIONAL BOATING L.D. MINOCK, Univ. of British Columbia, Graduate School, Vancouver - British Columbia, Canada

Problem: Recreational boating populations in Anglo-America are expanding at a rapid rate. In order for this growth to be accommodated in a rational fashion government agencies and others will have to be able to estimate the carrying capacity of various waters for recreational purposes. One aspect of any such evaluation of coastal waters must be a consideration of hazardous conditions. This research project is designed: (1) to describe the various hazardous characteristics of coastal waters; (2) to probe the responses of boaters to hazardous situations; and (3) to develop a method of classifying coastal waters in terms of the kind and degree of hazard that they present to recreational boating.

Relationship to Other Research: This project is related to work being done in the area of environmental quality and perception and differs primarily in its emphasis on the marine environment.

Procedure: Original data to be gathered by direct observation, in-depth interviews, and a mail questionnaire.

SUPPORTED BY University of British Columbia

1.0034, SPACE STANDARDS FOR OUTDOOR RECREATION H.P. OBERLANDER, Univ. of British Columbia, Vancouver - British Columbia, Canada

Problem: To determine space standards for outdoor recreation; to relate the increasing pressures for outdoor recreation placed on a rapidly urbanizing area and the natural environment's capacity to sustain intensive human use. The shrinking work day and work week, early retirement, and a longer life have enabled man to devote more time to recreation. Thus, it will have to be determined how much and what kind of outdoor space ought to

1. RESOURCES

be set aside in perpetuity for more and increasingly intensive recreational use.

Method: The project will attempt to test its observations and criteria for space standards in the context of recreation opportunities in the Gulf and San Juan Islands. These islands will serve as an outdoor laboratory for the test phase of the project.

SUPPORTED BY William H. Donner Foundation
Incorporated

1.0035, PHEASANT ROADSIDE COVER EVALUATION STUDY

W.D. SNYDER, State Div. of Game Fish & Pks., Denver, Colorado 80203

Objective: To compare pheasant production under natural roadside conditions with the following cover types to be established along roadsides: (1) Grass; (2) Legume-grass mixtures.

Procedures: To select roadside test areas; Establish roadside cover (In progress); Measure pheasant production. Intensive nest search on test plots and control sites will be compared.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0036, ENVIRONMENTAL FACTORS IN CAMPGROUND REHABILITATION AND PROTECTION

R.E. DANIELSON, Colorado State University, School of Agriculture, Fort Collins, Colorado 80521

Instrumentation is being developed and adapted to characterize the environmental factors of light, precipitation and soil moisture, fertility and temperature. Native and introduced plant species are being subjected to broad ranges of these factors under various intensities of recreation use. Plant survival, growth and durability are being evaluated. Survival and growth are being related to environmental factors. These relationships under various intensities of recreational use will be used to develop guidelines to aid in locating, developing, maintaining and rehabilitating intensive use areas.

Study being conducted in Rocky Mountain National Park. Interim reports are available.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0037, A STUDY TO DEVELOP PRACTICAL TECHNIQUES FOR DETERMINING THE CARRYING CAPACITY OF NATURAL AREAS IN THE NATIONAL PARK SYSTEM

A.T. WILCOX, Colorado State University, Graduate School, Fort Collins, Colorado 80521

Park and recreation areas have definite limits on their capacity to absorb use and provide recreation experiences. If use exceeds such limits the resources which provide the recreation opportunity may be damaged or destroyed and the quality of the recreation experience available to the user may deteriorate. While it may be possible in some instances to increase the carrying capacity of an area through additional investments, there is a limit to what can be accomplished in this manner.

This study will seek to identify the major types of stress to which recreation areas and users of such areas are subject, to determine the causes of such stress, and to seek techniques for determining when such stresses have reached a critical point. The study will be concerned with the stress which develops out of the impact of the total environment on the user as well as the stress which users place on the environment.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0038, CARRYING CAPACITY STUDY

A.T. WILCOX, Colorado State University, Graduate School, Fort Collins, Colorado 80521

The purpose and scope of this project is to develop techniques for establishing carrying capacities of park areas as a basis for planning, and perhaps limiting, their future development and use. Because a complex mix of both quantitative and subjective factors must be considered in deriving measurement units of

capacity, a wide range of professional disciplines must be brought to bear on the problem.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0039, INVENTORY OF FOREST RECREATION RESOURCES

A.T. WILCOX, Colorado State University, Agricultural Experiment Sta., Fort Collins, Colorado 80521

Inventory of Forest Recreation Resources in Selected Colorado Counties: (1) To inventory existing and potential forest recreation areas of three Colorado mountain counties selected for representative but diverse conditions, and (2) To develop a forest recreation resource evaluation form based upon the environmental conditions characteristic of the study area. (Note: A companion project in preparation will analyze factors affecting recreation demand and develop criteria for determining demand for forest recreation facilities and services).

Study Procedure: Land-use data relating to forest recreation use or potential use will be collected from existing federal, state, and local sources for Eagle, Larimer and Teller counties. Population, traffic and land ownership characteristics and other data which may influence the potential demand for forest recreation or the potential supply of recreation areas and facilities will also be collected. These data will be summarized and presented as county and/or composite forest recreation resource inventories with pertinent tables, maps, and charts.

Inventory data will be subject to analysis and preliminary sampling trials to establish bases for developing a recreation resource evaluation form.

SUPPORTED BY U.S. Dept. of Agriculture

1.0040, INVENTORY OF FOREST RECREATION RESOURCES

A.T. WILCOX, Colorado State University, Agricultural Experiment Sta., Fort Collins, Colorado 80521 (COL00313)

Objective: Inventory existing and potential forest recreation areas of three Colorado mountain counties selected for representative but diverse conditions, and develop a forest recreation resource evaluation form based upon the environmental conditions characteristic of the study area.

Approach: Land-use data relating forest recreation use or potential use will be collected from existing federal, state, and local sources for Eagle, Larimer, and Teller counties. Population, traffic and land ownership characteristics and other data which may influence the potential demand for forest recreation or the potential supply of recreation areas and facilities will also be collected. These data will be summarized and presented as county and/or composite forest recreation resources inventories with pertinent tables, maps and charts. Inventory data will be subjected to analysis and preliminary sampling trials to establish bases for developing a recreation resource evaluation form.

Progress: An inventory of existing and potential physical recreation resources of Eagle, Teller and Larimer counties was completed, and a system of inventory classification developed to integrate with broader national and state classifications using data processing techniques. Field data was coded and a computer program developed to print out data for publications and reference to resource inventory maps. Printouts were made and inventory maps showing location of recreation resources have been completed. Final compilation of these data into resource inventory reports for each of the three counties is now in progress. Two theses have been produced from associated data gathered as part of the field study.

SUPPORTED BY U.S. Dept. of Agriculture

1.0041, HIGHWAY AS ENVIRONMENT

P.C. TUNNARD, Yale University, Bureau of Highways & Traffic, New Haven, Connecticut 06520

The relative importance is being evaluated of roadside features as commercial development, natural scenery, outdoor scenery, outdoor advertising, landscaping traffic control equipment, etc., on the environmental appearance of the highways.

1. RESOURCES

Evaluation will be made of (1) four functionally different types of highways: limited access highways, rural scenic secondary highways, highways with strip commercial development, and urban arterial streets, (2) design changes, incentives and controls, which should lead to improvements of benefit to the public, and (3) the cost and benefit implications of our suggested changes, incentives and controls.

SUPPORTED BY Connecticut State Government

1.0042, MARINE RECREATION PROBLEMS, TECHNOLOGIES, AND PROSPECTS TO 1980 A.B. BIGLER, Marine Technology Society Inc., Washington, District of Columbia 20005

Recreation use of marine resources will require application of measures in marine science and technology to (1) maintain and enhance present patterns and trends of recreation use, including solving problems associated therewith; and (2) open up a greater range of opportunities for recreation activity in the marine environment. Advances in coastal engineering, fish and wildlife management, environmental protection, and hardware development have potential application in recreation use of marine resources. The motivational, social, and economic factors that guide individuals and groups of people in seeking recreation experiences and achieving satisfactions therein are important considerations for the marine scientist and engineer in the development and application of marine hardware and management systems to recreation use. Consumer expenditures for marine-oriented outdoor recreation for 1968 are estimated to be in the range of \$14 billion, over twice the size of the 'ocean industry' market estimated for the same year.

SUPPORTED BY No Formal Support Reported

1.0043, MINE DRAINAGE POLLUTION AND RECREATION IN APPLACHIA E. SHOMO, Robert R. Nathan Associates, Washington, District of Columbia 20036

An inquiry into the effect of mine acid waste on recreational uses of water, including estimated demand and supply of water-based recreation and the potential economic benefits foregone by failure to depollute waters for recreational use.

SUPPORTED BY Appalachian Regional Commission

1.0044, APPRAISAL OF LOCAL SOIL, WATER AND OTHER RESOURCE ORGANIZATION W.D. ANDERSON, U.S. Dept. of Agriculture, Washington, District of Columbia

Objectives: Analyze the organization, financing, operation, supervision, and coordination of resource and resource-related local drainage, watershed, soil conservation, forest preserve, and grazing districts and associations.

Approach: An inventory is being made of the kinds and numbers of local resource organizations found in different States. Distinctive and significant types of local organizations will be selected for analyses. Individual organizations will be chosen for case studies. The analyses will include a review of relevant statutes, regulations, organizations' reports and files as well as interviews with local and State personnel and other informed persons. Relevant bulletins, research reports, journal articles, books, and pamphlets will be collected and reviewed.

SUPPORTED BY U.S. Dept. of Agriculture

1.0045, WILD AND SCENIC RIVERS STUDY A.H. UNDERHILL, U.S. Dept. of Interior, Bureau of Outdoor Recreation, Washington, District of Columbia 20240

On October 2, 1968, the 90th Congress authorized a new concept in water resources management with the establishment of the National Wild and Scenic River System as outlined in the Wild and Scenic Rivers Act, (P.L. 90-542). Because certain of America's rivers possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural and other similar values, Congress declared that they should be preserved in

their free-flowing condition for the benefit of present and future generations.

In addition to designating all or parts of eight rivers as initial components, Congress named 27 other rivers to be studied within the next ten years for possible inclusion in the National Wild and Scenic River System. The Secretary of the Interior has delegated to the Bureau of Outdoor Recreation the Department's responsibility in these studies. Since some of the 27 rivers will involve lands under the jurisdiction of the Department of Agriculture as well as the Department of Interior, the Forest Service has been named to coordinate river studies with BOR where Department of Agriculture lands are involved. Accordingly, the Department of Interior will take the lead in 18 river studies while the Forest Service will study the remaining nine. In addition, the several States involved in these river areas will also be included as participants in the studies. Based on the results of the studies, all or parts of each river will be classified, designated, and administered as a wild scenic or recreational river.

SUPPORTED BY U.S. Dept. of Interior - Bu. Outdoor Rec.

1.0046, MEASUREMENT OF THE AESTHETIC APPEAL OF MANAGED FOREST AND WILD LAND ROADSIDE ENVIRONMENTS K.R. SWINFORD, Univ. of Florida, Graduate School, Gainesville, Florida 32601

Object: To develop procedures for assessing aesthetic response potential of forested roadside landscapes. Procedures to be developed are to be synthesized from existing theories and procedures found within the fields of perceptual psychology, design theory and ecology.

Procedure: The first phase was to develop a means of assessing landscapes based upon existing, though at times divergent, theories. A system was developed utilizing the variables of order and complexity and it was then used to collect color slides showing various degrees and levels of these two variables. Pretesting was completed and refinement made on the color slide stimulus sets. Utilizing a mobile office, data was obtained for various response patterns from different sample populations. Basically, sets of three slides (triads) were shown to the respondents and they indicated which of the three they most preferred and which they least preferred. This produced a rank-order for each of 126 triads. In the final stages patterns, correlations and consistencies are being analyzed to determine the reliability and validity of the test instrument as well as the perceptual assessment system. The project was started in December, 1965 and should be completed during the second quarter of fiscal year 1970.

SUPPORTED BY U.S. Dept. of Agriculture

1.0047, HURRICANES AND THE ECOLOGY OF COASTAL VEGETATION IN SOUTHERN FLORIDA F.C. CRAIGHEAD, U.S. Dept. of Interior, Everglades National Park, Homestead, Florida

On September 9 and 10, 1960, Hurricane Donna struck the southern and western coast of Everglades National Park. Studies have revealed less damage to animal populations than was expected and quick recovery of most populations. In the case of vegetation, however, damage has proved to be even greater than was originally thought, and little recovery is yet apparent. Over an area of 300 - 500 square miles, the landscape and vegetation has suffered extreme alteration. A thorough investigation of hurricane effects upon vegetation and present environmental characteristics of the damage area is urgently needed. This study should lead to a general theory of the ecological role of hurricanes and to predictions regarding vegetation recovery which is important to the planning and management of this portion of the Park.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0048, VEGETATION CHANGES IN RELATION TO WATER LEVELS IN THE FRESH WATER COMMUNITIES OF THE EVERGLADES NATIONAL PARK F.C. CRAIGHEAD, U.S. Dept. of Interior, Everglades National Park, Homestead, Florida

1. RESOURCES

Compile and interpret observations of the past 10 year's results that have a bearing on the changes in vegetation from lack of water or the effects of too much water. Only about 1/3 of the Park, the Shark River Slough, is dependent on water from north of the boundary (Tamiami Trail). The remainder of the area is higher land the vegetation of which is dependent on rainfall or estuaries.

Two reports have been prepared: 'A preliminary report on the closure of the culverts along the mangrove area of the Falmingo Highway and some observations on the effects of the changing water levels on wildlife and plants (mimeographed)' Craighead, F.C. and Max Holden, August 1965.

Mimeographed paper presented at the February 1969, Water Resources Meeting, Everglades National Park. 'Some biological aspects of the water situation in the Everglades National Park.'

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0049, VEGETATION AND RECENT SEDIMENTATION IN THE MANGROVE AREA OF SOUTH FLORIDA F.C. CRAIGHEAD, U.S. Dept. of Interior, Everglades National Park, Homestead, Florida

Nearly one half of the land area of the Everglades National Park is of recent origin, 5000 to 7000 years. It is composed of mineral and organic sediments practically all of which has been deposited by plant and animal activities. These deposits have been laid down with and preserved by the rising sea. The vegetation responsible for these deposits has changed frequently from catastrophic agencies such as hurricanes and fires. Each has left a distinct stratum in the profile of the overburden.

Several reports have been issued. 'Vegetation and Recent Sedimentation in the Mangrove Area of South Florida' - In the Proceedings of the Second Meeting on Natural Science Research conducted in the Everglades National Park and the South Florida Region. Sponsored by the Office of Natural Science Studies. Everglades National Park, July 18-19, 1968 (page 17 to 25) copies available from the office of Natural Science Studies, Everglades National Park.

'The Vegetation and Sedimentation of the Whitewater Bay Drainage System of the Everglades National Park,' September, 1967 - mimeographed. This is part of a productivity study of the mangrove swamps supported by the Bureau of Sport Fisheries and Wildlife in cooperation with the Marine Institute, University of Miami. Their part of the project has not been completed.

'Florida Submergence Curve Revised: Its Relation to Coastal Sedimentation Rates' Science Vol. 163 - February 7, 1969 - Scholl, David W. and F. C. Craighead, Sr., Minze Stuiver, Yale Radiation Laboratory, New Haven, Conn. 06520. (Reprints available)

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0050, EUCALYPTUS GRANDIS OPEN POLLINATED PROGENY TEST

G. MESKIMEN, U.S. Dept. of Agriculture, Forest Resources Laboratory, Lehigh Acres, Florida 33936

1. Compare progenies of Florida selections with seedlings from the original Australian seed lots and with subsequent introductions.

2. Indicate the feasibility of mass selection for the development of superior Florida strains.

SUPPORTED BY U.S. Dept. of Agriculture

1.0051, EUCALYPTUS SCREENING TRIALS

G. MESKIMEN, U.S. Dept. of Agriculture, Forest Resources Laboratory, Lehigh Acres, Florida 33936

1. Compare the South Florida performance of a wide variety of eucalyptus species introduced from Australia.

2. Combine results of numerous eucalyptus screening trials into a single research report.

SUPPORTED BY U.S. Dept. of Agriculture

1.0052, N:PK RATES FOR LAUREL AND LIVE OAK SEEDLINGS

G. MESKIMEN, U.S. Dept. of Agriculture, Forest Resources Laboratory, Lehigh Acres, Florida 33936

1. Determine if comparative rates of N to P and K control the mechanical stability of live oak seedling stems.

2. Indicate NPK requirements for container-grown laurel oak.

3. Compare seedling growth rates for laurel and live oak.

4. Compare growing efficiency of a peat-sand potting medium versus a sand-calcined clay mix.

SUPPORTED BY U.S. Dept. of Agriculture

1.0053, REDBAY CONTAINER CULTURE

G. MESKIMEN, U.S. Dept. of Agriculture, Forest Resources Laboratory, Lehigh Acres, Florida 33936

1. Provide an initial experience in container-growing *Persea borbonia*, a medium-size native tree (evergreen hardwood) that has wildlife value and landscaping potential.

2. Test two fertilizer levels, one twice the other.

3. Determine if peat and calcined clay are complementary as potting medium components.

4. Test calcined clay as granules versus powder in potting mixes.

SUPPORTED BY U.S. Dept. of Agriculture

1.0054, LIVE OAK CONTAINER CULTURE

G. MESKIMEN, U.S. Dept. of Agriculture, Forest Resources Laboratory, Lehigh Acres, Florida 33936

Determine seedling growth rate in 4-gallon containers.

Identify ingredients and mixing ratios for a potting medium which exchanges water and nutrients efficiently with live oak seedlings.

Test shredded pine bark as a peat substitute in potting mixes.

Assess a potting mix of fine sand and calcined clay that could be washed off the roots to permit handling large seedlings as bare-root stock.

Compare two fertilizer levels, one twice the other.

SUPPORTED BY U.S. Dept. of Agriculture

1.0055, STUDIES ON THE SPORT FISHERY FOR BILLFISHES AND TUNAS IN THE WESTERN ATLANTIC AND SOUTHEASTERN PACIFIC OCEAN.

D.P. DESYLYA, U.S. Dept. of Interior, Bureau of Sport Fish. & Wildlife, Panama City, Florida 32401 (14-16-0008-775)

Objective: To carry out a survey of the sport fishery for billfishes and tunas in the western hemisphere.

Information will be obtained on: (a) what species of sailfish, marlins, swordfish, and tunas are caught by anglers in the western hemisphere; (b) their seasonal distribution; (c) size composition of catch; (d) an estimate of the number of anglers engaged in the sport fishery; (e) the economic value of the fishery; and (f) the effect, if any, on the sport fish catch by commercial fishermen as reflected in either decrease in size of fish landed by sportsmen or decrease in catch per unit of effort.

Questionnaires will be mailed to anglers, charterboat captains, angling clubs, marinas, and bait and tackle dealers who might be able to supply the above information. Personal logs and records will be borrowed or copied, and the data reduced for IBM processing.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0056, BIOLOGY AND CONTROL OF INSECTS IN OUTDOOR RECREATIONAL AREAS

H.H. TIPPINS, Univ. of Georgia, Agricultural Experiment Sta., Athens, Georgia 30602

Objectives: (1) To determine the insect problems associated with outdoor recreational areas such as parks, picnic and camping areas, and farm fish ponds. (2) To study the biology and ecology

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of the major pests. (3) To develop practical control and/or prevention measures with special emphasis on source reduction and other methods with minimum hazards to wildlife.

The important problem insects in outdoor recreational areas will be determined by identifying the annoying insects present in such areas during the use season and by studying the relative discomfort caused by various species by personal exposure and interviews. Biological and ecological studies will be conducted in the field and laboratory. The important species will be reared in the laboratory to obtain detailed information on life histories. Field studies on seasonal occurrence will be made by standard sampling methods and other techniques to be developed. Environmental conditions contributing to the development of populations will be studied. The degree of natural control will be studied by field observations and laboratory rearing. Control measures will be developed by evaluating baits containing brood poisons or chemosterilants for social insects, repellants for area application, source reduction by chemical and mechanical habitat alteration, and area control with low-volume application of insecticide concentrates.

SUPPORTED BY U.S. Dept. of Agriculture

1.0057, WATER LAW OF SOUTHEASTERN ESTUARIES UNKNOWN, Univ. of Georgia, Inst. of Government, Athens, Georgia 30602

A comprehensive survey of the estuarine water law of Louisiana, Mississippi, Alabama, Florida, Georgia, and South Carolina. The resulting monograph of approximately 300 pages would draw conclusions as to the extent to which the law of these jurisdictions (1) protects commercial fishing and public recreational uses against deleterious competing uses such as pollution, land-fill, and dredging, (2) is related in this respect to the law of bordering states and to the federal regulatory power in marginal and territorial seas. Conclusions will be drawn as to overlaps, gaps, and conflicts of the present law. These can provide bases for remedial state and federal action to restore and preserve the estuaries of Southern states. The study can assist similar research in other regions of the United States.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0058, HAWAII STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

S.M. MARK, State Dept. of Plan. & Econ., Honolulu, Hawaii

This project will investigate all phases of existing and proposed outdoor recreation, both urban and non-urban, of the State, its political subdivisions, the federal government, and private interests, including but not limited to, forests, reservoirs, lakes, rivers, sea shorelines, multiple-use areas, farms, hunting preserves, refuges, parks, natural areas, historic and cultural sites, and other significant outdoor recreation areas. It will consider such activities as hunting, fishing, skiing, hiking, camping, picnicking, pleasure driving, boating, swimming, golfing, and other forms of outdoor recreation in which people of the State, including handicapped and underprivileged, may participate in. It will serve as a guide for enhancing and preserving the natural beauty of the islands and its recreational areas. It also will consider and take into account the coordination of the activities of all agencies of the State, federal, and county governments relating to outdoor recreation.

The plan will attempt to project estimated general recreation information for the State to 1985, based both on an analysis of present use of areas and facilities and on trends in population, income, leisure time, mobility, recreation habits, and interests. More detailed and specific demand and programmed facilities data will be provided for the next five-year period. Assuming the Plan effectuation to begin as soon as possible, it will treat the ensuing five-year period.

In accomplishing the above, efforts will be made towards investigating the feasibility and possible methodology for utilizing Automatic Data Processing system following or adapted to that utilized in the national survey in maintaining recreation inventory and investigating and analyzing methodologies, concepts and alternatives for accommodating and integrating national concerns in programs for highway beautification, preservation and enhance-

ment of natural beauty, and the handicapped and underprivileged in Hawaii's outdoor recreation areas and facilities.

SUPPORTED BY U.S. Dept. of Interior - Bu. Outdoor Rec.

1.0059, STUDY TECHNIQUES FOR MEASURING RECREATION USE

D.R. MCCURDY, Southern Illinois University, School of Agriculture, Carbondale, Illinois 62903

Phase I (1 June, 1967 - 30 June, 1968) - 1. To evaluate and compare selected techniques for measuring recreation use at both the developed and non-developed recreation areas within the Crab Orchard Material Wildlife Refuge. Phase II. (1 July, 1968 - 30 June, 1970). 2. To select and redesign the combination of techniques found most efficient for the Crab Orchard Refuge, and to then test them for a two-year period.

Nine techniques for measuring recreation use will be tested for efficiency in obtaining the following statistics for both developed and non-developed areas within the Crab Orchard Material Wildlife Refuge: Man-hours of use, total number of visits (by activity and peak loads. Efficiency will be measured by the per cent error (or variance) of the estimated statistic at the 67 per cent confidence level. The nine techniques are: 1. patrolman observation, 2. fee collector count, 3. traffic counters, 4. self-counting system, 5. BSFW formula, 6. double sampling, 7. modified double sampling, 8. stratified random sampling, 9. modified stratified random sampling.

SUPPORTED BY U.S. Dept. of Agriculture

1.0060, THE IDENTIFICATION AND CRITICAL ANALYSIS OF LITERATURE DEALING WITH THE RECREATIONAL ASPECTS OF WATER RESOURCES

E.H. STOREY, Univ. of Illinois, Graduate School, Urbana, Illinois

Methods have been developed to identify, locate, manually retrieve, document, and classify selected literature pertaining to the recreational aspects of water resources use, planning, and development. Over one thousand pertinent articles and publications have been identified, fully documented, and classified during this research project. Secondly, a computerized bibliographic retrieval process has been developed to enable the researcher to receive, automatically, using Keyword inputs, those bibliographic notations that are pertinent to his request. This bibliographic retrieval is used to classify and assemble by topic pieces of literature providing insight into concepts and scientific results of research developed in numerous allied disciplines. Lastly, a topical outline model of the body of knowledge dealing with the recreational aspects of water resource use, planning and development has been constructed to provide a framework for critical analysis. The critical analysis of the body of knowledge will be organized according to categories in the outline. Existing knowledge and gaps in information will be demonstrated within each of these broad categories.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0061, NATURAL, ARCHEOLOGICAL, AND HISTORICAL RESOURCES OF THE WABASH RIVER BASIN, INDIANA-ILLINOIS

R.E. CARLSON, Indiana University, Graduate School, Bloomington, Indiana 47405

Identification and evaluation of existing natural, historic, and archeological resources of the Wabash River Basin, and the need for special consideration such as preservation, additional studies, survey or possible salvage.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0062, STUDY DESIGN - OUTDOOR RECREATION ENVIRONMENTAL STUDIES PROGRAM IN WATER RESOURCES

R.E. CARLSON, Indiana University, Water Resources Research Ctr., Bloomington, Indiana 47405

A study of problems resulting from recreational use of Monroe Reservoir in Southern Indiana will attempt to determine how

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recreational activities affect the quality of the water and the land immediately surrounding the reservoir, and to discover means of developing greater public concern for the care and wise use of the environment.

SUPPORTED BY Indiana University

1.0063, RESEARCH IN ROADSIDE DEVELOPMENT AND MAINTENANCE

W.H. DANIEL, Purdue University, Agricultural Experiment Sta., Lafayette - West Lafayette, Indiana 47907

This research is in three parts: Part I on roadside turf development, Part II on the selection, establishment and maintenance of ornamental plantings for roadsides, and Part III on chemical weed control. Part I includes selecting, increasing, testing, developing and proving low height types of vigorous, fast-growing bluegrasses especially adaptable for new construction and erosion areas. Part II is an evaluation of woody ornamental plants for their adaptability to conditions in Indiana, a determination of efficient methods of establishing highway plantings to insure their survival, and an investigation of methods for reducing maintenance costs and insuring permanent beauty. Part III includes research on the use of chemicals for selective weed control, as a soil sterilant and application techniques.

SUPPORTED BY U.S. Dept. of Transportation - Public Rds.

1.0064, PLASTIC UNDER POROUS ROOTZONES FOR COMPACTED TURF AREAS

W.H. DANIEL, Purdue University, School of Agriculture, Lafayette - West Lafayette, Indiana 47907

Rootzones for compacted turf areas with scheduled sports use need rapid internal drainage yet constant uniform moistness. Research on using a impermeable underlay with side drainage (adjustable terminals) under porous materials has been most encouraging for use on golf greens, tees, sports grounds and planters.

Two layers of .006 plastic sheeting placed as flat pools, in tiers as needed for desired contours. Place narrow slits in plastic pipe drains onto impermeable layer with exit to drain pits where terminal can be adjusted for pool reservoir desired. A tee with plug in end and nipples can work well.

Place sand, coarse, around pipe then use 0.1 to 0.5 mm sand as wick rootzone to modify surface 1' as needed for users benefit-add peat etc. to sand. Settle by compacting, and plant.

Wick action at low tension between particles gives uniform playability and water availability. Conserves nutrients in dilute solution. Conserves water above plastic from rainfall or irrigation.

By adding float chambers can add subsurface irrigation (automatic) and can install subsurface nutrient feeding if desired.

SUPPORTED BY Purdue University

1.0065, OUTDOOR RECREATION MANAGEMENT

D.M. KNUDSON, Purdue University, Graduate School, Lafayette - West Lafayette, Indiana 47907

Objectives: 1. Evaluate methods of public and private recreation resource planning and administration. 2. Compare flow recreationists between states, its economic impact and resource-based patterns. 3. Test methods of maintenance and recuperation of heavily-used recreation areas. 4. Develop objective evaluation of recreation carrying capacity. 5. Develop natural resource interpretation methods.

Approach and Methods: Comparative studies of management policies will use questionnaires, interviews and on-site observation. Tourist flow data will be collected from regional state agencies and cooperating universities. Resource evaluation will require on-site visits. Experimental plots on degraded and new sites will supply basic data for recuperation and carrying capacity studies. Public reactions to interpretive methods will guide their development.

Location: Campus; lands of Indiana Dept. of Natural Resources; commercial, local and federal recreation properties in Indiana and neighboring states; Patoka forestry project.

SUPPORTED BY Purdue University

1.0066, RESEARCH IN ROADSIDE DEVELOPMENT AND MAINTENANCE

F.O. LANPHEAR, Purdue University, Joint Highway Research Project, Lafayette - West Lafayette, Indiana 47907

This research is in three parts: Part I on Roadside Turf Development; Part II on the Selection, Establishment and Maintenance of Ornamental Plantings for Roadsides; and Part III on Chemical Weed Control. Part I includes selecting, testing, developing, and proving vigorous fast-growing bluegrasses especially adaptable for new construction and erosion areas. Part II is an evaluation of woody ornamental plants for their adaptability to conditions in Indiana, a determination of efficient methods of establishing highway plantings to insure their survival, an investigation of methods for reducing maintenance costs and insuring permanent beauty. Part III includes research on the use of chemicals for selective weed control and as a soil sterilant. Application techniques are also to be investigated.

SUPPORTED BY U.S. Dept. of Transportation - Public Rds.

1.0067, SUPPLY OF AND DEMAND FOR PUBLIC FOREST RECREATION IN IOWA PART OF REG. RES. NORTH CENTRAL REGION NC-92 (ABBREV)

F.S. HOPKINS, Iowa State University, School of Agriculture, Ames, Iowa 50010

Iowa's primary contribution to the regional project is an evaluation (now in progress) of the usefulness of 'scenic easements' as a device for expanding the supply of outdoor recreation opportunities available in the North Central Region. This contribution is based in part on intensive work done earlier on usefulness of scenic easements along the proposed Upper Iowa Scenic River. This work showed scenic easements to be potentially quite useful.

SUPPORTED BY U.S. Dept. of Agriculture

1.0068, ALIGNMENT COORDINATION IN HIGHWAY DESIGN

B.L. SMITH, Kansas State University, School of Engineering, Manhattan, Kansas 66504

The purpose of the project is to study the coordination of horizontal and vertical elements of highway alignment in order to provide some definitive guidelines for the designer.

An attempt will be made to set limits on spiral curve lengths and the ratio of lengths of spiral to circular arc in order that a free flowing, smooth appearing alignment will result. The coordination of horizontal and vertical alignment will be studied in order to provide the designer well-defined quantitative guides for the proper handling of visual trouble spots. The electronic plotter will be used to draw perspectives of the various visual problem areas.

Project started 1 June, 1968, completion date: 1 September, 1969.

SUPPORTED BY U.S. Dept. of Transportation - Public Rds.

1.0069, VISUAL ASPECTS OF HIGHWAY DESIGN

B.L. SMITH, Kansas State University, School of Engineering, Manhattan, Kansas 66504

Ways in which the highway designer can be assisted in his task of designing a visually stimulating highway are under study. The sag vertical curve will be studied in order to place limits on the length of vertical curve so that an aesthetically pleasing roadway will result. Determination will be made of the minimum length of horizontal and/or spiral curves which will yield a smooth-appearing rather than a jerky alignment. Problems concerned with the coordination of horizontal and vertical alignment will be explored. A number of highways will be rated visually and the geometrics will be studied. Photographs, models, perspective drawings and a study of perspectives and optical illusion will be utilized in this research. Interim reports are available from Principal Investigator.

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SUPPORTED BY U.S. Dept. of Transportation - Public Rds.

1.0070, ADJUSTMENT TO IMPOSED CULTURAL CHANGE
R.G. BARKER, Univ. of Kansas, Midwest Psychol. Field Sta.,
Oskaloosa, Kansas 66066

This is a study of the effects of a massive geo-cultural intrusion upon the environment of a rural county and upon the behavior of its inhabitants. The intrusion is a flood-control dam and conservation and recreational lake. In addition to elucidating the processes and consequences of one kind of imposed cultural change, the study aims to contribute to the methodology of eco-behavioral studies and field station operation and to theories of the environment of human behavior.

Data are available for the year 1959-60 when the county had an entirely agricultural economy, a population of 11,200, and nine towns of 115 to 1150 inhabitants. The lake, to be completed in 1968, will become the temporary destination of an estimated 1.5 million recreation-seekers per year and the permanent residence of many thousands of residents commuting regularly to cities 20, 25, and 45 miles distant. The 1959-60 data will be replicated in 1968-69 to assess the nature of the changes taking place in the towns and the impact of these changes on the behavior of the inhabitants.

Interim reports are under preparation.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - P.H.S.

1.0071, AN EVALUATION OF THE EFFECT OF STATE FORESTS AND PARKS ON PUBLIC RECREATIONAL USE OF PRIVATE FORESTS IN LOUISIANA
R.M. MCDERMID, Louisiana State University, Graduate School,
Baton Rouge, Louisiana 70803

Objectives: To determine if further development of State forests and parks will alleviate public demands for outdoor recreation now being made on private forest lands in Louisiana.

The study is designed to develop the following information: who the visitors to these facilities are, and their place of residence; how long they stay and what they use while at these recreation areas. It will evaluate the carrying capacity of existing recreation areas and the potential capacity of undeveloped areas. Thus recommendations can be made as to the need for additional public recreation areas and the size of these areas. In addition the study will appraise the economic effect of these visits by analyzing visitor expenditures for recreation equipment and supplies.

Personal interviews will be conducted among the recreation area users during peak and off-peak seasons. Traffic counters will help determine man-hours of use, number of visits, and peak loads. Weather data, day of week, and facilities used will be correlated with peak loads to determine their relationships, if any. Frequency distributions of responses will be analyzed by Chi-square to determine statistical significance. Isolated variables affecting areas and users will be analyzed statistically.

Interim reports are available from the principal investigator.

SUPPORTED BY U.S. Dept. of Agriculture

1.0072, RECREATION AND FOREST LAND USE PLANNING
J.C. WHITTAKER, Univ. of Maine, Graduate School, *Orono, Maine 04473*

Objectives: Develop guidelines for multiple-use planning for optimum use of commercial forest lands by analysis of: 1. Economic input-output relationships for recreation; 2. Substitution relationships between recreation and other uses of commercial forest land; 3. Barriers to economically efficient resource allocation and how they condition multiple-use planning; 4. Patterns of resource allocation to optimize multiple use of forest lands within various constraints.

Methods: Information will be collected through personal interview and mail questionnaire surveys of users and non-users of commercial forest land for recreation. Case studies of forest land-owner situations will be made to determine basic input-output relationships.

SUPPORTED BY U.S. Dept. of Agriculture

1.0073, STUDY OF RECREATIONAL FACILITIES IN THE CITY OF BALTIMORE AS RELATED TO NEEDS AND MOTIVATIONS
H.E. FAVOR, Morgan State College, Urban Studies Institute, *Baltimore, Maryland 21212*

A. An inventory of the available recreation facilities and programs in Baltimore City, classified by type and plotted on census tracts, and, to the extent possible, indicating date of establishment and history of development. B. The classification of all census tracts in Baltimore City to indicate socio-economic characteristics and degree of urbanization. C. Determining accessibility to recreation facilities, preferences as to type and location of recreation facilities, current utilization of existing recreation facilities and identification of age and relevant demographic characteristics. D. Analysis of inventory and survey data to determine the following: (1) Leisure time activities of Baltimore City residents, (2) Leisure time preferences not currently satisfied by available opportunities, and factors limiting realization of preferences. (3) Distribution and accessibility of recreation facilities and programs in relation to socioeconomic characteristics of neighborhoods. (4) Quantity and quality of recreation facilities and programs in relation to neighborhoods they are designed to serve.

The foregoing analysis should be aimed at providing a basis for development of programs which best meet the recreation needs of Baltimore City by addressing such questions as whether more money should be spent on programs than facilities, whether recreation programs should be based on bringing recreation opportunities into the city or taking city residents out to non-urban recreation sites, how policy-making procedures can be made more responsive to urban recreation needs, and whether greater use will be made of recreation facilities which are planned and operated on a community participation basis than on a centrally planned and managed system. E. Recommendations for a demonstration project in the planning and management of outdoor recreation facilities, utilizing the factual findings of the inventory and survey undertaken herein.

In connection with clearance of questionnaires and preparation of plans for inventorying facilities and surveying residents, Contractor will be responsible for satisfying Bureau of Outdoor Recreation that his procedures are appropriate to accomplish the purpose intended, and, if requested by the Bureau of Outdoor Recreation, he will pre-test procedures to establish their validity or appropriateness.

SUPPORTED BY U.S. Dept. of Interior - Bu. Outdoor Rec.

1.0074, A PHYSICAL, CHEMICAL AND PHARMACOLOGICAL STUDY OF THE TOXIN OF THE SEA NETTLE, CHRYSAORA QUINQUECIRRHA
J.W. BURNETT, Univ. of Maryland, School of Medicine, *Baltimore, Maryland*

Detailed physical, chemical and pharmacological analyses of purified toxin will be made in the laboratory from the manubria and tentacular tissue in both the fresh and autolyzed material supplied by the Chesapeake Biological Laboratory. These findings will be accompanied by a study of the mechanism of nematocyst discharge. Both efforts are designed to form a rational basis for developing methods to inhibit the untoward effects of the toxin in the sea nettle sting. Bioassay procedures utilizing LD50 for mice will be correlated with the reaction in other dermatological tests to provide a more reliable method of determining the relative toxicity of the nematocyst. The work will be performed by Joseph W. Burnett with David O. Cargo and Rosalie M. Vogel, and other temporary laboratory assistance as necessary. The initial stages of this study will continue until 31 December 1968.

The physical resources and staff of the University of Maryland may be drawn upon for assistance when necessary.

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SUPPORTED BY U.S. Dept. of Interior - Bu. Comm. Fish.

1.0075, A STUDY OF THE BIOLOGY OF SEA NETTLES TO DEVELOP POTENTIAL METHODS FOR CONTROL OF THEIR ABUNDANCE D.G. CARGO, Univ. of Maryland, Graduate School, College Park, Maryland

We propose: to gain a greater understanding of the ecological forces affecting the sea nettle. To examine the possible value of certain biological control organisms. To further define the nature of the sea nettle toxin and attempt to develop a combative pharmacological preparation (work done at University Hospital, Baltimore, Md.). To initiate a screening of possible chemical and physical control measures, (work done at Dept. of Mechanical Engineering, University of Maryland, College Park, Md.)

SUPPORTED BY U.S. Dept. of Interior - Bu. Comm. Fish.

1.0076, DEMAND FOR AND AVAILABILITY OF LAND AND WATER ORIENTED RECREATION FACILITIES IN MARYLAND - ECONOMIC ANALYSIS D.F. TUTHILL, Univ. of Maryland, Agricultural Experiment Sta., College Park, Maryland

1. To assess the existing facilities in Maryland for land and water recreation purposes. 2. To evaluate the present and future need for recreation facilities in Maryland, based on land and water resources, and analyze the economic potential for the state. 3. To collect cost data for construction and operation of recreational enterprises, particularly those suitable for the farmer or small businessman.

For Objective 1 - Available material on recreation facilities and use will be used and supplemented as necessary to provide the resource base information for recreation development.

For Objective 2 - National information on population and income trends, expected increase in leisure time, and changing preference for recreation activities will be interpreted for Maryland conditions to help predict future need for and use of recreation facilities in Maryland.

For Objective 3 - Costs and returns for recreation enterprises will be determined from existing data, or collected in field surveys of operating units. These costs and returns will help in decision-making of farms and business units, or for programming procedures in selecting optimum enterprise combinations.

SUPPORTED BY Maryland State Government

1.0077, EVAL. OF EXP. WATERFOWL HUNTING IN SAN LUIS VALLEY OF COLORADO A.D. GEIS, U.S. Dept. of Interior, Mig. Bird Population Station, Laurel, Maryland 20810

The objectives of this study are to determine the relationship between mallard hunting mortality in a production area and trends in the breeding population in that area; to evaluate the effect that hunting regulations have on hunter behavior; to obtain information on the behavior of mallards and the influence of hunting regulations in regard to this behavior; and to measure hunting success and activity during the special season by means of mail questionnaire, wing collection, hunter performance and bag check surveys in such a manner that the accuracy of the mail surveys may be evaluated in detail.

The surveys noted above, together with periodic population surveys and a pre-season banding program, will be conducted by established procedures.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0078, STUDIES OF THE LIFE HISTORY OF THE SEA NETTLE, CHRYSAORA QUINQUECIRRHA, IN CHESAPEAKE BAY WATERS D.G. CARGO, Univ. of Maryland, Natural Resources Institute, Solomons, Maryland 20688

This phase will continue much of the work already in progress and enable us to gain a more complete understanding of the life cycle of the sea nettle. We are particularly anxious to learn more about the growth rates, sexual and asexual reproduc-

tion, its causes and successes for prediction purposes, and the relationship of these phenomena to ecological conditions. Monitoring through regular sampling in the field and laboratory experiments and controlled cultural techniques will be employed to elaborate these various details. The evaluation of control measures upon other aquatic organisms will be an important part of these operations. Recognition of other closely related forms will be accomplished and these forms then used for the development of cultural techniques and for comparative data.

All of these studies will be performed at Solomons, Maryland or in the Chesapeake Bay by David G. Cargo, Leonard P. Schultz, Rosalie M. Vogel, and Michael J. Reber. This work can be accomplished to the extent that refined studies based on these findings will be possible in ensuing years.

The physical resources and staff of the University of Maryland may be drawn upon for assistance when necessary.

SUPPORTED BY U.S. Dept. of Interior - Bu. Comm. Fish.

1.0079, STUDIES OF THE LIFE CYCLE AND ECOLOGY OF ORGANISMS WHICH MAY BE USED TO CONTROL THE NUMBERS OF SEA NETTLES D.G. CARGO, Univ. of Maryland, Natural Resources Institute, Solomons, Maryland 20688

Certain gastropod molluscs in the order Nudibranchia have been observed feeding on scyphozoan scyphistomae. Since they are known to prefer coelenterate foods, it appeared a promising field for further investigation. Little is known of their life cycle or habits. This phase will attempt to delineate the geographic range in the Chesapeake area and its seasonal variation. Their tolerances, modes and season of reproduction, and the development of cultural techniques of species in the genera *Coryphella*, *Cratena* and *Stiliger* are of particular interest and will be emphasized. Varied studies both in the laboratory and the field will be initiated toward gaining this information. Since the seasonality of their life cycles is not known, the entire calendar year of 1968 will be required to complete this phase. David G. Cargo, Leonard P. Schultz, Rosalie M. Vogel and Michael J. Reber will be involved in this project. The work will be based at CBL, Solomons, Maryland.

The physical resources and staff of the University of Maryland may be drawn upon for assistance when necessary.

SUPPORTED BY U.S. Dept. of Interior - Bu. Comm. Fish.

1.0080, A STUDY OF POSSIBLE CHEMICAL CONTROL AGENTS AND AN EVALUATION OF IMPROVED PHYSICAL BARRIER SCREENS D.G. CARGO, Univ. of Maryland, Natural Resources Institute, Solomons, Maryland 20688

Any program designed to regulate the numbers of aquatic organisms must consider chemical control agents and barrier screens. To this end, the response of the polyp stage to certain chemicals will be examined in the laboratory. Short term exposure to low concentrations will be made and the condition of individuals one week later will be the criterion for success. Chemicals already tested against other organisms will be screened first, utilizing published information of their virulence. Promising agents will, in subsequent phases, be tested for effects on other aquatic organisms. The physical barrier study will entail a survey of existing structures, interviews, and then attempting to develop a set of criteria for an efficient structure, recognizing the local geographic and hydrographic conditions. Consideration of wave action, exposure, water currents will be related. Preliminary tank and laboratory testing of utilizing bubble screens alone and in conjunction with fencing structures will be made. The Mechanical Engineering Department of the University of Maryland will be consulted on many aspects of this study, which is expected to require the entire calendar year. David G. Cargo and Leonard P. Schultz will be involved in this study. Miss Rosalie Vogel and David G. Cargo will be responsible for the chemical screening tests.

The physical resources and staff of the University of Maryland may be drawn upon for assistance when necessary.

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SUPPORTED BY U.S. Dept. of Interior - Bu. Comm. Fish.

1.0081, LOCATING POTENTIAL OUTDOOR RECREATION AREAS FROM AERIAL PHOTOGRAPHS

J.J. LINDSAY, Univ. of Massachusetts, Graduate School, Amherst, Massachusetts 01002

The feasibility of using aerial photographs to locate potential outdoor recreation areas in natural environment surroundings is being studied. A set of criteria for use as guides in selecting recreation areas from aerial photographs is being developed. Various mapping and photogrammetric techniques for regional surveying, and planning specific outdoor selected recreation areas are being studied. The study is designed to assist land planners, managers and owners in developing, managing and protecting their natural resources to provide outdoor recreation on a multiple use basis.

SUPPORTED BY University of Massachusetts

1.0082, GREAT LAKES RESEARCH - COASTAL AREA SEDIMENTATION

J.H. SAYLOR, U.S. Army, Lake Survey, Detroit, Michigan 48226

Data on energy sources (waves, winds, currents) impinging on selected coastal reaches along the Great Lakes will be collected and studied to learn how environmental energy affects sediment movement, characteristics, and distribution in beach and nearshore areas. Results will be used to derive relationships and/or mathematical models. Investigations will devise methods of establishing rates of coastline change and how to forecast the future behavior of the coastline. Information is needed for the design and location of harbors, marinas, industrial plants, and recreational areas.

SUPPORTED BY U.S. Dept. of Defense - Army

1.0083, SUPPLY OF PUBLIC FOREST BASED OUTDOOR RECREATION FACILITIES IN THE NORTH CENTRAL REGION

R.S. MANTHY, Michigan State University, School of Agriculture, East Lansing, Michigan 48824

A contributing study to the NC-92 region study of the forest based outdoor recreation market in the North Central region.

To inventory the supply of outdoor, forest based recreation facilities in the North Central region, supplying public agencies are being contacted. Given physical inventory data, economic supply schedules will be developed for the region, based on 1968 data. Projections of economic supply will be made for 1980. In this study the supply price is defined as the sum of the direct and associated costs of supplying public forest based recreation facilities. Direct costs are the costs incurred by the supplying agency. Associated costs are the costs incurred by the users of the recreation facilities.

This study began in July, 1968 and will be completed in June, 1970. Results of the supply study will be combined with results of studies of the demand for forest based recreation currently being undertaken at the University of Wisconsin to provide a description of the recreation market.

SUPPORTED BY U.S. Dept. of Agriculture

1.0084, RECREATIONAL POLICIES, PROGRAMS, AND OPPORTUNITIES ON INDUSTRIAL FORESTS IN THE LAKE STATE REGION

C.R. CROWTHER, Michigan Technological Univ., Graduate School, Houghton, Michigan 49931

Objectives: (1) To trace the evolution of recreational programs applied on their lands by forest industries; (2) to inventory existing and potential recreational resources on industrially owned lands; and (3) to compare and evaluate differences in recreation policies and programs among types of industrial forest land owners.

This project is based on a study of forest land-owning companies in the Upper Peninsula of Michigan, relating to recreational

uses of their lands and the development of related policies through the past century. Findings will be compared with similar information secured through a survey of representative companies throughout the Lake States Region. Emphasis will be placed on recreation program and policy variations between company types, and factors underlying these differences.

SUPPORTED BY U.S. Dept. of Agriculture

1.0085, HYDROLOGY OF RIVER-BASED RECREATION

G.E. HENDRICKSON, U.S. Dept. of Interior, Water Resources Division, Lansing, Michigan 48933

Purpose - This research is part of the program of water resources investigations conducted by the U.S. Geol. Survey in cooperation with the State of Michigan. To analyze the hydrologic factors related to use of cold-water rivers in a glacial terrain, to provide guidelines for assessing the potential recreational value of such rivers, and to determine how development by man in the watersheds affects the recreational value of the streams.

Methods - On the basis of streamflow and water quality records, geology, topography, and amount of development, select representative rivers in northern Michigan, assemble information regarding streamflow characteristics, stream morphology, water temperature, ground-water levels, and areas of ground-water discharge. Obtain information on recreational potential of rivers, including fish populations and present and future use for fishing, boating, and camping. Interpret relationships of recreational uses to hydrology of the watershed. In developed watersheds obtain information on surface and ground water withdrawals, disposal of sewage and other wastes, regulation by dams, and indirect controls by timber-cutting and other changes in land use in the watersheds. Report on relationships of characteristics of streamflow, water quality, and stream morphology to river-based recreation.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

1.0086, ECOLOGY OF TIMBER WOLVES

L.D. MECH, Macalester College, Graduate School, Saint Paul, Minnesota 55101

Seeks to determine sociology and food habits of wolves in the Boundary Waters Canoe Area, particularly in their relation to white tailed deer.

SUPPORTED BY U.S. Dept. of Agriculture

1.0087, A STUDY OF THE RECENT VEGETATIVE HISTORY OF THE BOUNDARY WATERS CANOE AREA

M.L. HEINSELMAN, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta., Saint Paul, Minnesota 55101

This study provides for a vegetation history for the BWCA for the period since white entry (ca. 1700 A.D.) which will answer two questions: (1) How did the present forest communities originate? (2) What differences, if any, are there between the present natural vegetation and the primeval, and between the disturbed vegetation and the primeval?

SUPPORTED BY U.S. Dept. of Agriculture

1.0088, THE UPLAND DISTURBED VEGETATION OF THE BOUNDARY WATERS CANOE AREA

L.F. OHMANN, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta., Saint Paul, Minnesota 55101

To characterize quantitatively the disturbed plant communities and their associated environments within the study area and to compare the characterization with that of the upland natural plant communities. To determine the types and amount of residual seed material in the duff and mineral soil of disturbed communities.

SUPPORTED BY U.S. Dept. of Agriculture

1.0089, THE UPLAND PLANT COMMUNITIES OF TWO ADJACENT RECENT WILDFIRE AREAS IN THE BWCA

L.F. OHMANN, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta., Saint Paul, Minnesota 55101

1. RESOURCES

To determine the variability in ecological effects of wild fire in the resultant upland plant communities in the Frost and Cherokee Lake areas. The two areas burned under similar fire conditions, during the same fire season, covering the same amount of acreage in essentially the same timber types, are located adjacent to each other geographically.

SUPPORTED BY U.S. Dept. of Agriculture

1.0090, A STUDY OF THE UPLAND NATURAL VEGETATION OF THE BOUNDARY WATERS CANOE AREA
R.R. REAM, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta., Saint Paul, Minnesota 55101

The primary objective is to characterize quantitatively the plant communities and their associated environments present within the study area. Utilizing these basic data, the relationships between communities and between communities and the environment will be investigated. Using the same data, the relationships between individual species and between species and the environment may be determined.

SUPPORTED BY U.S. Dept. of Agriculture

1.0091, HYDROLOGIC PARAMETERS CONTROLLING RECREATIONAL USE OF MINNESOTA RIVERS
R.F. BROWN, U.S. Dept. of Interior, Geological Survey, Saint Paul, Minnesota 55414

Purpose: This research is part of the program of water resources investigation conducted by the U. S. Geological Survey in cooperation with the State of Minnesota.

To determine the effect of hydrologic parameters - streamflow, water quality, geology, stream morphology - on recreational use of selected rivers in Minnesota.

Methods: Selected Minnesota rivers have been designated by the State as "Wild Rivers" and knowledge of the geologic and hydrologic environment of these streams is required by conservationists and recreation managers and planners to evaluate their recreational use. Available records of streamflow, water quality, and geology will be evaluated in terms of the controlling influence of these parameters on the present and future recreational value of the rivers. Longitudinal profiles of streams will be made, channel morphology will be studied, and additional measurements of streamflow and water quality parameters will be made and their relation to recreational use will be evaluated.

Field investigations and a report to the State of Minnesota have been completed. HA - 299 published by U. S. Geological Survey. Three additional HA publications are in preparation.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

1.0092, INVESTIGATION OF THE FORM AND RATE OF DETERIORATION OF NEWLY ESTABLISHED CAMPSITES
L.C. MERRIAM, Univ. of Minnesota, Graduate School, Saint Paul, Minnesota

This study seeks to determine if, how and why campsites on locations of differing vegetation types, use intensities, geological areas, soil types, slopes, and aspects deteriorate over a period of some 5 years. Also sought is information on which campground sites are the most resistant to use and which deteriorate most quickly. The study will produce information useful to Superior National Forest administration in wilderness campsite management.

SUPPORTED BY U.S. Dept. of Agriculture

1.0093, IMPACT OF WATER QUALITY AND QUANTITY ON FOREST RECREATION IN THE NORTH CENTRAL REGION

J.A. NICOLSON, Univ. of Minnesota, Graduate School, Saint Paul, Minnesota

Study Objectives: To assess possible recreational trends which would be related to water quality and/or quantity changes in the past and to establish some measure of preference and tolerance of the recreationist for water quality and quantity in the recreational experience.

Justification: This broad regional project is designed for forecasting future supply of and demand for recreation in the North Central Region. Specific contributions of water quality and quantity to the amenity package of the recreational experience have not been defined which is a prerequisite for proper consideration when making predictions of future supply and demand for forest oriented recreation.

Methodology: Past trends in recreational use will be secured for public forest lands and related to records of water quality and quantity. Measures of preference and tolerance by the recreationist for certain levels of water quality and quantity will be estimated from interviews. Attempts to define cutoff points of water quality, tolerance and water quantity preference will be made. Both surface and groundwater aspects of water quality and quantity will be considered.

Time, Cost, Manpower: This proposed three year study will be initiated in July, 1969. It will be conducted as a 3 phase study. Phase one will yield estimates of recreational use on public forested lands. Phase two will determine water quality and quantity data to correlate with use patterns. Phase three will yield information pertaining to public preference and tolerance levels related to water quality and quantity.

A minimum of \$5,000 per year will be required, including support funds for a one-half time graduate research assistant.

SUPPORTED BY No Formal Support Reported

1.0094, OPEN SPACE INVENTORY AT ST. LOUIS COUNTY, MISSOURI

K.C. CHILMAN, Univ. of Missouri, Graduate School, Columbia, Missouri 65202

Open space is coming to be regarded as an increasingly important resource in urbanizing areas. This study attempts to develop quantitative and qualitative criteria for systematic inventory of open space opportunities for recreation and other environmental planning of large land areas. The criteria developed were tested in St. Louis County, Missouri.

SUPPORTED BY U.S. Dept. of Agriculture

1.0095, PERCEPTION OF RECREATION PLANNING DATA NEEDS

K.C. CHILMAN, Univ. of Missouri, Graduate School, Columbia, Missouri 65202

This study is part of a North Central region study of public forest recreation demand and supply.

Public land management agency leaders will be interviewed to learn how they view their recreation planning data needs and how the demand and supply study might be useful to them.

SUPPORTED BY U.S. Dept. of Agriculture

1.0096, THE CARRYING CAPACITY OF DIFFERENT FOREST SITES FOR DIFFERENT RECREATION USES

K.C. CHILMAN, Univ. of Missouri, Graduate School, Columbia, Missouri 65202

'The Carrying Capacity of Different Forest Sites for Different Recreational Uses' - A. To determine the effect of different kinds and intensities of recreational use in different types of forest stands on the soil. B. To determine the effect of different kinds and intensities of recreational use in different types of forest stands on vegetation. C. To determine the point at which recreational use of forest land causes a deterioration in the recreational value of an area and/or deterioration in other values (watershed, wildlife, etc.) of the recreational area and adjacent areas (based on results of A and B). D. To establish standards of carrying capacity of different forest sites for different recreational uses (based on results of C).

Description of work: Objectives A and B will be carried out on small plots in different types of forest stands on several soil types under varying intensities of recreational use. Sites which have been used for recreation for an extended period and sites not now so used but which will be developed for use will be studied. Bulk density, pore volume, air capacity, field capacity, permanent wilting percentage, soil texture and infiltration capacity will be

determined. Plants will be inventoried and the number of dead roots determined. Areas will be photographed periodically. Recreationists will be counted as a measure of use intensity. Objective C and D will be developed from the results obtained under the first two objectives.

SUPPORTED BY U.S. Dept. of Agriculture

1.0097, INVESTIGATION OF ACTIVITIES OF SMALL GAME HUNTERS

F.W. SAMPSON, State Dept. of Conserv., Jefferson City, Missouri 65102

The purpose of this investigation is to develop a reliable post-season mail survey, suited to our facilities for estimating annual harvests, hunter success and related information for as many of the small game species as feasible. Results of this study serve as background data for more detailed species research.

Current randomized sampling will be obtained from second copies of the 1968 resident small game hunting and combination hunting and fishing permits as remitted monthly by distributing agents. Statistical specialists will be consulted relative to methods and sample sizes adequate for projections statewide and for zoogeographic regions. Questionnaire design and layout of continuous forms for printing contract for use following the 1968-69 season will begin no later than July 1968. The questionnaire will include such information as type of permit purchased and hunting activity composed of number of each species killed, county where most hunting was done and number of days (times or trips) each species was hunted. Species considered for inclusion are rabbit, squirrels, quail, dove, raccoon, woodchuck, ducks, geese, crow, foxes, coyote, bobcat and pheasant. The initial mailing is to be made at the close of all hunting seasons on protected small game species (end of February or early March) with two follow-up mailings contemplated to non-respondents at suitable intervals of about three to four weeks. Outside IBM machines and services will be used for all addressing of questionnaire forms, punching follow-up finder cards, data cards and processing of data. The statistical clerk will check all replies for usability and code or units hunted for regional distribution.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0098, RECREATION PLANNING FOR THE STATE OF ARKANSAS

J. MCKELVEY, Midwest Research Institute, Kansas City, Missouri 64110

This project, recently completed, was designed to prepare the Arkansas Statewide Comprehensive Outdoor Recreation Plan, in accordance with directives set forth by the Bureau of Outdoor Recreation. The basic elements of this plan included a physical inventory of existing and potential recreation areas, determination of demand, and resulting comparisons. In addition, based on the statistical data and supplemental information obtained from other plans for recreational development existing within the state, a five-year acquisition and development schedule for all levels of government, and an action plan was developed for the state. This action plan was designed to point out specific needs, provide for systematic continuation of recreation planning for the state, define areas of responsibilities, establish certain priorities, and recommend legislative programs relating to recreation.

SUPPORTED BY Arkansas State Government

1.0099, RECREATION PLANNING FOR THE STATE OF TENNESSEE

J. MCKELVEY, Midwest Research Institute, Kansas City, Missouri 64110

This study, presently in its final stages, was designed to assist the state in developing the Tennessee Statewide Comprehensive Outdoor Recreation Plan. The basic elements of the study were: (1) An inventory of all existing and potential recreation areas, including all publicly and privately owned and/or administered recreation facilities and resources; (2) A demand survey, collecting data on socio-economic characteristics of a sampling of the

state's population; their participation in 45 outdoor recreation activities; vacation characteristics; and a special study on hunting, fishing, and boating participation; and (3) A comparison of recreation facilities and resources with demand, to determine the need for, or idle capacity of, recreation opportunities. The statistical data on supply, demand, and need, both present and future, will be analyzed and included in the Tennessee Recreation Plan.

SUPPORTED BY Tennessee State Government

1.0100, MICROBIOLOGICAL STUDIES IN AN OPEN AND A CLOSED WATERSHED

W.G. WALTER, Montana State University, Graduate School, Bozeman, Montana 59715

Preliminary microbiological and chemical studies have been made during recent summers on waters serving Bozeman. One of the watersheds has been closed to the public for about 47 years except for limited logging; the other has been open for extensive logging and recreation. Quantitative and qualitative bacteriological tests have often resulted in higher 'total' enterococci and coliform counts in the closed area possibly because of closer proximity to streams of animals present.

Studies will be directed to identifying microbes in deer, elk, moose etc. droppings and to determine the presence of these bacteria in the waters at different locations, particularly in the closed watershed which may be opened soon for public use. Interim reports are available from principal investigator.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0101, WILDERNESS VEGETATION INVENTORY

R.C. LUCAS, U.S. Dept. of Agriculture, Forestry Sciences Laboratory, Missoula, Montana 59801

As a first step in wilderness biological research, a general description of existing vegetation and resources is needed. This will provide a better framework than now exists for future, more detailed studies of recreation potential, plant ecology, wildlife ecology, wildlife habitat, grazing capacity, fire, insects, and disease. A description of general vegetation conditions is also needed for the study of similarities and differences between wilderness units leading to the classification of wilderness areas. This study is being tested on the Bob Marshall Wilderness Area. The objectives are: 1. To very broadly characterize from aerial photographs the major vegetal communities and spatial distributions of types within wilderness areas in the Northern Rockies. 2. To compare classifications derived from aerial photographs with actual plant communities on the ground. 3. To provide a very general description of wilderness environments and variation in these environments in terms relevant to recreational use potential.

88 51 29

SUPPORTED BY U.S. Dept. of Agriculture

1.0102, A STUDY OF THE RECREATIONAL CARRYING CAPACITY OF WILDERNESS

G.H. STANKEY, U.S. Dept. of Agriculture, Forestry Sciences Laboratory, Missoula, Montana 59801

To determine the effects of various forms and levels of recreational use on the quality of the wilderness recreational experience. The study will attempt to determine the manner in which users perceive define capacity, what factors influence the perception of capacity, what changes in the spatial and temporal patterns of use occur as capacity is reached in the opinion of visitors, and what management alternatives exist to increase wilderness capacity with little or no loss in recreational quality.

This study will be comprised of a three part questionnaire administered at access points to the Bob Marshall Wilderness, the Bridger Wilderness, and the High Uintas Primitive Area by an interviewer. Additionally there will be a mail survey of users registering at unmanned trail registration boxes in the study areas. The questionnaire will consist of a series of multiple choice questions concerning respondent attitudes toward use, a group of attitude statements based on the Likert Attitude Scale, and a series of questions for obtaining standard socio-economic data. The

1. RESOURCES

questionnaire will be administered to all party members 15 years of age and older.

SUPPORTED BY U.S. Dept. of Agriculture

1.0103, THE BIOTIC COMMUNITIES OF THE DANAHER VALLEY, BOB MARSHALL WILDERNESS AREA, MONTANA
S.S. FRISSELL, Univ. of Montana, Graduate School, Missoula, Montana 59801

One management goal for national forest wilderness areas is to 'promote, perpetuate, and, where necessary, restore the wilderness character of the land.' In most wilderness areas we have inadequate background information on the precise nature of either the contemporary or pre-whiteman 'wilderness character' we seek to preserve and/or maintain. This study is designed to provide some of this background information for a portion of the Bob Marshall Wilderness Area. The study objectives are:

1. To determine what natural biotic communities existed in the study area before the influence of modern man. This will involve examination of historical journals, records, surveys, and reports to obtain all possible first-hand data on the original communities. Additional information will be gained through the identification and study of relics of these communities.

2. To evaluate the role of wildfire in the maintenance of these early biotic communities. Information from historical documents and an intensive study of fire scar dates and forest age class structure will be used to obtain a picture of the nature, frequency, and area affected by wildfire.

This project began in July 1968 and will continue until June 1971.

SUPPORTED BY U.S. Dept. of Agriculture

1.0104, THE MONTANA DUDE RANCH INDUSTRY -- A BASIC APPRAISAL
W.K. GIBSON, Univ. of Montana, Graduate School, Missoula, Montana 59801

One of the main problems in evaluating Montana's natural resources and their economic base is lack of good usable base data. It is the purpose of this study to provide a data base for the Dude Ranch Industry in Montana. This data should provide researchers with use requirements from the Dude Ranch portion of the total Outdoor Recreation demand in Montana.

The study will be carried out by personal interview of most of the operating dude ranches in Montana. The questionnaire will be divided into three basic parts: natural resource utilization, selected business characteristics of the dude ranch operation, and supply-demand relationships of the industry. It is hoped to set up a profile of Dude Ranching as the results of the field investigation.

SUPPORTED BY University of Montana

1.0105, INVENTORY AND ATLAS OF MARINE SPORT-FISHING FACILITIES
B. FREEMAN, U.S. Dept. of Interior, Sandy Hook Marine Lab., Highlands, New Jersey 07732

A series of line maps will be prepared as an atlas and will summarize marine sport-fishing facilities and fishing grounds of the Atlantic coast from Maine to Florida. Intended as both a comprehensive guide for sportsmen and an inventory of facilities, each map will show locations of boating facilities, supplies, and services, as well as principal roads and towns. Water depths, fishing grounds, and common game fish will be indicated to a distance of ca. 30 miles offshore. The atlas will include location of natural and artificial reefs as well as principal wrecks. Tabular summaries accompanying each map will list fishing piers and public shore fishing areas, State and Federal parks, wildlife areas and associated recreational facilities.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0106, TURFGRASS BREEDING AND EVALUATION. PROJECT NUMBER 145
C.R. FUNK, Rutgers The State University, Agricultural Experiment Sta., New Brunswick, New Jersey 08903

1. Develop the concepts, procedures and techniques required for the efficient genetic improvement of our various turfgrass species and demonstrate their effectiveness in the development and release of improved varieties and genetic materials. 2. Assess the merits of available and potentially available turfgrass species, varieties and mixtures and develop more efficient evaluation techniques.

SUPPORTED BY U.S. Dept. of Agriculture

1.0107, BREEDING AND EVALUATION OF KENTUCKY BLUEGRASS FOR TURF
C.R. FUNK, Rutgers The State University, Agricultural Experiment Sta., New Brunswick, New Jersey 08903

1. Assemble and evaluate germplasm resources. 2. Determine the effect of various environmental factors on apomictic versus sexual reproduction in Poa. 3. Study genetics of apomixis and develop more efficient breeding procedures. 4. Develop and utilize techniques to best assess morphological, physiological, pathological and agronomic responses and methods of turf quality rating. 5. Assess the performance characteristics of single and multiple genetic types through blends of different components. 6. Develop and release improved varieties.

SUPPORTED BY U.S. Dept. of Agriculture

1.0108, ANGLER HARVEST COMPARISONS ON THE FLY FISHING ONLY AND OPEN FISHING STRETCHES OF THE BIG FLATBROOK
R.H. SOLDWEDEL, State Div. of Fish & Game, Trenton, New Jersey 08625

Objective: To determine the proper stocking techniques to employ on open and fly-only fishing sections of the Big Flatbrook.

Procedure: The first draft of a final report combining findings obtained throughout the study was completed during project segment six. Activities during project segment seven will be devoted to the finalization of this report, including publication. When it reaches the publication stage, bids will be sought and the project amended accordingly.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0109, METHODS AND TECHNIQUES FOR ELIMINATION OF HIGHWAY STRIP COMMERCIAL BLIGHT
R.E. ROSA, Woodbridge Dept. of Plan., Woodbridge, New Jersey 07095

With the use of a two-mile section of highway frontage along U.S. Route 1 in Woodbridge as a study area, a comprehensive action program for the elimination of highway strip commercial blight has been developed. Techniques employed in this demonstration include survey and evaluation techniques and the development of a highway frontage classification system, or rather, a system for functional grouping of land uses. The study also analyzed existing conditions of blight; established property improvement standards and design controls for existing and proposed development; and tested these standards and controls. A report on the project has been prepared for the guidance of other communities.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

1.0110, HYDROLOGIC AND CAVE CLIMATE STUDY OF CARLSBAD CAVERNS
W.E. HALE, U.S. Dept. of Interior, Water Resources Division, Albuquerque, New Mexico 87106

To monitor and describe the climate and hydrologic conditions within the Caverns with automatic recording equipment. The parameters measured are humidity, temperature, carbon dioxide concentrations and air pressure at several locations within the caverns. The continuous recording data and other data collected manually at intervals will be used to interpret the conditions and possibly find out the effects of mass activity in the Caverns.

The field work is conducted in Carlsbad Caverns, south of Carlsbad, New Mexico. The interpretation and report work is

1. RESOURCES

conducted at the U. S. Geological Survey Water Resources Division office at Albuquerque, New Mexico.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0111, SUBSURFACE SEISMOLOGIC STUDIES IN CARLSBAD CAVERNS

R. ZBUR, U.S. Air Force, Weapons Laboratory, Albuquerque - Kirtland A.F.B., New Mexico 87117

A Benloff Seismograph System, loaned temporarily from Holloman Air Force Base, has been installed at the 700 foot level in Carlsbad Caverns. The system is maintained by the U. S. Geological Survey and chart interpretation is being done by Kirtland Air Force Base geophysicists. The object is to record local events in the cavern complex. After June this year this recording system will be returned to Holloman Air Force Base. Approximately a year of recorded data will be interpreted as a detailed study to define the frequency of ground motions in the immediate Cavern area.

This project is not funded and has been made possible by: (1) the loan of equipment by Holloman Air Force Base, (2) servicing of recorders by Park officials, (3) the periodic checking of the equipment by the Geological Survey and, (4) the interpretive work by Kirtland Air Force Base.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0112, CANADARAGO LAKE EUTROPHICATION STUDY

L.J. HETLING, State Dept. of Health, Albany, New York

The Research Unit, Environmental Health Services, is conducting a study on the nature and causes of eutrophication of lakes within New York State. To start this study, Canadarago Lake, Otsego County, has been selected for detailed study. Before detailed, specific research-oriented studies could be made, basic knowledge on the physical, hydrological, chemical and biological characteristics of the lake was required. In order to obtain these basic data, a sampling program on the lake has been in operation since May, 1968.

As the above information is gathered, it is being put into usable format and made available to interested parties. From this basic information, a more detailed plan of research has been formulated from which the need for and value of engineering control mechanisms such as advanced waste treatment, improved individual summer home disposal methods, agricultural practices, diversion of land run-off or waste, etc., can be evaluated. Once this research phase of the project is completed, the final phase of the project will be started. This will be a full scale demonstration of the engineering control measures found necessary in order to determine their cost and effectiveness.

Interim reports are under preparation.

SUPPORTED BY New York State Government

1.0113, DETERMINE TOTAL LEGAL TAKE OF BIG GAME AND ASSOCIATED INFORMATION FROM BIG GAME TAGS

S. FREE, State Div. of Fish & Game, Albany, New York 12226

Procedure: Reports of big game are mailed to the Conservation Department by a number of successful hunters. At checking stations and other places where legally tagged big game animals are found, information on license number, sex, age, kill locations and other data are recorded by Bureau of Game personnel. Law Enforcement personnel also record license numbers and kill locations during their field checks. These license numbers are collated against those of hunters reporting their deer and a reporting percentage is determined. By applying this reporting factor against the reported take, a calculated take by town is determined. This calculated take is also separated into sex and age (fawn, adult) classes according to the ratios observed at check stations. Date of kill information by region and license type is also tabulated by machine processing methods. If a computer (Job II-B) proves feasible, this work will be completed using a computer operation.

Work schedule: September 1 to October 1 - revise and prepare schedule for operation for the machine tabulation of the

deer take. December 1 to February 20 - prepare report on calculated deer take. February 1 to March 1 - prepare report on township deer take. To be done under supervision of H. Maguire. Estimated man days required: 60.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0114, LAND USE AND NATURAL RESOURCES INVENTORY

D.D. BRANDON, State Off. of Plan. Coord., Albany, New York 12225

This inventory is being conducted for the State with a land use classification system consisting of 95 major categories and 40 sub categories by using air photo interpretation tied to data compilation and computer graphic techniques. The inventory is designed to assess and portray the present extent, character and uses of the land and water resources. Techniques for conducting the inventory were developed jointly by Cornell and Harvard Universities. Work is now completed for 21 counties and the total inventory should be complete by the end of 1969 or early in 1970.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

1.0115, NASSAU SUFFOLK REGIONAL NATURAL AREA STUDY

D.D. BRANDON, State Off. of Plan. Coord., Albany, New York 12225

The report to be published will consist of an Inventory and Commentary on open areas remaining in the region which are unique to Long Island or totally representative of the areas Natural Resources.

The Nassau Suffolk Region incorporate Nassau & Suffolk Counties which comprise the non New York City portion of Long Island.

SUPPORTED BY New York State Government

1.0116, NASSAU SUFFOLK REGIONAL SAND AND GRAVEL STUDY

D.D. BRANDON, State Off. of Plan. Coord., Albany, New York 12225

A study of the demand for Sand and Gravel in the region including a projection of the needs for sand and gravel and the land use and environmental problems resulting from current operations. Proposes a program for management of the resource.

The Nassau Suffolk Region consists of Nassau & Suffolk Counties.

SUPPORTED BY New York State Government

1.0117, NASSAU SUFFOLK REGIONAL RECREATION STUDY

D.D. BRANDON, State Off. of Plan. Coord., Albany, New York 12225

This project incorporates four major sub-projects: 1) A home interview recreation demand survey of recreation activities of the regions residents. 2) An on-site survey of recreation users. 3) An inventory of outdoor parks in the region and an analysis of existing supply and demand for recreation facilities.

The Nassau Suffolk Region incorporates Nassau and Suffolk Counties which comprise the non New York Cities portion of Long Island.

SUPPORTED BY New York State Government

1.0118, RESOURCE DEVELOPMENT PLAN FOR THE NEW APPALACHIAN REGION

C. LANIGAN, State Off. of Plan. Coord., Albany, New York 12225

Objectives and Procedures: The study is to develop an overall resource development plan for the State's Appalachian Region that will provide policies and project recommendations regarding the allocation of funds available under the Appalachian

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Regional Development Act of 1965. Data should be available for use in the Appalachian Investment Plan for 1969.

This study will develop an inventory and preliminary analysis of the region's climate and agricultural, industrial, manpower, community, transportation, forest, soil, mineral, recreational and cultural resources.

SUPPORTED BY U.S. Dept. of Commerce - Econ. Dev. Adm.

1.0119, SYSTEMATIC STUDY AND DEVELOPMENT OF LONG-RANGE PROGRAMS OF URBAN WATER RESOURCES RESEARCH

M.B. MCPHERSON, Amer. Soc. of Civil Engrs., New York, New York

The ASCE Urban Water Resources Research Program is centered at Harvard University, 40 Oxford St., Cambridge, Mass. 02138. The program objective is to provide guidelines for initiating and expanding a program of long-range studies on urban water problems. Work supported by OWRR from 9/67 through 2/69 is reported in Urban Water Resources Research, ASCE, N.Y., N.Y. 10017, September, 1968. Supplementary work supported by the USGS from 10/67 to 6/69 is reported in Basic Information Needs in Urban Hydrology, ASCE, N.Y., N.Y. 10017, April, 1969. These two publications concluded the first phase of the program.

The second phase of the program, supported by OWRR, was started 3/69. Work includes: (1) a review of professional reactions to the two reports cited above; (2) a study of metropolitan water management administrative arrangements; (3) development, collaboration and participation in research by others; (4) initiation of the design of a comprehensive simulation model for an engineering-economic systems analysis of all aspects of urban water; (5) publication of a text on urban water resources as a reference for non-engineers and the general public; and (6) a feasibility study on the concept of a metropolitan water intelligence system.

The second phase will be completed about 9/70.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0120, ENHANCEMENT OF RECREATION SERVICE TO DISABLED CHILDREN

D.L. BERRYMAN, New York University, School of Education, New York, New York 10003

Reliable information on the quality of recreation service to disabled children is seriously limited. The proposed project is designed to provide an estimate of the quality of existing recreation services and evaluate the following: (a) procedures necessary to provide optimum service; (b) problems preventing or impeding the initiation of service; (c) factors affecting improvement and expansion of service.

A reliable stratified sample of recreation resources for disabled children in the United States is now available as a result of a quantitative study (CB R-196) conducted by Comeback, Inc. with partial support of the Children's Bureau, Department of Health, Education and Welfare. These data permitted the selection of an appropriate sub sample for this project in nine Standard and one Consolidated Metropolitan Statistical Area.

Utilizing standards for recreation service and interview guides developed during the first year of the project, on-site observations and in-depth interviews will be done to evaluate the nature, quality and scope of existing services. Based on data collected, a series of manuals will be prepared and reviewed by selected personnel. The manuals will provide guidelines for initiating, administering, and improving recreation services to children who are disabled.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - S.R.S.

1.0121, DEVELOPMENT OF EDUCATIONAL PROGRAMS FOR NEW CAREERS IN RECREATION SERVICES FOR THE DISABLED

D.L. BERRYMAN, New York University, School of Education, New York, New York 10003

Purpose - To define the roles and functions of subprofessional recreation personnel in hospitals, extended medical care facilities, and municipal recreation departments; to develop educational programs to prepare individuals for work at the various levels identified; and to demonstrate and evaluate at least one of the educational programs developed.

Expected contribution to education - Specific recommendations for further development of curricula in community college and vocational training programs to prepare subprofessional recreation personnel for service in a variety of settings providing recreation services to ill, disabled and aged persons.

Procedures - The roles and functions of subprofessional recreation personnel in recreational activity programs in hospitals, extended medical care facilities, and municipal recreation programs will be analyzed. Educational curricula and training programs will be developed consistent with the specific job requirements delineated by the job analysis and in accord with good vocational education practice. One training curriculum, utilizing a field unit teaching technique, will be applied with unemployed or underemployed young adults, homemakers, and a few selected older persons. Evaluation of the effectiveness of the curriculum will include: a) distribution of questionnaires to trainees, supervisors, agency administrators and clients served by the trainees to obtain data concerning the quality of trainee performance; b) follow-up interviews with each trainee three months subsequent to completion of training to ascertain their satisfaction with placement and supervision in their work situations; c) trainee reports concerning aspects of the training program most and least helpful in job performance; d) evaluation of foregoing data by representatives of the Office of Education, members of the therapeutic recreation profession, the vocational education profession, faculties of community colleges, and a research consultant. This project, initiated May 1968 will be completed October 1970.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - Off. Ed.

1.0122, SPORT FISHERY CATCH STATISTICS FOR SUMMER FLOUNDER

R.H. SCHAEFER, State Conservation Department, Ronkonkoma - Long Island, New York 11779

Objective: To obtain estimates of the catch and catch per effort of the sport fishery for summer flounder in Great South Bay as part of basic information to evaluate the 14 inch size limit on sport-caught summer flounder which became a law on January 1, 1965.

Procedure: There will be approximately 5,000 interviews of fishermen in Great South Bay in the months of May through September. These field interviews will obtain information on the catch and the catch per effort. In addition, information will be obtained in such a manner that estimates of the monthly catch statistics can be tabulated by the separate sport fisheries; e.g., private boat, rowboat, open boat and charter boat. Airplane counts of boats and anglers will be made on 2 week days and 2 week-end days each month so that interview data can be expanded for monthly and total catch. An inventory of sport fishery facilities in Great South Bay will be completed in May. All data collected will be comparable to data collected in 1956-1960, which were reported in 'The Sport Fisheries of Great South Bay and Vicinity' by Philip T. Briggs. Interim reports are available.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0123, RELATIONSHIP BETWEEN PHYSICAL SITE CHARACTERISTICS OF ADIRONDACK CAMPING AREAS AND INTENSITY USE

E.L. SHAFER, State University of New York, U.S.D.A. Forest Service, Syracuse, New York 13210

To determine whether physical site characteristics significantly influence the average use per campsite at Adirondack camping areas.

Scheduled for completion in 1969.

SUPPORTED BY U.S. Dept. of Agriculture

1.0124, PREDICTING THE ESTHETIC APPEAL OF NATURAL LANDSCAPES

E.L. SHAFER, State University of New York, U.S.D.A. Forest Service, Syracuse, New York 13210

To test whether pattern measurements and tonal variations of given landscape configurations are significantly related to public preference for that landscape. Scheduled for completion in 1969.

SUPPORTED BY U.S. Dept. of Agriculture

1.0125, INVENTORY AND MEASUREMENT OF RECREATION USE

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802 (SE1901)

Objective: Develop principles and guides to enhance recreational use benefits from forests and other wild lands of the Southeast.

Approach: Improve methods for collecting and processing information on area and site characteristics, and use. Design and test a system to compile, store and retrieve facility and use data for all National Forest recreation lands. Studies aimed at maximizing the use of fish and game resources, including the availability and use of access roads and trails. Studies of the Southeast's cold water fishery resource will involve an assessment of its nature, amount and worth. Improvement of the selection, design and management of recreation sites will be sought by studies of criteria for site value, and design and facility layout including manipulation of restoration of problem sites, measurement of carrying capacity, and choice of horticultural materials.

Progress: To keep pace with rapidly changing and continually growing demands for recreation opportunities of the National Forests, resource managers must have current, readily available information. A centralized statistical unit was established in 1965 within the Project-in cooperation with the Washington Office Division of Recreation--to provide rapid retrieval of a wide variety of detailed recreation information. The computerized system, known as RIM (Recreation Information Management), is now fully operational. During the year, source documents--repositories of information on various management aspects--were developed for the following elements. Basic address--Location and status of all Forest Service recreation sites and areas, and area-by-area basis. Facility inventory.--A complete inventory of all site and area facilities. Recreation use sampling models.--Several sampling models were developed and tested nationwide during the year and estimate use of developed sites, general forest areas, winter-sports sites, and wilderness areas. Other.--Numerous documents were prepared for the Washington Office to answer requests for information from the Bureau of Outdoor Recreation and other Federal and State Agencies.

SUPPORTED BY U.S. Dept. of Agriculture

1.0126, A PROGRAM FOR THE CONTINUING ACCUMULATION & MANAGEMENT OF NATIONAL FOREST RECREATION INFORMATION FOR PURPOSE OF RESOURCE MANAGEMENT & RES

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802

Provide for the collection, storage, analysis, and retrieval of a wide variety of data on all recreation sites and areas of the National Forest System, including both their biological and physical characteristics and condition, and the volume and kinds of use they support. Continuing.

SUPPORTED BY U.S. Dept. of Agriculture

1.0127, PILOT TEST OF SAMPLING PROCEDURES FOR ESTIMATING USE ON WILDERNESS-TYPE AREAS

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802

Pilot test a sampling plan for estimating amounts, types, timing, and location of dispersed recreation use that occurs in wil-

derness. The technique is designed to yield use estimates that can be revised annually, based on one or more related indicators of use (predictor variables). A 1968 test was conducted on the Mission Mountains Primitive Area in Forest Service Region 1. A revised sampling model, incorporating use of electric-eye counters on all trails, is being conducted during 1969 on the San Geronio Wilderness area in Forest Service Region 5. Scheduled for completion in 1970.

SUPPORTED BY U.S. Dept. of Agriculture

1.0128, PILOT TEST OF SAMPLING PROCEDURES FOR ESTIMATING MASS AND DISPERSED TYPES OF RECREATION USE ON AN ENTIRE NATIONAL FOREST

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802

The primary objective is to pilot test a sampling plan for estimating dispersed types of recreation use of the Teton National Forest, Wyoming; a Forest consisting of four Ranger Districts. The method is designed to yield use estimates that can be revised (updated) annually, based on an easily obtained use indicator. Scheduled for completion in 1972.

SUPPORTED BY U.S. Dept. of Agriculture

1.0129, PILOT TEST OF SAMPLING PROCEDURES FOR ESTIMATING RECREATION USE OF LARGE BODIES OF WATER

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802

To pilot test a sampling plan for estimating recreation use which occurs on bodies of water of such size and shape that air observation is needed to obtain information on which use estimates can be based. The method is designed to yield use estimates that can be revised (updated) annually, based on an easily obtained indicator of use such as traffic-flow pattern.

A pilot study was successfully completed during 1968 on two lakes in eastern Oregon. Two demonstration tests of the sampling technique are being conducted during 1969 on the Allegheny Reservoir in Pennsylvania and on the Watauga Reservoir in Tennessee. Scheduled for completion in 1969.

SUPPORTED BY U.S. Dept. of Agriculture

1.0130, A STUDY OF UNDERSTORY VEGETATION RESPONSE TO SEVERAL LEVELS OF OVERWOOD DENSITY REDUCTION

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802

To determine relations between timing and intensity of overstory density reduction, controlled mass recreation use, and the response of understory vegetation on a developed recreation site in the Southern Appalachians. Scheduled for completion in 1971.

SUPPORTED BY U.S. Dept. of Agriculture

1.0131, A STUDY TO DETERMINE WHICH NATIVE AND INTRODUCED UNDERSTORY TAXA ARE BEST SUITED FOR PLANTING ON DEVELOPED RECREATION SITES

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802

To determine which native and introduced understory taxa (grasses, shrubs, and trees) are best suited for planting on heavily used, developed recreation sites in the Southern Appalachians, as affected by timing and intensity of overstory density reduction and controlled mass recreation use.

SUPPORTED BY U.S. Dept. of Agriculture

1.0132, A STUDY OF THE EFFECTS OF FLUORIDE, AN IMPORTANT AIR POLLUTANT, ON THE RESPIRATION OF COMMON FOREST TREES OF NORTH CAROLINA

R.L. BARNES, Duke University, Graduate School, Durham, North Carolina 27706

1. RESOURCES

Techniques are being developed to measure respiratory responses (both photo- and dark-respiration) of leaf tissues to fluoride. A number of native trees will then be screened for sensitivity to fluorides as indicated by respiratory responses. Species which are most responsive to fluoride will be selected for more detailed biochemical studies of respiratory pathways.

SUPPORTED BY North Carolina State Government

1.0133, BIOCHEMISTRY OF OZONE INJURY TO PINES R.L. BARNES, Duke University, Graduate School, Durham, North Carolina 27706

The broad objective of my research project is to study the effects of ozone on the metabolism of two important pine species--white pine (*Pinus strobus* L.) and loblolly pine (*P. taeda* L.). Emphasis will be on (1) basic physiological and biochemical responses to ozone exposures under controlled environmental conditions, and correlations of these responses with visible injury symptoms; and (2) the effects of controlled environmental preconditioning on sensitivity to ozone.

Two possible applications of such fundamental information will also be explored: (1) The use of biochemical and physiological knowledge to improve the usefulness of pines as bio-indicators of ozone as an air pollutant in the fields. (2) The improvement of methods of handling and testing tree materials in controlled-exposure investigations.

Project was started in fiscal 1968 and should be completed in 1971.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - P.H.S.

1.0134, USE OF SELECTED RECREATION AREAS IN THE UNITED STATES - A CARTOGRAPHIC STUDY H.D. STILLWELL, East Carolina University, Graduate School, Greenville, North Carolina 27835

There is a need for geographical appraisal of recreational land use. Otherwise, the areal impact of growing recreational activity cannot be fully appreciated. It is the purpose of this proposal to compile information as to the visitation at all major recreation areas in the United States, and to present it in a cartographic form (scale 1:3,000,000). Changing use trends will be indicated where possible. Thus an areal analysis of recreation may offer some guide to future planning.

SUPPORTED BY No Formal Support Reported

1.0135, INSECT PESTS ON AMERICAN BEACH GRASS AND THEIR CONTROL

W.V. CAMPBELL, Univ. of North Carolina, Graduate School, Raleigh - N.C. State Univ., North Carolina 27600

American Beach grass, *Ammophila breviligulata*, planted on the North Carolina Outer Banks to reduce wind erosion and aid in dune stabilization is attacked by a scale insect *Eriococcus caroliniae* Williams n. sp. Beach grass was killed by the scale in heavily scale-infested areas of Cape Hatteras National Seashore. Investigations of the biology, distribution, and control of this soft scale was initiated in 1967.

Eriococcus caroliniae was found widely distributed on the North Carolina Outer Banks. Three areas of the Outer Banks were heavily infested.

The scale overwinters as an egg in the felted ovisac. There are two generations a year. The first generation larvae reach a peak in May and the second generation peak occurs in August.

Since the scale infestation is located in a recreational and wildlife area only the safer insecticides were selected for experimental control. Among the insecticides tested dimethoate, Dibrom, and malathion were the most effective. Dimethoate was the most effective insecticide; in fact, it was four times more effective than Dibrom or malathion. Summer oil was ineffective. The project was initiated in 1967 and will terminate in 1970.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0136, DEVELOPMENT OF A SYSTEM OF DETERMINING THE CAPACITY OF WATER RESOURCES TO SUP-

PORT VARIOUS TYPES AND COMBINATIONS OF RECREATION USE

R.A. CRYSDALE, Univ. of North Carolina, Graduate School, Raleigh - N.C. State Univ., North Carolina 27600

The general purpose of the proposed research is to formulate concepts and practical methodology for estimating or predicting the volume of recreation use which can be properly supported by various types of water bodies in the state of North Carolina. More specifically, it is proposed to: 1. Define the statistical population and develop parametric descriptions of component elements and groups. 2. Establish criteria based on observable or predictable characteristics of typical population elements, or groups of elements, as a basis for recognizing the degree to which significant characteristics and attributes are present. a. Minimize the effect of subjective reasoning through a dichotomous sequence of alternative/consequence decisions. b. Express the effect of decisions in numerical terms to facilitate comparison of typical sets of circumstances and combinations of characteristics. 3. Develop a simple appraisal technique which will yield a quantified estimate of the capacity of any individual waterbody under a specified set of conditions and management assumptions. Validate methodology in typical situations. Express capacity in meaningful units of time, area, and patron presence. Interim reports available from Mr. Gordon A. Hammon, Dept. of Recreation Resources Administration, Field House 103, North Carolina State University, Raleigh, North Carolina 27607.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0137, CONTRIBUTION OF VARIOUS QUALITATIVE FACTORS TO RECREATIONAL VALUE OF SOUTHERN APPALACHIAN TROUT FISHERY (ABBREV)

D.R. TALHELM, Univ. of North Carolina, Graduate School, Raleigh - N.C. State Univ., North Carolina 27600

To determine the overall value of part of the Southern Appalachian trout fishery to fishermen, and to determine the relative contributions of various qualitative aspects of the resource to its overall value. Scheduled for completion in 1970.

SUPPORTED BY U.S. Dept. of Agriculture

1.0138, ECOLOGY OF SAND DUNES IN RELATIONSHIP TO THEIR STABILIZATION

W.W. WOODHOUSE, Univ. of North Carolina, School of Agriculture, Raleigh - N.C. State Univ., North Carolina 27600

Study adaptation, propagation and fertilization of dune plants, use of dune plants in growing and shaping dunes, development of superior varieties of dune plants.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0139, STATE OUTDOOR RECREATION PLAN

C. SEIBEL, State Outdoor Rec. Agcy., Bismarck, North Dakota 58501

The Plan is based on series of continuing background papers, each to be updated and revised to meet specific scheduling. Each deals with a specific phase or element of comprehensive statewide outdoor recreation planning. Subjects, and relation to water resource planning include: The Regional Setting - comparison of water availability in North Dakota and surrounding states and provinces; Resources - quantity, quality of the state's water resources; Land Use - extent of water resources, potential future extent; Participation and Preferences (Demand) - amount of water area, access, quality, etc., needed for outdoor recreation activities including swimming, boating, water skiing, fishing, aesthetics, etc.; Present Recreation Opportunities - intensively managed fishing lakes, developments of recreation on existing water areas, quality indices applied to supply data; Standards of Capacity and Seasonal Use - amount of water areas, quality of experiences, needed to sustain use; Outdoor Recreation Needs - mathematical comparison of supply, standards and demand; Responsibilities - legal implications of programs related to outdoor recreation including PL 89-72; Plans of Others - proposed developments of water resources for recreation and related uses; Game and Fish in North Dakota - suitability of various sizes of im-

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poundments, lakes, streams, for fish habitat and wildlife propagation; Outdoor Recreation in North Dakota (condensed version of plan) summary of data on water resources and other matters; Impact of Garrison Diversion on Outdoor Recreation in North Dakota - a study of recreation and reclamation; Recreation for North Dakota's Disadvantaged Persons - how water resources can provide recreation for the handicapped; The Lewis and Clark Trail - a special area study of the Trail route and its relation to federal reservoirs; The Turtle Mountains - a special area study of the water resources of an outstanding recreation area of North Dakota; Interim Action Program - a comparison of needs for water and land oriented recreation with the potential and financial possibilities of action. In North Dakota's outdoor recreation planning careful attention is paid to all matters relating in anyway to water resources since they are a very vital part of the outdoor recreation picture.

SUPPORTED BY U.S. Dept. of Interior - Bu. Outdoor Rec.

1.0140, EVALUATION OF NATURAL RIVER ENVIRONMENTS

M. MORISAWA, Antioch College, Undergraduate School, Yellow Springs, Ohio 45387

Objective methods for identifying and assessing comparative values of rivers in their natural states will be developed. Biological, geological and esthetic aspects of two wild or natural rivers will be compared with these same qualities in a developed river. Pertinent geological factors will include discharge and stream regimen, channel morphology and composition, soil types and profiles and the relations of these to biotic communities. Biological factors will include community types and compositions and methods of judging successional status. We will attempt to identify relations of geologic and biotic processes that are pertinent to present and future river qualities. Methods and criteria will be organized around the problem of judging over-all value of a river system in relation to human requirements. These criteria will be reported as an aid to agencies concerned with selection and management of rivers for wild, scenic, or recreational status.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0141, INVESTIGATION OF AQUATIC WEED PROBLEMS AND MEANS OF CONTROL WITH EMPHASIS ON BRAZILIAN WATERWEED

C.E. BOND, Oregon State University, School of Agriculture, Corvallis, Oregon 97331

Objectives: 1. To determine means of controlling Brazilian waterweed and other nuisance aquatic plants. 2. To assess impact of control measures on recreational, industrial, and domestic uses of the bodies of water involved.

Progress to date - Preliminary screening tests have been carried out to determine the effectiveness of a number of chemicals against Brazilian waterweed, and secondary tests using some of the more effective have been run at several concentrations. Field tests are underway. Many herbicides have been tested for acute toxicity to fish. Dichlorobenzil and diquat have been investigated for their effects upon pond invertebrates.

SUPPORTED BY Oregon State Government

1.0142, A CLASSIFICATION OF THE LAKES OF THE STATE OF OREGON

J.R. DONALDSON, Oregon State University, School of Agriculture, Corvallis, Oregon 97331

The primary objective of the proposed research is to continue to make an accurate appraisal of the quantity and quality of the lakes of the state of Oregon in order to document for posterity the existing conditions and to serve as an aid to the present and future water use manipulations.

The specific project objectives are as follows: (1) Assemble information presently available concerning the lakes of Oregon. (2) Continue to sample selected lakes by differing geological areas and/or drainage basins in order to accumulate limnological data essential for a statewide classification. (3) Set up a format for recording and processing the collected information with the

eventual purpose of making the results available in published form.

The field work involves the collection of information on the morphological features, thermal and optical properties, major chemical features (dissolved oxygen, pH, alkalinity, major cations, total solids and specific conductivity) and the qualitative and quantitative aspects of the biota of each lake visited.

An intensive study of four oligotrophic lakes (Crater, Woahink, Odell and Waldo) was begun in June, 1968. Routine limnological and basin environmental data is being assembled and compared. Phytoplankton primary production is being estimated for each lake employing the Carbon-14 in situ technique. During the summer and autumn of 1969, nutrient limiting factors relative to phytoplankton will be evaluated using an in situ bioassay technique. Hopefully, this research will provide a more precise set of criteria for describing oligotrophic lakes and predicting the future of lakes in general.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0143, TOCKS ISLAND REGIONAL-INTERSTATE SOLID WASTE MANAGEMENT STUDY

F.W. DRESSLER, Tocks Isl. Reg. Advisory Council, Stroudsburg, Pennsylvania 18360

1. Project Objectives - The specific objectives of the solid waste study project are: A. To determine the full magnitude of the solid waste disposal problem, both now and in the future. B. To determine the present pattern of solid waste service and facilities presently provided in the area. C. To study those disposal methods and collection procedures which are applicable to serve the area. D. To determine the legislative requirements with regard to solid waste activities in the area. E. To investigate the feasibility of developing a mathematical model which may formalize the structural relationships which exist between solid waste generators, disposal methods and service areas. F. To standardize the criteria for the evaluation of various solid waste disposal possibilities. G. To develop alternate solid waste disposal plans suitable for meeting the needs of the area. H. To develop an implementation program including cost and financing figures. I. To establish a continuing solid waste program which TIRAC can undertake in the future.

Project started July 1, 1967 - completed July 1, 1969.

SUPPORTED BY U.S. Dept. of Hlth Ed. & Wel. - P.H.S.

1.0144, SOME EFFECTS OF LAND USE ALONG PINE CREEK, PENNA.

P.W. FLETCHER, Penn. State University, School of Agriculture, University Park, Pennsylvania 16802

Objectives: Determine: 1. Watershed's historical changes. 2. Flood plains's recent changes. 3. Nature, source, degree and extent of stream quality deterioration. 4. Flood plain's capability of providing potable water while accepting sewage wastes. 5. Views of creek-front property owners on valley objectives, goals.

Procedures: 1. Trace watershed resource changes from historical records and interviews. 2. Trace recent flood plain changes from surveys of aerial photos and buildings. 3. Collect and analyze water quality samples periodically along the main stem and on major tributaries. 4. Measure water percolation rates and sewage effluent movement in stream bank soils. 5. Conduct and analyze an opinionnaire, both mail and personal interview.

All field work will be performed on the watershed in north-central Pennsylvania.

The project is scheduled to start 1 July 1969 and terminate 30 June 1973.

SUPPORTED BY Pennsylvania State University

1.0145, STREAM POLLUTION AND RECREATION

H.B. GAMBLE, Penn. State University, Inst. For Res. on Land & Water, University Park, Pennsylvania 16802

The basic hypothesis in the proposed research is that there is a negative correlation between the degree of pollution and the intensity of recreational use of streams. The major objective is to examine a number of streams in Pennsylvania in order to derive

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estimates of one of the social costs of pollution - that of recreational development and use foregone.

Field investigations will include the selection of a number of streams or stretches of streams throughout Pennsylvania showing varying degrees of recreational use. Variables other than pollution which affect recreational use and development along any given stream will have to be accounted for. A detailed study of the degree and kinds of pollution will be made, and will involve physical and chemical testing of the waters as well as development and application of schematic scaling techniques for the aesthetic and nonbiochemical qualities of the water and environs. Detailed data will be gathered through field interviewing as to the amount and kinds of expenditures by recreational users of streams.

Regression analysis will be the statistical tool employed to describe the relationship between direct and indirect expenditures from recreationists and kind of stream pollution and the control factors.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0146, REDUCTION IN DAMAGES TO FOREST RESOURCES BY IMPROVEMENT OF STRIP-MINING METHODS AND REHABILITATION MEASURES

G. DAVIS, U.S. Dept. of Agriculture, N.E. Forest & Range Expt. Sta., Upper Darby, Pennsylvania 19082

Strip-mining disturbs extensive areas in the Appalachian Mountains and creates problems of runoff and erosion until stabilized and revegetated by proper reclamation measures. Weeping lovegrass provides the best initial cover on extremely acid spoils. Spoil pH may be used to predict manganese toxicity in legumes planted on strip-mined lands. Liming is essential to the establishment of crownvetch on coal breaker refuse.

Chemical pollutants in streamflow increase but suspended sediments decrease six months after mining a watershed. Load bearing strength of coal haul roads can be improved by the addition of asphalt compounds. Spoil slides are more likely to occur in the valleys and on steeper slopes in contour strip-mining.

Additional studies are underway which are aimed at evaluating various spoil treatment on runoff and erosion reduction from strip mined areas. Further research is being carried out in the evaluation of various grasses, shrubs, and tree species in conjunction with site preparation and fertilization. Aerial application of seed and fertilizer is being studied.

The actual studies are being carried out at Berea, Kentucky; Princeton, West Virginia; and Kingston, Pennsylvania.

The project was started in 1963 with various studies being initiated and others completed at various times. No completion date has been set for the project as a whole.

SUPPORTED BY U.S. Dept. of Agriculture

1.0147, MIGRATORY HABITS OF LARGE SHARKS

J.G. CASEY, U.S. Dept. of Interior, Marine Game Fish Research Lab., Narragansett, Rhode Island 02882

To determine the migratory patterns of sharks occurring in North Atlantic coastal waters from Maine to North Carolina.

The plan of work is to: (1) tag sharks in the course of longline fishing operations conducted by the Sandy Hook Marine Laboratory under an additional shark study project; (2) supply tagging materials and instructions to cooperating sportsmen and sporting clubs who have volunteered assistance; (3) continue tagging through October, 1966, at which time tag return data will be collected and analyzed.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0148, AGE DETERMINATION OF LARGE ATLANTIC SHARKS

J.G. CASEY, U.S. Dept. of Interior, Marine Game Fish Research Lab., Narragansett, Rhode Island 02882

Sample sharks from southern New England to North Carolina. Collect vertebrae that represent full ranges of sizes, section vertebrae to treat for microscopic examination; interpret year marks using standard techniques of age determination; prepare growth curves for *Carcharhinus milberti*, *C. obscurus*,

Carcharias taurus, *Carcharodon carcharias*, *Prio race glauca*, and *Sphyrna zygaena*.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0149, DISTRIBUTION OF SHARKS IN NEW YORK-NEW JERSEY STUDY AREA

J.G. CASEY, U.S. Dept. of Interior, Sandy Hook Marine Lab., Highlands, New Jersey 07732

Systematically fish for sharks in a circumscribed area in the Middle Atlantic Bight, using standard gear to estimate annual changes in relative abundance and to determine the species composition, distribution, seasons of occurrence, food and reproductive habits of sharks in this region.

The plan of work is to sample with longline fishing gear and gill nets for two-hour intervals at selected stations in a 200-square-mile study area in New York-New Jersey coastal waters. These operations include three daily cruises per week from May to October. Maintain records of quantities and species caught and for each specimen length, sex, and state of maturity.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0150, SYSTEMATICS OF ATLANTIC SHARKS

J.G. CASEY, U.S. Dept. of Interior, Sandy Hook Marine Lab., Highlands, New Jersey 07732

The taxonomy of sharks remains unsettled largely because descriptive accounts by early systematics were often brief, emphasizing features which were not truly diagnostic, sometimes based on badly preserved museum specimens and usually not recognizing anatomical differences between young and adults. To strengthen the description of currently recognized species and to determine the taxonomic position of other species which cannot be accurately classified from existing data, it is necessary to make detailed morphometric measurements and internal examinations on a large number of specimens. The objective of this project is to gather this information.

The plan of work is to measure 30 anatomical features on all specimens collected; collect samples of jaws, vertebral columns, skulls, skin and fins; analyze measurements and examine anatomical features for differences which can be used in classifying species.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0151, THE IMPACT OF IMPOSING A WATER QUALITY STANDARD ON A LIVE STREAM

J.N. DORNBUSH, South Dakota State University, School of Engineering, Brookings, South Dakota 57007

This proposed study involves an evaluation of the impact of imposing quality standards on a stream which is presently being considered for multipurpose development through reservoir construction.

Water resources development frequently requires long-range decisions involving huge expenditures; however, these decisions are often made without complete consideration of existing information. It is the purpose of this study to appraise information for decision-making regarding beneficial uses including flood control, recreation, irrigation, fish propagation and quality control.

The approach will be to evaluate statistically existing information in order to relate the proposed quality requirements to the projected uses. The case study will consider the interrelationships of existing and projected stream quality, the frequency of low stream flows, the pollution abatement requirements, the effect of river impoundment and the need for flow augmentation.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0152, TRAIL PAVEMENT SECTIONS - WAITEMATA COUNTY

F.G. JONES, Waitemata County Council, New Zealand

Eight alternative pavement types each of 330 feet are being constructed as part of a seven mile reconstruction contract on a country road which will carry recreational traffic of up to 10,000 vehicles per day. Performance of local materials is to be deter-

1. RESOURCES

mined. The alternatives include untreated high quality base course, cement treated and bitumen treated local aggregate, use of medium quality local aggregate as subbase, and lime stabilization of the insitu subgrade clays. (IRF)

SUPPORTED BY New Zealand Government

1.0153, THE RECREATION RESOURCES OF LARGE PRIVATE FOREST OWNERSHIPS IN TENNESSEE K.F. SCHILL, Univ. of Tennessee, Agricultural Experiment Sta., Knoxville, Tennessee 37916

Objectives: 1. To determine the recreation resources of large private forest ownerships in Tennessee. 2. To identify the problems associated with utilizing these resources. 3. To formulate solutions to these problems to facilitate utilization of the recreation resources.

Procedures: 1. A list of large (5000-acres minimum) forest ownerships will be compiled. The owner or manager of each ownership will be personally interviewed to obtain study data about the recreation resources on his land. 2. The problems of developing recreation on the forest ownerships will be identified. 3. Correlation analysis will be used to test for relationships between problems of development and the various characteristics of ownerships and government policies.

Scheduled completion date: September 1969.

SUPPORTED BY U.S. Dept. of Agriculture

1.0154, CREEL SURVEY

J.D. LITTLE, State Game & Fish Commission, Nashville, Tennessee 37203

Objectives: The major objective of this project is to determine the most efficient and economical ways to establish a trout population and fishery in a two-story reservoir. The success of the fishery is measured by sampling the sport fishing catch and determining the following: a. Total catch, b. Fishing pressure, c. Fishing success, d. Percent returns of stocked trout, e. Economic value of the fishery.

Procedure: Up to one million rainbow trout will be stocked in Dale Hollow Reservoir annually for five years, if available. All fish will be marked; fishing pressure, total catch, fishing success, percent return of stocked trout, and the economic value of the fishery will be estimated by using a creel survey designed by Dr. Don Hayne, Institute of Statistics, North Carolina State University, and biologists of the Tennessee Game and Fish Commission.

Three creel clerks work five days each week. The lake is divided into three major areas with a clerk assigned to each. Each area is subdivided into three sub-areas. One sub-area in each area is sampled every work day.

The work day is from one-half hour before sunrise to one-half hour after sunset, and is divided into two periods with 12:00 noon separating the periods, except when on Daylight Savings Time, when the break is at 1:00 P.M. Each clerk works one period per day.

There are three possible times during each period that a fisherman count can be made. A progressive count is used and each count time requires approximately two hours. The clerk makes a fisherman count during one of the count times each day, and spends the remaining part of the time interviewing fishermen in the selected sub-area collecting data on catch and percent return of stocked trout.

Each sub-area fishing pressure count is expanded each day giving total weekly fishing pressure in each major area. Each day's expanded weekly fishing pressure is averaged for that week for total weekly pressure. The total fishing pressure of the major areas is combined each week to give total pressure for that week.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0155, WATERSHED EVALUATION

J.M. STUBBS, State Game & Fish Commission, Nashville, Tennessee 37203

OBJECTIVES: The major objective is to show what effects watershed impoundments, stream snagging, clearing, and channel excavation have on fish populations and water quality. The fol-

lowing data will be collected under each phase: (a) Complete population samples will be taken to evaluate the standing fish population. (b) Bottom fauna studies to evaluate benthic populations. (c) Temperature studies to measure the effects of the impoundments on stream temperatures. (d) General sport creel survey to measure fishing pressure and use. (e) A complete water chemistry study to analyze present water quality.

PROCEDURES: Three collecting stations are set up on Hurricane Creek and one of the major tributary streams (Little Hurricane Creek). Each station consists of at least a one-fourth mile sample section, and the fish population will be estimated by the mark-and-recovery method. The study will be carried out during the summer and fall months. Electro-fishing will be employed as the collecting method.

Quantitative and qualitative benthos samples will be taken at each of the four selected stations, and will be identified to family, and in some cases to Genus. The samples will be taken at least twice, once in the summer and once in the fall during the study period. Samples will be collected with a Surber sampler; identification will be carried out in the spring and winter months.

Three water temperature stations are set up on Hurricane Creek to measure the warming effects of the impoundments. The thermometers will be read and remain in the stream during the summer and fall months. Weather conditions the day before and condition of the water (turbid, clear, etc.) will be noted and recorded.

A complete water chemistry analysis will be collected on the stream at two stations. One sample will be collected in the fall and one in the spring.

A general sport creel survey will be taken by the local Game and Fish Officer. The purpose of a partial creel survey is to get a general idea of how many people are utilizing the creek for fishing purposes, species caught, and catch rate.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0156, POLLUTION STUDIES

G.G. HENDERSON, State Parks & Wildlife Dept., Austin, Texas 78701

Objectives: To determine the source and nature of pollution.

Segment Objectives: General: To investigate instances of pollution affecting specific fish populations and to report findings to the State Water Quality Board when remedial action is needed. Specific: (1) To determine the extent of damage to fish populations. (2) To trace the source of pollution. (3) To determine the nature of the pollution. (4) To report instances of violation and negligence to the State Water Quality Board.

Procedures: Pollution will be investigated through observation of the extent of occurrence of dead fish upstream and downstream. Population sampling will be done with gill nets and/or seines to determine surviving fish species. Water samples will be collected and analyzed. When the source of pollution is discovered, the findings will be reported to the State Water Quality Control Board.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0157, REGION 1-D FISHERIES STUDIES JOB NO. 9 (PROJECT TITLE) PUBLIC LAKE AND STREAM ACCESS AND FACILITIES SURVEY (JOB TITLE)

G.G. HENDERSON, State Parks & Wildlife Dept., Austin, Texas 78701

Objectives: To publish findings of the Public Lake and Stream Access and Facilities Survey conducted in Region 1-D.

Procedures: Both segment completion reports will be checked to insure current application of information.

The reports contain public access sites available to streams and lakes in Region 1-D. Information includes location of launching sites, concessions, picnic facilities, fish species available to fishermen, and availability of gasoline, oil, and groceries.

SUPPORTED BY Texas State Government

1.0158, PUBLIC ACCESS SURVEY

J.E. TOOLE, State Parks & Wildlife Dept., Austin, Texas 78701

1. RESOURCES

Objective: To gather information concerning public access to public waters of Region 3-B.

Procedures: Existing access points to public water have been checked in eight of the twenty-one counties within Region 3-B to determine location, description and available facilities. The remaining counties in Region 3-B will be checked this segment. All data will be compiled for publication.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

1.0159, A MODEL OPTION OF COURSES FOR INSTRUCTION IN WILDLAND RECREATION MANAGEMENT AT THE COLLEGE UNDERGRADUATE LEVEL
K.L. BURY, Texas A & M University System, Graduate School, College Station, Texas 77843

A group of four courses in wildland recreation management are being developed through analysis of educational needs and job priorities as rated by recreation managers on western National Forests. This analysis has been combined with philosophies, theories, and knowledge from general education, recreation, and wildland recreation management as revealed by the literature and by contacts with educators in outdoor recreation. From this has emerged a structure for the subject content of wildland recreation management. Combining all of these, an educational philosophy and preliminary details for a series of four courses have been developed. The study has focused on recreation management on public lands within the multiple-use management context.

A final report was filed with U. S. Office of Education on December 31, 1968; a longer report is expected to appear during 1969 through Texas Agricultural Experiment Station. Interim reports available from Dr. Richard L. Bury, Department of Recreation and Parks, Texas A&M University, College Station, Texas, 77843.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - Off. Ed.

1.0160, THESAURUS OF OUTDOOR RECREATION TERMS
R.L. BURY, Texas A & M University System, Graduate School, College Station, Texas 77843

Develop a list of terms to be used for indexing, classifying, storing, or retrieving information related to outdoor recreation. As of early 1969, the list contained about 2,000 terms arrayed in each of two formats: (1) alphabetical, and (2) classified. The alphabetical arrangement indicates the Broader Term and the Narrower Terms directly related to each of the 2,000 terms. The classified arrangement attempts to place the entire 2,000 terms in an indented list or heirarchical arrangement. A third arrangement is anticipated in the permuted, or rotated, style such as that used in *Urbanec* developed by City University of New York. This project will also develop a standard list of place names for natural and cultural features of the United States.

SUPPORTED BY Texas State Government

1.0161, A STUDY OF THE RELATIONSHIP OF BOATING FACILITIES USE TO LOCAL WEATHER AT DARDANELLE RESERVOIR, ARKANSAS
C.D. DOWELL, Texas A & M University System, Graduate School, College Station, Texas 77843

The purpose of this study is to investigate the relationships between recreational boating for pleasure cruising and a local climate. The research will be performed at four specific boat ramp locations on the Dardanelle Reservoir, Arkansas. Boat launch tabulations will be compared with the following weather records: temperature, wind, precipitation, barometric pressure, relative humidity. A regression analysis technique of least squares with co-variance will be used to determine the weather factors affecting boating facilities use.

SUPPORTED BY Texas A. & M. University System

1.0162, INVESTIGATION AND PREPARATION OF AN ANNOTATED BIBLIOGRAPHY OF RESEARCH STUDY OF NATURAL RESOURCE USE OF THE TEXAS GULF COAST
C.A. GUNN, Texas A & M University System, Graduate School, College Station, Texas 77843

This study is to search and analyze all available studies that pertain to natural resource use of the Texas Gulf Coast. Both ongoing and past (1950 and beyond) research studies are to be investigated. For each, the following data will be documented: title, authors, date of publication, research organization, source of funding, amount of funding, location of publication, research approach, anticipated results or principal findings. By 'resource' is meant the following: water, wildlife, space, location, vegetative cover, topography, soils, minerals, climate, air, cultural, historic, and landscape amenities. By 'use' is meant all land uses, such as residential, manufacturing, transportation, communication, trade, services, tourism, recreation, resource production, extraction, undeveloped land, water.

SUPPORTED BY U.S. National Science Foundation

1.0163, A STUDY OF CONSERVATION AND OUTDOOR EDUCATION PROGRAMS IN SELECTED COLLEGES AND UNIVERSITIES OPERATING OUTDOOR LABORATORIES
J.G. NOEL, Texas A & M University System, Graduate School, College Station, Texas 77843

The purpose of this study is to: determine the nature of the existing conservation and outdoor education programs in the eleven universities operating outdoor laboratories and identified by the National Audubon Society; to investigate the use that is being made of these outdoor laboratories; and to test the eight outdoor educational objectives approved by Raymond Rhead in his investigation of this subject. The basic information will be obtained by questionnaire survey; to eleven institutions operating outdoor laboratories. They will be requested to supply data on: existing conservation and outdoor education programs, use of outdoor laboratories, response to the eight postulates of R. Rhead. This research will begin in 1967 and be completed in 1969.

SUPPORTED BY Texas A. & M. University System

1.0164, AN APPLICATION OF WATER RECREATION CAPACITY STANDARDS TO RESERVOIR DEVELOPMENT PLANNING
G.A. PETERSEN, Texas A & M University System, Graduate School, College Station, Texas 77843

The purpose of this study is to examine the acceptability of using existing capacity standards as a means of determining the numbers, types and locations for facilities, and in establishing management procedures for recreation water use of a reservoir in Texas. This includes: to review capacity standards and methods of formulation used by resource-oriented outdoor recreation agencies; to formulate a set of water capacity standards for application to the site, based on an evaluation of the reservoir site and the standards reviewed; compute capacity figures for various activities; and formulate facility development and management recommendations for the reservoir, based on the figures computed. The application test will be made to Lake Livingston.

SUPPORTED BY Texas A. & M. University System

1.0165, SUBURBAN RECREATION SUBDIVISIONS IN MONTGOMERY COUNTY, TEXAS--A CASE STUDY ANALYSIS
C.E. WATT, Texas A & M University System, Graduate School, College Station, Texas 77843

This study is designed to determine the institutional factors which influence recreation-oriented subdivision developments in Montgomery County, Texas and to identify the relationships between physical land development and population characteristics in a selected recreation-oriented subdivision in this area. The study will survey both resident and non-resident property owners, include interviews with subdivider and subdivision

manager, as well as interviews with key informants of all institutions influencing the subdivision development. Throughout the research, the emphasis will be upon the implications of recreation development within subdivisions.

SUPPORTED BY Texas A. & M. University System

1.0166, A STUDY OF THE GROWTH AND DEVELOPMENT OF MUNICIPAL PARK AND RECREATION DEPARTMENTS AND PROGRAMS IN THE STATE OF TEXAS FROM 1940 TO 1969

J.S. WILLIAMS, Texas A & M University System, Graduate School, College Station, Texas 77843

The main objective of this study is to document, for the first time, the growth of municipal park and recreation departments in the State of Texas. A direct mail questionnaire will be utilized to obtain data from all of the Texas cities having organized recreation and park departments. In addition, a small selection of park operations under unorganized official departments will be investigated. The information sought for each year includes: history of managers, budgets, capital outlay, bond issues, revenues, contributions, numbers and sizes of parks, method of land acquisition, personnel, supervised and unsupervised playgrounds, cemeteries, and projections of growth to 1975. The data will be analyzed to determine trends and will be classified by city size, park size, and management pattern. This project was begun in January, 1969; and will be completed January, 1970.

SUPPORTED BY Texas A. & M. University System

1.0167, FOREST RECREATION POLICIES FOR THE FORESTED REGIONS OF TEXAS

E.F. HASTINGS, Stephen F. Austin State Coll., Graduate School, Nacogdoches, Texas 75962

The primary objectives of this research is to develop and publish a system of policies and guidelines for the development of the forest recreation resources of Texas. Consideration will be given to the inter-relationships of wildlife and the attractions of inland lakes, streams, and reservoirs with forest recreational values. A broader view of the forest resources, including the non-commercial forest types, will be emphasized in this study as the recreational aspects of all forested areas will be considered. Some emphasis will be given to population trends, social changes, and the mobility of people within and throughout the state as they effect, and are affected by outdoor recreational opportunities and needs.

SUPPORTED BY Texas State Government

1.0168, MAINTENANCE AND SURVIVAL OF VEGETATION ON SUNRISE CAMPGROUND, CACHE NATIONAL FOREST

W.G. BEARDSLEY, Utah State University, U.S.D.A. Intermt. For. Sta., Logan, Utah 84321

The growth and volume of vegetation on Sunrise Campground are being related to (1) management treatments (watering, fertilizing, seeding), (2) amounts of visitor use, and (3) such site characteristics as soils data, plant competition, and amount of sunlight. Radial tree growth is measured with a microdendrometer. Ground-cover vegetation and shrubs are measured with a grid on mil-acre plots. Visitor use is estimated for each campsite by a self-registration system. The study was started in F. S. 1964 and is expected to run through F. Y. 1973.

SUPPORTED BY U.S. Dept. of Agriculture

1.0169, IMPROVEMENT AND MAINTENANCE OF CAMPGROUND VEGETATION

R.B. HERRINGTON, U.S. Dept. of Agriculture, Intermt. For. & Rg. Exp. Sta., Ogden, Utah

Object: To test the effectiveness of selected management procedures (watering, fertilizer, trail location, and barriers) in maintaining vegetation in campground situations. Vegetation in heavily used campgrounds frequently is badly depleted. Some deterioration is inevitable in any area trampled by many visitors. The situation is particularly serious in the drier parts of the West.

1. RESOURCES

Procedures: Vegetation will be measured annually on both treated and untreated portions of a test campground in Idaho. Changes in vegetation will be related to amount of visitor use, campground design, treatment, soil characteristics, topography, and amount of tree overstory. A model will be developed by regression techniques to predict vegetation response for specific situations.

SUPPORTED BY U.S. Dept. of Agriculture

1.0170, ANALYSIS OF FACTORS INFLUENCING USE-INTENSITY OF SKI AREAS IN VERMONT

M.I. BEVINS, Univ. of Vermont, Agricultural Experiment Sta., Burlington, Vermont 05401

1. Describe the factors which significantly affect use-intensity of individual ski areas with special reference to location, type, and interrelationship of facilities. 2. Develop a basis of predicting use-intensity under given conditions.

A sample of ski areas in Maine, New Hampshire, Vermont, and Northeastern New York were personally visited and the manager interviewed. Data have been tabulated, transferred to processing cards, and analysis is underway. A factor analysis was done at the Northeast Forest Experiment Station, Syracuse, New York. Preparation of a descriptive analysis is underway at the University of Vermont. Published results should be available late 1969.

SUPPORTED BY Vermont State Government

1.0171, CONTROL OF UNWANTED PLANT GROWTH IN CROPS, FORESTS, WATER, AND RECREATIONAL AREAS

S.W. BINGHAM, Virginia Polytechnic Institute, Agricultural Experiment Sta., Blacksburg, Virginia 24061

OBJECTIVES: (1) To determine selectivity of growth regulators for the removal of unwanted vegetation and to relate environmental, edaphic, biological factors to the performance of such compounds. (2) To develop means of killing cover crops for use in no-tillage crop production and to evaluate the effects of these on soils and on growth of succeeding crops. (3) To devise methods of non-chemical vegetation control.

DESCRIPTION OF WORK: Herbicides and other plant growth regulators will be evaluated for weed control, plant selectivity, effects on crop yields, and for inhibition or stimulatory effects on plants. Combinations of chemicals will be studied for synergistic effects in an effort to reduce the amount of these pesticides necessary for vegetation control. The use of nonpesticide methods of vegetation control, such as flaming, will be evaluated in all major crops in the State. Interim reports are available from Dr. H. B. Couch, Dept. of Plant Pathology and Physiology, Virginia Polytechnic Institute, Blacksburg, Virginia 24061.

SUPPORTED BY Virginia State Government

1.0172, SHORELINE INVESTIGATIONS WITHIN THE CAPE HATTERAS NATIONAL SEASHORE

R. DOLAN, Univ. of Virginia, Coastal Research Associates, Charlottesville, Virginia 22903

This research is designed to answer questions concerning the magnitude, variation, and predictability of the processes responsible for shoreline dynamics within the Cape Hatteras National Seashore Area. Specifically, the major topics of investigation are (1) establishment of shoreline trends (historical) and monitoring of continuing changes, (2) the behavior of beach nourishment, and (3) general investigation of shoreline processes. The most important progress to date includes: 1. The role of sand wave migration in shoreline dynamics and engineering planning. 2. The historical, seasonal, and short-term trends in shoreline variation near Cape Hatteras. 3. Relationships between rates of shoreline recession and beach sediment characteristics. 4. And, documentation of the frequency and magnitude of destructive extra-tropical storms ('northeasters'), including investigations of wave forces and storm surges within the North Carolina sounds. 5. Scheduled for completion in 1971; Interim reports are available.

1. RESOURCES

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

1.0173, WILDERNESS RECREATION INTERPRETATION
J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To develop an interpretive booklet for the Glacier Peak Wilderness that will serve as a management tool to help raise the quality of available wilderness experience, disperse use to little used portions of the wilderness and communicate proper wilderness behavior to others.

SUPPORTED BY U.S. Dept. of Agriculture

1.0174, A TYPOLOGY OF CONSERVATION ORGANIZATIONS AND OUTDOOR CLUBS
J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To prepare an inventory of all conservation groups and outdoor clubs in the Pacific Northwest and index these clubs on the basis of their location, activities, extent of membership, historical development and objectives.

SUPPORTED BY U.S. Dept. of Agriculture

1.0175, A GLOSSARY OF RECREATION TERMS
J.A. TORNEY, Univ. of Washington, Graduate School, Seattle, Washington 98122

The purpose of the project is seek the agreement of professional recreators and physical educators upon definitions of recreation terms.

The sub-problems are: 1. To establish the terms to be defined. 2. To arrive at acceptable definitions of the selected terms.

The method of obtaining data for the solution of the first sub-problem has been by the tabulation of terms appearing in newspapers of the selected State of Washington, researching of publications of the Bureau of Outdoor Recreation. A list of the terms has been compiled and submitted to selected recreators and physical educators to obtain recommendations for inclusion or exclusion in the proposed glossary.

Solution of the second sub-problem will be undertaken when the list of terms is refined. To a reproduction of the definitions appearing in the 'Glossary of Recreation Terms' compiled by the North Carolina Recreation Commission will be added other options in definitions.

The present intent is to submit the definition options to a selected panel of experts for acceptance, proposals for modification or rejection.

The study was initiated September 10, 1967. The estimated date of completion is May, 1970.

SUPPORTED BY Washington State Government

1.0176, FACETS OF PUBLIC RECREATION
J.A. TORNEY, Univ. of Washington, Graduate School, Seattle, Washington 98122

The purpose of the project was to determine the scope of recreation in the State of Washington.

During the 40th session (Spring 1967) of the Washington State Legislature, House Resolution 67-82 created an Interim Committee of the Legislature with the charge 'to make a study of all facets of public recreation.' The Committee requested the Washington Association for Health, Physical Education and Recreation to sponsor a study and report findings, and the President of the Association appoint a committee to undertake the task. The Northwest Association and the American Association approved the project outline and joined the Washington Association in funding the study.

The sources of the data were newspapers published in the State, professional recreators and educators in the State and pertinent publications from other sections in the nation. The data were categorized in fourteen facets: Value, Type, Financial, Conflict, Legal, Government Administrative, Citizen Advisory, Voluntary Agency, Private, Commercial, Environmental, Educational-Professional, Activity, and Community Promotion.

The study was initiated September 10, 1967. The findings of the study were printed and submitted to the Interim Committee of the Washington State Legislature, March 25, 1969.

SUPPORTED BY Washington State Government

1.0177, EVALUATING THE EFFECTIVENESS OF INTERPRETIVE FACILITIES AT OUTDOOR RECREATION AREAS

J.A. WAGAR, Univ. of Washington, U.S.D.A. Pac. N.W. For. Sta., Seattle, Washington 98105

For a number of existing interpretive facilities, this study examines the effectiveness of various components and procedures. Effectiveness is defined in terms of stimulating visitor interest and conveying information. The study was started in FY 1969 and is scheduled for completion in FY 1971.

SUPPORTED BY U.S. Dept. of Agriculture

1.0178, INVENTORYING VISUAL IMPACTS ON FORESTS AND RELATED RECREATION ENVIRONMENTS
J.A. WAGAR, Univ. of Washington, U.S.D.A. Pac. N.W. For. Sta., Seattle, Washington 98105

This study tests procedures for inventorying scars that blight the visual environment through which visitors pass. Aerial photographs are being used in conjunction with on-the-ground data collection. The study was started in FY 1968 and is scheduled for completion in FY 1970.

SUPPORTED BY U.S. Dept. of Agriculture

1.0179, MANIPULATION OF RESERVOIR WATER FOR IMPROVED QUALITY AND FISH POPULATION RESPONSE
T.L. WIRTH, State Div. of Conservation, Madison, Wisconsin 53701

The number of small recreation reservoirs (50-200 acres) in Wisconsin's lakeless region is rapidly increasing. The formation of these impoundments alters the downstream channel while the fertility of the region causes the reservoirs to become highly eutrophic with limited aesthetic value due to aquatic nuisances. Recreational angling in the reservoirs appears to be depressed due mainly to intense algal growths and adverse aquatic environments (anerobic hypolimnion) which limit fish production in the steep-sided basins. Different management techniques are being applied to two in-line reservoirs. The downstream impoundment, which first filled in May 1967, is equipped with an outlet structure which continuously discharges hypolimnion water.

The upstream impoundment discharges epilimnion water and is being continually mixed to prevent thermal stratification. Quantity and quality (temperature, pH, D. O., transparency, major nutrients, and elements) of the inflow, and impounded waters are being measured throughout the year. Fish production and harvest are measured through techniques of population estimates, growth rates, age distribution, and angler's catch for comparison to previously measured levels. Invertebrate species composition and relative abundance are being measured in both of the impoundments and in the stream below the lower reservoir to ascertain changes brought about by manipulation. Aquatic vegetation changes are also being noted in the stream below.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

1.0180, PROJECTING RECREATION DEMAND IN THE NORTH CENTRAL UNITED STATES
W.R. BENTLEY, Univ. of Wisconsin, School of Agriculture, Madison, Wisconsin

Public and private providers of recreation opportunities require projections of recreation demand in order to plan facilities and areas to meet that demand. This study will provide a method for making demand projections on a regional basis.

SUPPORTED BY U.S. Dept. of Agriculture

1.0181, TECHNIQUES FOR ESTIMATING RECREATION DEMAND

W.R. BENTLEY, Univ. of Wisconsin, Graduate School, *Madison, Wisconsin*

The Wisconsin Department of Natural Resources is responsible for writing a state outdoor recreation plan which will qualify Wisconsin for Land and Water Conservation Funds. Projections of outdoor recreation demand are required in the plan. This study will provide recommendations of appropriate projection procedures. It will include writing of any necessary questionnaires, providing the sampling scheme, and providing a computer program to analyze the data and make the projections. To determine appropriate projection techniques it will be necessary to first study the outdoor recreation planning process to decide for which activities projections are required and by activity what unit is the relevant measure of demand.

SUPPORTED BY Wisconsin State Government

1.0182, VALUE OF THE GAME AND FISH RESOURCES IN RELATION TO THE FUTURE UTILIZATION OF THE WATER OF THE GREEN RIVER DRAINAGE IN WYOMING

G.T. BAXTER, Univ. of Wyoming, Graduate School, *Laramie, Wyoming 82071*

The evaluation of the game and fish resources of the Green River, and their potential value under different types of future water utilization, particularly as anticipated under either the Wild Rivers Act or prospective State or Federal developments including irrigation, industrial, trans-basin diversions, etc. This study will be essentially a refined inventory of the Green River, to include lengths of stream, water surface areas, stream classification, fish and game populations, general productivity, land ownership status, review of flow records as they pertain to fisheries, and present utilization of sportsmen. Various aspects of water quality - present and anticipated - will be analyzed. A prediction of the effects of various types of water utilization on the game and fish resources will be made on the basis of the data obtained during the course of the study.

Field work will be undertaken near Pinedale, Wyoming. All other portions of the study will be on the campus of the University of Wyoming.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

2. ECONOMICS

Cost and Return From Production, Distribution and Consumption of Outdoor Recreation

2.0001, WATER QUALITY REQUIREMENTS IN ALASKA CAMPGROUNDS WITH PROJECTIONS OF RECREATION DEMANDS AND BENEFIT/COST ANALYSIS FOR SITE SELECTION

R.S. MURPHY, Univ. of Alaska, School of Engineering, *College, Alaska 99735*

Alaska's outdoor recreation resources represent a major income producing sector of the State. To a large extent its further growth appears restricted by insufficient and inadequate campgrounds. Existing camping facilities have not been examined thoroughly in terms of water quality problems, and the role of water in benefit/cost analysis in evaluating recreation in Alaska barely has been touched. The product of the study would provide important information which would aid directly in the programming of new recreation sites.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

2.0002, FOREST RECREATION DEMAND ANALYSIS

D.A. KING, Univ. of Arizona, Agricultural Experiment Sta., *Tucson, Arizona 85721*

Description of Work Proposed: Subobjective 1: The general theory of demand and, in particular, recreation demand will be examined for its applicability to estimating demand functions for

2. ECONOMICS

motor-boating in an arid environment. Based on this examination, modification of existing methods will be made as necessary. Subobjective 2: The method developed above will be applied. A survey of boatowners will be made to gather necessary information. This will include cost data, socioeconomic characteristics, distribution of use among reservoirs. The data will be used to develop demand functions and derive value estimates. Use distribution data will be used to estimate cross elasticities of demand between reservoirs.

SUPPORTED BY U.S. Dept. of Agriculture

2.0003, ORGAN PIPE CACTUS NATIONAL MONUMENT ECONOMIC STUDY

G.F. LEAMING, Univ. of Arizona, Graduate School, *Tucson, Arizona 85721*

The investigator is studying the economic impact of Organ Pipe Cactus National Monument in southern Arizona with particular emphasis on Pima County, Western Maricopa County, and certain other areas.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

2.0004, ECONOMICS OF MULTIPLE-USE WATER IN ORIGINATING WATERSHEDS IN CENTRAL ARIZONA

W.E. MARTIN, Univ. of Arizona, Water Resources Research Ctr., *Tucson, Arizona 85721*

An operational model will be devised for determination of the economic optimum of joint production of timber, grazing, recreation and outflowing water that might be produced from water supplies available on central Arizona watersheds. The empirical adequacy of the model devised will be tested by applying it to a selected watershed where the economic relations between the products, timber grass and outflowing water will be investigated. The technological relations of complementarity, neutrality and competitiveness between these three water use products will be synthesized from other research and from the experienced judgments of other scientific investigators. Demand functions for timber products, grazing and for outflowing water will be estimated by drawing on other available data and investigations. Having formulated the production possibilities surface and the demand functions for the three products, derivation of the economic optima in the joint production of timber, grazing and outflow the water from the water supply available in the selected watershed becomes a straightforward mathematical (and/or graphic) procedure defined by economic theory.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

2.0005, CAMPGROUND EXPANSION BUDGET ALLOCATION MODEL

G.H. ELSNER, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., *Berkeley, California*

To develop a formal model for allocating campground expansion monies.

SUPPORTED BY U.S. Dept. of Agriculture

2.0006, NONLINEAR CAMPING USE-AXLE COUNT FUNCTION STUDY

G.H. ELSNER, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., *Berkeley, California*

To define the expected mathematical properties of camping-use axle count functions, formulate a function that satisfies these properties, and describe the method of estimation.

SUPPORTED BY U.S. Dept. of Agriculture

2.0007, VISIBLE AREA ALGORITHM STUDY

G.H. ELSNER, U.S. Dept. of Agriculture, Pac. Sw. For. & Rg. Expt. Sta., *Berkeley, California*

To develop and present a computational procedure for solving the forest landscape visual delineation problem.

2. ECONOMICS

SUPPORTED BY U.S. Dept. of Agriculture

2.0008, DEVELOPMENT OF METHODS FOR VALUING WILD RIVERS

G.T. ORLOB, Water Resources Engineers Inc., Walnut Creek, California 94529

The overall objective of this work is to provide a methodology for evaluating the worth of preserving river basins in their wild state, as opposed to developing them to serve traditional economic purposes. Two methods in particular are proposed to be studied: 1) benefits foregone and subjective decision, and 2) nonmonetary benefit expressions. These benefit evaluation methods will be incorporated in the traditional benefit-cost ratio method of analysis for evaluating water resources projects.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

2.0009, THE MANITOBA SKIER MARKET

N. NIXON, Manitoba Dept. of Tour. & Rec., Winnipeg - Manitoba, Canada

The study was designed to indicate the market area of two major ski resorts in the Province of Manitoba. Throughout the 1968-69 skiing season a record was maintained of the licences of all vehicles using the parking lots at the Mt. Agassiz and Falcon Lake Ski Areas. Through the use of a computer program written for the Manitoba Department of Transport it is possible to determine the registered address of each licenced vehicle, in terms of city or town for the rural areas and the postal zone for Metropolitan Winnipeg. Regression analyses were run on the number of visits generated by each town or postal zone, and several variables including: distance to the ski area, the number of persons reporting incomes greater than \$10,000 and greater than \$7,000 the number of persons in professional, technical and managerial occupations, the lift capacity of the ski area divided by the distance to the ski area, and the number of males in the population between the ages of 20 and 34. A report on the study will be available in July, 1969. The study will be continued at several additional areas in the 1969-70 season.

SUPPORTED BY Manitoba Provincial Government

2.0010, TO DETERMINE THE FEASIBILITY OF LEASING AND DEVELOPING SMALL FARM PLOTS FOR PHEASANT PRODUCTION AND HARVEST.

W.D. SNYDER, State Div. of Game Fish & Pks., Denver, Colorado 80203

Objective: To determine the cost per pheasant harvested by leasing and developing small farm plots.

Procedures: 1. Lease concerned plots (non-project). 2. Establish plantings and other developments (non-project). 3. Measure pheasant harvest and hunter use of areas before and after development.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

2.0011, ECONOMIC AND SOCIAL IMPACT OF RECREATION AT RECLAMATION RESERVOIRS

J.G. MILLIKEN, Univ. of Denver, Denver Research Institute, Denver, Colorado 80210

A study of economic and social impacts of recreational usage at selected reservoirs of the Colorado-Big Thompson Project.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

2.0012, DETERMINATION OF ANNUAL GROSS VALUES OF HUNTING AND FISHING

K.C. NOBE, Colorado State University, Graduate School, Fort Collins, Colorado 80521

Objective: Develop data on the gross and net annual contribution of hunting, fishing and general recreation expenditures to the economy of the State of Colorado.

Procedures: 1. All necessary data for an analysis of gross annual hunting and fishing expenditures in Colorado have now been

collected and in part evaluated. 2. A review draft of the findings will be available on or about September 15, 1968 and the final report will be completed prior to August 1969.

Schedule: Second Year of Two Year Study.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

2.0013, ECONOMIC EVALUATION OF THE LAND PURCHASE PROGRAM

K.C. NOBE, Colorado State University, Graduate School, Fort Collins, Colorado 80521

Objective: Assemble and evaluate historical data relative to the Commission's land purchase program and translate these data into statistical measurements of the degree of efficiency in the spending of state funds for purchase of land to develop hunting and fishing areas.

Procedures: 1. Begin an evaluation of the resulting body of data in regard to: a. Probable overall economic impact on former land owners, recreation service industries and local government units. b. Overall effectiveness of the purchase program in meeting increasing demand for recreation areas and facilities. 2. Data available from Job No. 1 will allow correlation of hunting and fishing demand data with historical data on the land purchase pattern of the Commission. Further, availability of a decision making model, (developed in connection with a study of the recreation development process of the U.S. Forest Service in a separate Economics Department study) will allow setting a series of alternative patterns of future purchase. These alternatives will allow ranking of individual parcels of land in response to variation of a number of decision making criteria inserted into the model.

Schedule: Second Year of Two Year Study

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

2.0014, THE POTENTIALS OF COMMERCIAL TOURISM

W. FOTHERGILL, Checchi & Company, Washington, District of Columbia 20006

Objectives and Procedures: The purpose of this study is to set forth the future development potentials for the tourist industry in the Upper Great Lakes Region, develop the basic strategy for realizing these potentials, and make recommendations for action for the realization of this strategy.

Current Developments: Checchi and Company has completed a draft report which is being circulated for review. This report notes that tourism in the Region is based on outstanding natural resources: woods, lakes, fishing, hunting, and a variety of winter sports. Tourist expenditures are a major factor in the economy. In 1967, an estimated 4,780,000 tourists spent about \$350,000,000 in the Region, according to available figures. Numerous tourist facilities exist.

Throughout the Region, however, the tourism industry faces problems. Most facilities are old and obsolete. Per capita tourist expenditures are low. Tourism is mostly on a one-season basis which aggravates problems in financing, labor supply, and profitability.

Tourist facilities in the Region must be made competitive to continue growth. Tourism patterns in the 1970's will be altered by completion of the Interstate Highway system: The Upper Great Lakes Region will be able to draw from a much larger primary market (estimated at 103 million people vs. 37 million now), but, with new highways, traditional markets may be lured to other vacation areas instead.

Three strategies for tourism are proposed to hold present markets and to attract new, higher spending tourists to the Region. They are upgrading existing facilities, planning for year-round tourism on a large scale and establishment of a network of 'star' attractions.

SUPPORTED BY U.S. Dept. of Commerce - Econ. Dev. Adm.

2.0015, A PROGRAM FOR OPTIMIZING TOURIST INDUSTRY AS AN INTEGRAL PART OF ECONOMIC GROWTH IN THE COASTAL PLAINS REGION

E.L. LEWIS, Leisure Systems Incorporated, Washington, District of Columbia 20006

2. ECONOMICS

Objectives and Procedures: The prime objective of the study is the development of a master 'action plan' which is of sufficient scope and depth, and yet is specific enough in detail to spur the implementation of eight or ten new and/or expanded recreation-tourist oriented centers which will result in increased incomes and jobs within the Region. Concomitant with this aim is the encouragement of interest and investment from the private sector - a factor which underlines the necessity for spelling out with what might be called 'hard nosed precision' not only the levels of investment required and the volumes, profits, and return on investment projected for specific projects, but the exposure and risk also.

The procedure will be to: (1) collect, analyze, and correlate data relating to tourism-recreation trends and statistical and historical data of the Region; (2) conduct field research of existing tourist attractions; (3) compare and analyze tourist attractions outside the Region and existing attractions inside the Region in order to gain useful insights in the development of better attractions within the Region; and (4) suggest several short term and long term opportunities for the development of the Region.

SUPPORTED BY U.S. Dept. of Commerce - Econ. Dev. Adm.

2.0016, SCENIC EASEMENTS - LEGAL, ADMINISTRATIVE & VALUATION PROBLEMS & PROCEDURES D.T. SUTTE, Natl. Academy of Sciences, Washington, District of Columbia 20037

Major Objectives: The major objectives of the proposed study are the justifications, documentations, and interpretations of the valuation or appraisal aspects of the Scenic Easement problem as they pertain to scenic, conservation and roadside easements. In addition, the study includes the legal aspects of the program pertaining to interpretations of various documents and laws pertaining to the general scenic easement and conservation fields. An attempt will be made to justify document and interpret the various aspects of scenic easements from partial takings of the fee to entire or plus fee takings.

At the completion of this study a working handbook with the various sample types of real estate appraisals will be published for use in conjunction with state highway programs as well as various conservation agencies. We shall include the techniques used by various states relating to the physical steps to acquire the scenic strips and include methods used by negotiators in the various states as to what would constitute the proper and most practical manner of acquisition.

Pertaining to the legal section of the scenic easement problem we will attempt to explain what type of administrative types of practices are being developed under the existing programs for surveillance and enforcement of the public interest acquired by means of scenic or conservation easements. Conclusions with respect to the advantages and disadvantages of the Scenic Easement and similar less than fee property interests will be shown from the legal viewpoint. The emphasis will be on the various legal problems that may be revealed by the analysis set forth in the general market studying of this area.

Summation: The general study and research pertaining to the legal and valuation section of scenic or conservation easements from the beginning stage through the legal aspects and ramifications.

SUPPORTED BY National Academy of Sciences

2.0017, RECREATION IN THE MARINE ENVIRONMENT A.B. BIGLER, Natl. Planning Association, Washington, District of Columbia 20009

'Recreation in the Marine Environment' is one of 18 research papers in preparation by the Center for Techno-Economic Studies under the heading of New Technology and Government-Business Cooperation in Marine Resources Development. The purpose of this paper is to explore the extent and manner to which resources of the marine environment are used for recreation purposes, and possible ways in which (1) access, preservation and management, (2) new equipment, products and services, and (3) policies for planning and government-business cooperation in recreation could be enhanced through the application of R&D in the marine sciences. Particular attention was given to identifying the areas in

which the application of government sponsored R & D and other institutional measures would provide incentive for private enterprise to meet a greater proportion of the demand for recreation areas and services in the marine environment. Other papers in the oceanics project series closely related to the recreation use of marine resources are 'Shoreline Development' by A.B. Bigler and Clifford Elkins, and 'A Preliminary Review of Alternative Federal Measures in Development,' by M. B. Spangler.

SUPPORTED BY U.S. National Science Foundation

2.0018, DEVELOPMENT OF METHODS FOR ESTIMATING RECREATION DEMAND IN A METROPOLITAN AREA A. SATTERTHWAITE, Planning Foundation of America, Washington, District of Columbia 20005

First, CONRAD will perform a survey of selected literature, focusing on studies concerned with modelling recreation demand. Next, a phase of model design, construction, and operation will commence. The third task will analyze the performance of the models; operate models for urban areas and outline areas for further needed research.

The study will produce a set of flexible demand estimate models and alternative models for estimating demand for recreation facilities in a metropolitan region. The models will have different levels of accuracy and detail in estimating demand to reflect the fact that metropolitan regions have different data bases and resources to spend.

For each model, the resources required to apply the method to a metropolitan region will be specified. A comparison of different methods in terms of advantages and disadvantages will be made. In order to allocate different activities to given geographic supply capacities, the participation distribution model will require a stratification of recreation.

A Joint Committee of the AIP and NRPA will review and coordinate the technical work. The Committee is made up of fifteen nationally known authorities in the fields of recreational and regional planning. Interim reports are available.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

2.0019, TOURISM IN NEW ENGLAND J.M. CARSON, Robert R. Nathan Associates, Washington, District of Columbia 20036

Objectives and Procedures: This study will contribute to a regional over-view within which the States may continue to plan with a better understanding of the magnitude and character of tourist demand, and to the articulation of regional tourist development principles, the adoption of policies, and the implementation of programs.

The study consists of an analysis of market trends, location and specialization of New England's tourist industry from which a regional tourist resource development plan with program and policy implications may be developed.

SUPPORTED BY U.S. Dept. of Commerce - Econ. Dev. Adm.

2.0020, RECREATION AS AN INDUSTRY E. HOLLANDER, Robert R. Nathan Associates, Washington, District of Columbia 20036

Objectives and Procedures: The objective of the study was to evaluate the direct, indirect, and developmental impact of the tourist-recreation industry on a local economy.

Three interrelated efforts were made: a search of available literature; onsite observation and analysis of nine recreation complexes and statistical analysis incorporating the data of input-output tables, available national and regional accounts; and information developed from the literature and field research.

SUPPORTED BY Appalachian Regional Commission

2.0021, MARINE INDUSTRY DEVELOPMENT IN NEW ENGLAND J.R. LEONARD, Robert R. Nathan Associates, Washington, District of Columbia 20036

2. ECONOMICS

Objectives and Procedures: The purpose of this study is to identify the past, present, and potential impacts of marine industries of the New England economy, and the nature and extent of internal adjustments which the industries are undergoing; to describe public policies which will foster the growth of the industries; to establish specific goals and to identify opportunities for public investments designed to supplement private efforts to develop the industries.

The industries to be assessed are: commercial fishing (including fish processing), marine transportation (including boat and shipbuilding), oceanographics, and marine recreation. On the basis of the analysis and projections made in the study, public investment opportunities and goals will be established for each of the major marine industries.

SUPPORTED BY U.S. Dept. of Commerce - Econ. Dev. Adm.

2.0022, APPALACHIAN HIGHLANDS RECREATION STUDY

N. WALP, U.S. Appalachian Reg Comm., Washington, District of Columbia

Objectives and Procedures: The Highlands Area consists of 143 Appalachian counties extending from northern Georgia to southcentral New York. The study will assess the resources in this region and select areas with the greatest market potential for development into major terminal recreation areas. Appropriate policies for recreational investments at the selected sites will be recommended, and an action plan for each area will be developed.

Current Development: Preliminary analysis indicates that 14 sites will be chosen and market studies will be conducted for each area. A General Regional Recreation Plan will also be prepared as an overall program for utilizing the Highlands as a major recreation area in the United States.

SUPPORTED BY U.S. Dept. of Commerce - Econ. Dev. Adm.

2.0023, THE ECONOMIC IMPACT OF RURAL RECREATIONAL ENTERPRISES

R.A. CHRISTIANSEN, U.S. Dept. of Agriculture, Natural Resource Econ. Div., Washington, District of Columbia 20250

Locate and classify private rural recreational enterprises in Wisconsin; assemble and analyze economic information about them relative to their income-producing abilities and possible institutional problems peculiar to recreation enterprises; and evaluate by recreational regions the extent and potential for farmland conversion to private recreational uses and the effect of recreational development on regions of the State.

A sample of recreational business, in Wisconsin, and economic analyses will be made based on information from the sample. The analyses will flow budgeting procedures wherever possible but also will consider input-output factors, allocations of resources between recreation and other uses, problems peculiar to recreation businesses, operator characteristics, problems associated with management, and the factors of demand distribution and enterprise location as they affect opportunities. Research is carried out by a team consisting of ERS and Experiment Station staff.

Progress Report: Several manuscripts on various rural recreation enterprises have been prepared for publication by the cooperator. Three manuscripts entitled, 'Cabin Resort Income in the Near North', 'Some Economic Aspects of the Vacation Farm in Wisconsin' and 'A Study of Retirement in the Resort Areas of Oneida and Vilas Counties, Wisconsin' are now at the printer. Other research report manuscripts containing economic analyses of privately owned campgrounds, fishing enterprises riding stables and shooting preserves are in various stages of clearance for publication. Leadership was provided to graduate students involved on the cooperative recreation project. The investigator served as ERS representative of the Wisconsin Technical Action Panel and the Tri-State Technical Action Panel.

SUPPORTED BY U.S. Dept. of Agriculture

2.0024, ECONOMIC ANALYSIS OF COSTS AND RETURNS TO RECREATION ENTERPRISES IN RURAL AREAS OF APPALACHIA

H. JOHNSON, U.S. Dept. of Agriculture, Natural Resource Econ. Div., Washington, District of Columbia 20250

Locate, enumerate, and classify recreational enterprises in Appalachia; assemble and analyze costs, returns and other economic data by major groups of recreation enterprises; and assess the effects of location, access and institutional constraints on the recreation enterprises.

Results of the 1965 inventory of non-urban outdoor recreation enterprises of the National Association of Soil and Water Conservation Districts will be assembled and analyzed. A subsample will be drawn for a personal interview survey. Inventory and survey data will be supplemented by secondary information in the analysis.

Progress Report: A manuscript of study results has been prepared for technical review and possible publication. The study involved a field survey of five rural recreation enterprises in the Appalachian Region; campgrounds, fishing areas, hunting areas, riding stables and vacation farms. Only 83 usable survey schedules were obtained. Many of the enterprises were found to be small, part time units operating at a loss. There is a serious question whether inferences from the small sample obtained will support valid conclusions for the region being considered.

SUPPORTED BY U.S. Dept. of Agriculture

2.0025, RECREATIONAL USE OF NATURAL RESOURCES

H. JOHNSON, U.S. Dept. of Agriculture, Natural Resource Econ. Div., Washington, District of Columbia 20250 (NRES-2-54-00)

OBJECTIVE: Determine resource characteristics, locational factors, and qualities of management and services required for successful recreation enterprises; analyze competitive and complementary relations in the industry; evaluate alternative opportunities for developing optimum levels of benefits from recreational use of available natural resources; relate recreation demand characteristics to potential resource development; and evaluate both public and private programs for improving the natural beauty of our environment.

APPROACH: Analyses will be made and guidelines developed which will relate present and projected uses of land, water, and associated resources to demands for outdoor recreation and natural beauty experiences. Studies will include determinations of physical resource characteristics, locational factors, and qualities of management and services required for successful recreation enterprises and public resource developments plus user preference and demand analyses for various kinds of recreation and natural beauty experiences. Secondary information sources will be heavily utilized. Development of improved methodology for measurement and analysis will be stressed.

PROGRESS: A brief survey was made of development and management problems associated with increased demands for recreation use of suburban forests, and research needs were specified. Two papers developing economic concepts of incorporating natural beauty into the process of planning, development and management of natural resources were prepared and presented. Two articles were prepared for 1967 Yearbook, Outdoor USA. Considerable staff assistance was provided for related activities. A staff member serves on the USDA Working Party on Outdoor Recreation which functions as a policy staff group and supports participation by the Secretary on the President's Council on Outdoor Recreation and Natural Beauty. A major project of the Working Party was the report of a subcommittee, chaired by the ERS representative, specifying needs for research in support of Department programs for recreation and natural beauty.

SUPPORTED BY U.S. Dept. of Agriculture

2.0026, DEVELOPMENT, STATUS, AND OPERATING METHODS OF RECREATION COOPERATIVES

C.E. REED, U.S. Dept. of Agriculture, New Services Division, Washington, District of Columbia 20250 (FCSA-1-10-14)

OBJECTIVE: Determine development, types, and activities of recreation cooperatives and formulate guidelines for such associations.

APPROACH: Study has two phases: inventory existing recreation cooperatives, and analyze selected ones. In phase one, determine names, addresses, types of ownership, activities provided, and features from secondary sources and recreation specialists in the states. In phase two, selected cooperatives will be studied regarding legal status, membership, financing, bylaw provisions, operating practices, promotional methods, and physical and economic environment.

PROGRESS: No report.

SUPPORTED BY U.S. Dept. of Agriculture

2.0027, ANALYSIS OF LAND USE CONTROL MEASURES

E. SOLBERG, U.S. Dept. of Agriculture, Natural Resource Econ. Div., Washington, District of Columbia 20250

Objectives: Summarize the current status and analyze changes in zoning and other land use regulatory measures, principally those enacted by State and local governments; identify and evaluate the economic effects of land use controls; appraise the role of land use control as a method for implementing resource plans.

Approach: A continuing inventory and classification of all State rural zoning legislation is made to assess the current status and significant innovations in this areas of the law. Selected local zoning ordinances are analyzed for approaches to zoning implementation for particular purposes such as flood plain regulation, conservation zoning, and agricultural zoning. Other types of land use regulatory measures exercised by both general and special purpose governments are studied. Land use regulation and various alternatives are compared in terms of their effect on land use, land values, and other selected offsite economic factors. Studies are made of land use planning situations, and alternative approaches evaluated as to their legal, economic, and administrative feasibility.

SUPPORTED BY U.S. Dept. of Agriculture

2.0028, THE ECONOMIC IMPACT OF RURAL RECREATIONAL ENTERPRISES

S.D. STANFORTH, U.S. Dept. of Agriculture, Forest Service, Washington, District of Columbia

Locate and classify private rural recreational enterprises in Wisconsin; assemble and analyze economic information about them relative to their income-producing abilities and possible institutional problems peculiar to recreation enterprises; and evaluate by recreational regions the extent and potential for farmland conversion to private recreational uses and the effect of recreational development on regions of the State.

A sample of recreational enterprises will be drawn from the inventory of rural private recreational businesses in Wisconsin, economic analyses will be made based on information from the sample. The analyses will follow budgeting procedures wherever possible but also will consider input-output factors, allocations of resources between recreation and other uses, problems peculiar to recreation businesses, operation characteristics, problems associated with management, and the factors of demand distribution and enterprise location as they affect opportunities. Research is carried out by a team consisting of ERS and Experiment Station staff.

Progress Report: Three manuscripts entitled, 'Cabin Resort Income in the Near North,' 'Some Economic Aspects of the Vacation Farm in Wisconsin' and 'A Study of Retirement in the Resort Areas of Oneida and Vilas Counties, Wisconsin' are now at the printer. Other research report manuscripts containing economic analyses of privately owned campgrounds, fishing enterprises, riding stables and shooting preserves are in various stages of clearance for publication.

2. ECONOMICS

A Ph. D. thesis entitled, 'Private Outdoor Recreation in Wisconsin: An Industrial Organization Analysis' has been successfully defended in oral examination and is in the final stage of typing. One or more publications from this material are planned.

SUPPORTED BY U.S. Dept. of Agriculture

2.0029, OPPORTUNITIES FOR PRIVATE CAMPGROUND OPERATIONS IN GEORGIA

E.E. BROWN, Univ. of Georgia, School of Agriculture, Athens, Georgia 30602

(1) To determine the economic potential for developing private overnight campground facilities in Georgia. (a) Determine the types of facilities preferred. (b) Determine the adequacy of existing facilities offered. (c) Determine the demand for sites as measured by occupancy and willingness to pay for individual facilities offered. (d) To estimate the profit potential of setting up additional privately owned campgrounds. (e) Establish guidelines for development of additional facilities.

SUPPORTED BY University of Georgia

2.0030, TOURISM IN NEW ENGLAND

J.M. CARSON, Robert R. Nathan Associates, Chicago, Illinois

Objectives and Procedures: This study will contribute to a regional overview within which the States may continue to plan with a better understanding of the magnitude and character of tourist demand; and to the articulation of regional tourist development principles, the adoption of policies, and the implementation of programs.

Highlights of Findings: States, municipalities, and tourist industries provide facilities in user-oriented areas and intermediate use areas; however, regional effort is required to protect resource-based areas. The report accordingly suggests policies and programs that can contribute to recreation resource development. Some of the key background factors in this regard are the following: (1) the deterioration of natural resources through economic use to the point that open space and land use programs are necessary to provide for recreation, to preserve scenic and historic sites, to protect water sheds, and to provide for natural drainage; (2) as the megalopolis stretches out from the cities, it engulfs the countryside and with it historic landmarks; (3) the arts are a small part of New England's recreational resources, but have a large potential role in increasing the appeal of the region to tourists, as well as to its residents; and (4) the tourist market is a very imperfect market because the customers have limited knowledge with which to make choices. The focus of State recreation planning has shifted from resource-based areas to user-oriented areas, due to the attention being devoted to urgent problems in urban centers. A review of statewide recreation plans reveals the presence of planning and funding efforts with a predominantly short-term emphasis.

SUPPORTED BY U.S. Dept. of Commerce - Econ. Dev. Adm.

2.0031, RECREATIONAL IMPACT OF FEDERAL MULTI-PURPOSE RESERVOIRS

J.S. MATTHIAS, Purdue University, Joint Highway Research Project, Lafayette - West Lafayette, Indiana 47907

This research is a study concerned with the development of a model that can be used to predict recreational trips to new reservoirs in Indiana.

The model developed utilizes only road distance, county population, and the influence of other similar facilities as the parameters affecting attendance. A technique was developed illustrating how the model can be used to predict future attendance and traffic volumes.

Three Parks, Raccoon State Recreation Area on Mansfield Reservoir, Lieber State Park on Cagles Mill Reservoir, and Monroe State Park on Monroe Reservoir were used in the study. Data were collected by conducting interviews of twenty-five percent of arriving trips at the park entrances. Over 13,000 interviews were conducted over a two year period. Yearly distributions of trips by trip purpose and frequency were investigated.

2. ECONOMICS

The prediction model was developed by using non-linear regression analysis to determine the parameters of distance, population and the influence of other parks. Two equations were developed, one for the condition where there is no other park closer to a county than the park under consideration and the other for the condition where there is another park closer to a county than the park under consideration. Together, the two equations constitute the predication model.

Continuing research includes: a) collection of data at the three reservoirs on a reduced sample basis, b) analysis of data on gasoline consumption by motor boats, c) analysis of changes in land use and land value near the reservoirs with time, d) evaluation of travel time versus travel distance as a trip making factor, and e) test the stability of the trip rate models previously developed.

SUPPORTED BY U.S. Dept. of Transportation - Public Rds.

2.0032, ECONOMIC ANALYSIS OF ENVIRONMENTAL QUALITY EFFECTS ASSOCIATED WITH SEASONAL HOMES

D.M. TOBEY, Univ. of Maine, Agricultural Experiment Sta., Orono, Maine 04473

OBJECTIVES: Determine the environmental situations (positive and negative) associated with seasonal homes and analyze the attitudes, interests, and goals of people for a quality seasonal home environment. Evaluate the social and private costs and benefits of identified environmental situations at both the regional and national level. Determine the total potential market for seasonal homes in the Northeast and delineate the effects of environmental factors upon this market.

Approach: Case study method will be used in five selected areas: (1) Lake in organized township in Central Maine (2) Lake in densely populated area in Southern Maine (3) Lake in unorganized township in Northern Maine (4) Community in densely populated coastal area in Southern Maine (5) Community in sparsely populated coastal area in Eastern Maine. For each selected area major factors analyzed will be air, water and scenic pollution. Causes will be related to methods of waste and sewage disposal and effects of unplanned land use. Systems analysis will be used to estimate social costs and benefits generated by environment effects. Benefit: cost ratio will be computed wherever possible.

SUPPORTED BY U.S. Dept. of Agriculture

2.0033, ORGANIZATION AND INPUT-OUTPUT RELATIONSHIPS OF A MULTIPLE ENTERPRISE OUTDOOR RECREATION FIRM

D.M. TOBEY, Univ. of Maine, Agricultural Experiment Sta., Orono, Maine 04473

To determine and analyze the organization of existing privately owned campgrounds and other recreation firms. To design a model of a typical multiple enterprise recreation firm. To simulate a recreation firm with the model and obtain information for decision making.

Description of work: A list of existing private owned transit and vacation campgrounds primarily for York and Cumberland Counties will be compiled. Through personal interviews, information about the investments, costs, returns, organizations, and physical input-output coefficients of selected campgrounds will be obtained. On the basis of the data obtained, a typical multiple enterprise recreation firm model will be designed. The design of the model will enable it to handle all the different questions in connection with economic analysis of a multiple enterprise recreation firm. Recreation firms will then be simulated using this model to get information such as: most efficient use of available land, labor and capital when used for recreation, economics of changing organization of existing firms, returns to scale and economics of combining enterprises. Interim reports are available, scheduled for completion 12-31-69.

SUPPORTED BY U.S. Dept. of Agriculture

2.0034, FEASIBILITY STUDY OF A LAND DEMONSTRATION EXPERIMENT IN EASTERN MAINE

UNKNOWN, Univ. of Maine, Graduate School, Orono, Maine 04473

The study will seek to test whether recreational development can serve as an economic base for the recovery of a depressed rural area and to develop techniques to preserve the amenities of a large recreational region without total public ownership of the land or exclusive dedication of it to parks.

SUPPORTED BY Ford Foundation

2.0035, PRIVATE OUTDOOR RECREATION OPERATIONS AND PUBLIC POLICY IN THE CONNECTICUT VALLEY REGION OF MASSACHUSETTS

J.H. FOSTER, Univ. of Massachusetts, Agricultural Experiment Sta., Amherst, Massachusetts 01003

Objectives: a. To determine the current role of the public and private sectors in the supply of specified outdoor recreation facilities in a region. b. To compare public and private sectors on such characteristics as over-all costs and distribution of costs among groups paying them. c. To suggest criteria for decisions on the respective development of the public and private sectors and to apply these criteria to a region. d. To suggest public policy which will guide the development of the private sector.

Proposed work: Except for some additional data on the public sector, the project will be based on analysis of existing data on the Connecticut Valley Region. For each of the several specified types of recreation facilities, the public and private sectors will be compared on current use, costs, cost distribution, and similar characteristics. Following this analysis and a literature review, criteria for deciding what facilities should be supplied by each sector will be developed and applied to the study region. The project will be completed with development of suggestions for public policy related to the private sector. The services of two graduate assistants will be used. Scheduled for completion August 1969.

SUPPORTED BY U.S. Dept. of Agriculture

2.0036, ECONOMIC STUDY OF CAPE COD NATIONAL SEASHORE, 1968

P.B. HERR, Philip B. Herr & Associates, Boston, Massachusetts 02116

The study is designed to provide factual data concerning the actual economic experiences of the communities of the communities adjacent to Cape Cod National Seashore and to determine the economic impact of the Seashore upon these communities.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

2.0037, INTERACTIONS OF URBAN ACTIVITY AND THE HYDROLOGICAL CYCLE

E. MILLER, Abt Associates, Cambridge, Massachusetts

The proposed research is to: 1. investigate the question of the costs and the benefits of investment in pollution abatement aimed at expanding water recreation facilities, 2. to examine the potentialities of new directions in urban design that are made possible by the availability of waterfront land for other than transportation-oriented activity, 3. to conduct a reconnaissance into the technology of water supply and its alternatives to predict developing patterns of feasibility and highlight important trade-off margins among competing techniques and 5. to examine the industrial, aesthetic, residential, commercial and recreational interaction of an urban estuarial environment. Interim reports are available from: Edward Miller, ABT Associates, 55 Wheeler Street, Cambridge, Mass. 02138.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

2.0038, TRANSPORTATION FOR URBAN RESIDENTS TO PARKS AND OUTDOOR RECREATION FACILITIES

G. KRAFT, Charles River Associates Inc., Cambridge, Massachusetts 02138

2. ECONOMICS

Objective: The primary objective of the study is to investigate the factors which determine the supply of and the demand for recreation and park areas by residents of large cities. One of the specific policy questions to which the findings might apply would be the evaluation of the comparative merit of providing additional parkland and other outdoor recreation facilities in the central city area as opposed to providing suburban recreational facilities, as well as cheaper public transportation to serve these facilities.

Description of Work: Ideally, a demand model would be developed describing the relationship between the use of an outdoor recreation facility and the characteristics of both the user and the facility, the price of recreation and the stock of alternative facilities. The factors to be considered as affecting demand for an outdoor recreation facility include: (1) the socio-economic characteristics of the individual (income, employment status, leisure time, car ownership, family size, type of housing etc.), (2) characteristics of the facility (size, equipment, services, etc.), (3) the cost of using the facility (including both dollar use costs and dollar and time transportation costs, and (4) the availability and characteristics of substitute goods and services. On the supply side, the existing stock of recreational facilities in urban areas will be reviewed, and the costs of providing these facilities will be estimated.

Collection of primary data will not be undertaken, and a complete estimation of the parameters for the model may not be possible with extant data. The limited data available may be useful, at least, for placing bounds on the parameters, and may prove sufficient to undertake the solution to the trade-off mentioned above.

The study was started during fiscal year 1969 and will be completed during fiscal year 1970.

SUPPORTED BY U.S. Dept. of Housing & Urban Development

2.0039, A STUDY OF THE DEMAND FOR INTERNATIONAL TRAVEL TO AND FROM THE U.S.
D. SHERK, Boston College, Graduate School, Chestnut Hill, Massachusetts 02167

The main purpose of the overall study is to estimate the relationships that exist between the demand for travel on a per country basis, both to and from the U. S., and economic, financial and demographic variables using time-series data, primarily, and the least-squares method of multivariate regression analysis. In the investigation of U. S. Travel abroad, no published data is available for the important classification of travel by purpose of trip, i.e., business versus pleasure reasons. (This is, in fact, not the case with travel flows to the U. S. requirements for travel for purposes of business and pleasure.)

In an appendix to the dissertation, the hypothesis of the relationship between U. S. business travel and international business activity. Using the annual questionnaire surveys of the Department of Commerce, Office of Business Economics as the original source, the investigator collected data on business travel as measured by either the number of travelers or the total expenditures (excluding the intercontinental transportation costs) for eighteen European countries. Two separate samples were constructed for 1965 and 1966 and cross sectional analyses performed using total dollar trade and the current value of direct foreign investment as the independent or explanatory variables and the alternative measures of demand with the eighteen countries as observation points. Additional information on the length of stay, the number of countries visited and the mode of transportation are also given in tabular form.

SUPPORTED BY U.S. National Science Foundation

2.0040, BUSINESS TRENDS, ECONOMIC IMPACTS, INVESTMENT AND EMPLOYMENT POTENTIAL OF SKIING IN THE GREAT LAKES REGION
W.A. LEUSCHNER, Univ. of Michigan, Graduate School, Ann Arbor, Michigan

To evaluate the ski industry as an investment opportunity and source of local employment, to identify characteristics of financial success, and to find out how to identify areas of investment potential.

SUPPORTED BY U.S. Dept. of Agriculture

2.0041, FACTORS AFFECTING RECREATION DEVELOPMENT IN THE NORTHERN LAKE STATES REGION
L. POLLNOW, Univ. of Michigan, U.S.D.A. Nat. Resour. Ec. Div., Ann Arbor, Michigan 48104 (NRES-2-23-02)

OBJECTIVE: Analyze the physical conditions, economic and social relationships, institutional environment and other factors affecting local resource development decisions in a small economic area. Assess the potential opportunities for development of profitable and aesthetically pleasing recreation enterprises and services through actions by local people constrained in their options by the above factors.

APPROACH: Criteria will be developed for selection of a viable economic area within which significant decisions affecting recreation development can be made. A case study area will be selected in Upper Peninsula of Michigan or adjoining areas of northern Wisconsin. Significant factors affecting recreation developments will be specified and related to the existing decision making processes. Obstacles to desirable recreation development will be examined and alternative solutions assessed as to feasibility within local decision making constraints.

PROGRESS: The Marquette-Alger area of the Upper Peninsula, Michigan has been selected as a study area. Study papers of relevant factors affecting recreation development were prepared.

SUPPORTED BY U.S. Dept. of Agriculture

2.0042, RECREATIONAL PROGRAMS AND RESOURCES ON INDUSTRIAL FOREST LANDS IN THE WEST CENTRAL UPPER PENINSULA OF MICHIGAN
C.R. CROWTHER, Michigan Technological Univ., Graduate School, Houghton, Michigan 49931

To trace the historical evolution of recreational policies and programs applied by forest land owning firms throughout their existence. To inventory the existing and potential recreational resources and developments relating to industrially owned lands of the area, and similar resources on adjacent lands of other ownership. To compile case histories of recreational developments, including information in improvements, services, costs of development, recreational uses, and fees charged. It is anticipated that information of this nature would prove useful to firms or individuals contemplating similar developments.

SUPPORTED BY U.S. Dept. of Agriculture

2.0043, SUPPLY & DEMAND FOR PUBLIC FOREST RECREATION IN N CENTRAL REG WITH SPECIAL EMPHASIS ON WILDERNESS DEMAND & RECREATION TIMBER INTERRELATIONSHIPS
J.M. HUGHES, Univ. of Minnesota, Graduate School, Saint Paul, Minnesota

Method of Procedure: Visitor origin information is collected for the BWCA by the U.S. Forest Service. It will be necessary to obtain permission to use this information. Assuming permission is granted, the data for the years 1967-1971 will be used for the development of a two-stage model for: (1) predicting total visitor numbers annually and by mode of BWCA travel, and (2) estimating economic demand. Several visitation prediction and economic demand models will be tested including a 'ratio estimate', simple linear regression, multiple regression, and 'Clawson-type' consumer's surplus models.

Timber-recreation interrelationships will be studied in 3 phases. Phase 1 will yield estimates of forest acreages and timber volumes; phase 2, estimates of timber values; phase 3, alternative approaches for minimizing timber opportunity costs. Data will be obtained by questionnaire surveys on a sample basis of all public forest recreation agencies in the North Central Region and by area sampling of selected kinds of activity sites.

Project synthesis will involve summarizing the results of all regional supply and demand studies in such a way as to answer the following questions: (1) How much forest-based recreation is being provided now and at what cost? (2) How much is likely to

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be provided, and at what cost, in the future? (3) How much forest-based recreation could be provided at alternative cost levels? (4) What are the opportunity costs in terms of other major forest resource activities foregone, if any, in the provision of alternative kinds and levels of recreation services?

SUPPORTED BY U.S. Dept. of Agriculture

2.0044, SOME TIMBER OPPORTUNITY COSTS OF RECREATION DEVELOPMENT ON THE SUPERIOR NATIONAL FOREST IN MINNESOTA

J.M. HUGHES, Univ. of Minnesota, Graduate School, Saint Paul, Minnesota

Objectives: 1) Evaluate recreation in terms of timber opportunity costs, 2) Examine applicability of criterion of timber opportunity cost minimization to forest recreation development, 3) Determine relative magnitude of timber opportunity costs as part of total recreation development costs, 4) Determine effectiveness and practicality of using this methodology for a similar larger study.

Methodology: Timber opportunity cost estimates will be based upon acreage figures, volume and species site data, and stumpage value data for recreation sites and zones where timber management practices are modified, and timber opportunity costs exist. Policies and management practices must be determined.

Acreage estimates: Boundaries of sites and zones will be delineated on serial photo overlays. These will be located with assistance from the Isabella staff and use of District compartment maps of the same scale as the aerial photos. Acreage estimates will be made using an area indicator gauge. Consideration will be given to commercial/non-commercial capability.

Volume estimates: Point sampling techniques used to estimate volume on the different kinds of recreation areas. 1) Actual volume on the site, and 2) potential volume on the site. Estimate will be made using site index data and appropriate yield tables, and represents the volume which would exist on the site were it managed for timber production. Volume estimates represented: 1) Total standing foregone timber volume, 2) Reduction in annual allowable cut, 3) Reduction in sustained yield capacity.

Timber opportunity costs: Apply appropriate stumpage values and allowing for timber sales administration costs (and other costs which are foregone because of management for recreation) results in estimates of timber opportunity costs.

SUPPORTED BY No Formal Support Reported

2.0045, FOREST RESOURCE ECONOMICS - ANALYSIS OF DETERMINANTS OF FOREST RESOURCE SUPPLIES, BENEFITS AND MANAGEMENT LEVELS IN MINNESOTA

J.M. HUGHES, Univ. of Minnesota, Graduate School, Saint Paul, Minnesota

Objectives are: (1) to determine the influence of various economic, institutional and legal factors on timber production and the supply of forest benefits; and (2) to establish economic guidelines for investment in alternative forest resource management practices in Minnesota and for various kinds of forest conditions.

Economic and financial evaluations of alternative management practices for timber and related forest uses will be made. The management of certain species of timber, notably aspen, offers attractive opportunities for research at this time. Forest recreation costs and benefits also offer important opportunities for research.

SUPPORTED BY Minnesota State Government

2.0046, PUBLIC INVESTMENTS IN NATURAL RESOURCES

L.R. MARTIN, Univ. of Minnesota, Agricultural Experiment Sta., Saint Paul, Minnesota (MIN-14-087)

Objective: Improve investments in natural resources in Minnesota for such purposes as parks, recreation and wildlife, water developments, land improvements, drainage, flood control, waste disposal, and forestry.

Approach: The first part will involve an inventory and categorization of natural resource expenditures by various resource districts and other governmental units from secondary sources. The second part of the project will involve an evaluation of organizational and operational characteristics of selected existing and proposed districts. The third part, will develop suggestions for decision making by districts.

Progress: Work on Phase I of the project has been largely completed with the inventory of numbers, kinds, and operational status of resource districts complete. The legal and operating characteristics of each type of district have been described. Also an inventory of 1960-65 expenditures for natural resource conservation and development in Minnesota has been completed. A report on Phase I is in progress. Preliminary work has begun on Phase II of the project, a detailed evaluation of the economic consequences of natural resource investment decisions by specific special districts. Tentatively chosen for study are three or four watershed districts in the Red River Valley. Natural resource configurations and problems in the Valley have been explored, data and sources of data obtained. A preliminary research proposal has been formulated. The proposed research will test the general hypothesis that existing types of watershed and drainage districts are incapable of arriving at investment decisions which reflect the full economic costs and benefits of their actions.

SUPPORTED BY Minnesota State Government

2.0047, THE IMPACT OF HIGHWAY INVESTMENT ON REGIONAL ECONOMIC DEVELOPMENT

J.A. KUEHN, Univ. of Missouri, Agricultural Experiment Sta., Columbia, Missouri 65202 (ED7-9-26-01)

OBJECTIVE: Derive an index of highway quality; study effects of new highways on regional economic development in the Ozark Region.

APPROACH: Assist in compiling data needed for the highway indices for the Ozark Region. These data will include information on highway mileage and quality, usage, selected indicators of regional economic activity, and data on location patterns, locational factor requirements, and growth aspects for recreation industries in the Ozark Region. Engineers, State highway departments, and the Bureau of Public Roads will be consulted. Correlation, regression, and other statistical techniques will be utilized to measure the relationship between highway investments and changes in regional economic activity. Impacts of highway investments on the development of recreation industries will be evaluated. Industries will be ranked according to intensity of highway use and growth prospects. Case studies will be conducted in areas and for recreation industries for a more detailed analysis of the impact of highway investments.

PROGRESS:

SUPPORTED BY U.S. Dept. of Agriculture

2.0048, EFFECTS OF PAWTUCKAWAY STATE PARK ON LOCAL ECONOMY & THE ORGANIZATION & FINANCING OF LOCAL GOVERNMENT OF 4 SOUTHEASTERN NEW HAMPSHIRE TOWNS

G.E. FRICK, Univ. of New Hampshire, Graduate School, Durham, New Hampshire 03824

The research philosophy is to record and analyze the economic changes in a region caused by the introduction of a large public investment in an outdoor recreation facility. A survey completed before the Park was built provides an initial economic activity measurement. Annual data relating to economic indicators such as local government expenditures, land transfers and valuations, Park users and their expenditure patterns are collected. Some of these series go back to 1960. The final work will involve a survey of business firms in the four towns to determine their economic ties to the Park.

A simulation model is being developed to use this economic information. This model is designed to test alternative land use essentially park development versus private recreational development. It will estimate use of resources, need for public services and environmental characteristics. The direct monetary phases of the model will compare income and expenditure flows to the region associated with public versus private development. The

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model will be time oriented so that various rates of development of alternative land uses can be measured. The project was started in May, 1965; final field work will be completed in September, 1970, with reports completed by October, 1971.

SUPPORTED BY U.S. Dept. of Agriculture

2.0049, SOCIO-ECONOMIC VALUE OF ANDROSCOGGIN RIVER FISHING

O.P. WALLACE, Univ. of New Hampshire, Graduate School, Durham, New Hampshire 03824

The '13 mile woods' section of the Androscoggin River between Errol and Berlin, New Hampshire was the study area.

During the study period there were 22,230 man-days of recreation, an average of 247 people per day. Fishing activities comprised 40 percent of the total, with sightseeing 25 percent, camping 15 percent, picnicking 10 percent, canoeing 4 percent and miscellaneous activities 6 percent.

Most of the fishermen were from New Hampshire with 36 percent local area residents. Thirty-nine percent were out-of-state fishermen.

Recreationists spent \$93,000 during the 90-day study period; this was spent in nearby local communities. Fishermen spent \$7.94 per day and made over 60 percent of the total recreationist expenditures. They purchased auto supplies, meals, lodgings and equipment, with lodging and meals 74.5 percent of their total amount. Recreationists like the river area as it is and none recommended any substantial changes.

Final report will be available from authors about 9/69.

SUPPORTED BY New Hampshire State Government

2.0050, TOURIST-RECREATION SERVICES - THE MACRO CONTRIBUTION

M.O. CLEMENT, Dartmouth College, Graduate School, Hanover, New Hampshire 03755

The study attempts to provide a quantitative estimate of the net contribution of tourism-recreation to the interstate 'balance of payments' of the individual states. The three latest Censuses of Business--1954, 1958, 1963--provide the data from which the state's receipts from tourist-recreationists are computed. The state's expenditures on tourist-recreation services are compiled from expenditures and income estimates published by the Bureau of Labor Statistics. These latter data are on a regional basis. Because of rough approximations inherent in the raw data and in the computational methodology, the absolute size of the expenditures figures is probably in error. Nevertheless, there is no reason to suspect that the magnitude of the error, in relative terms, varies from state to state or over time. Therefore, while the net balance of payments surplus or deficit figure itself is not especially useful for analytical purposes, a comparison of this figure as between the Census of Business years is meaningful. Consequently, the analysis of the tourist recreation services balance of payments figures is performed on a comparative basis, both cross-sectionally and intertemporally.

SUPPORTED BY U.S. Dept. of Commerce - Econ. Dev. Adm.

2.0051, A STUDY OF THE DEMAND FOR OUTDOOR RECREATION BASED ON THE ANALYSES OF THE NATIONAL RECREATION SURVEYS OF 1960 AND 1963

P. DAVIDSON, Rutgers The State University, Graduate School, New Brunswick, New Jersey 08903

The Bureau of Outdoor Recreation initiated a supply inventory for public recreation facilities throughout the United States. In 1960 the Outdoor Recreation Resources Review Commission sponsored a National Recreation Survey for each quarter of 1960; this was followed up by a similar Survey of Outdoor Recreation Participation by the Bureau of Outdoor Recreation in 1965.

The purpose of this project is to analyze the interactions of demand and supply variables which jointly determine participation patterns of different cross section segments of the population for different activities. A theoretical, as well as, an empirical del will be used to test different economic hypotheses for dif-

ferent factors, which determine participation in Outdoor Recreation.

The water based outdoor recreation activities have been considered primary activities in this study. This is true because they are important from the demand side because of the vast numbers of participants and from the supply side because of the extensive data that the B.O.R. has inventoried disaggregating recreation water by quantity and quality.

The project is scheduled to start 1 July, 1969 and terminate 30 June, 1973.

SUPPORTED BY U.S. Dept. of Interior - Bu. Outdoor Rec.

2.0052, AN ECONOMIC STUDY OF THE DEMAND FOR OUTDOOR RECREATION

J.R. GRAY, New Mexico State University, School of Agriculture, Las Cruces - University Park, New Mexico 88001

To develop methods and procedures for estimating the demand for, and economic impact of, recreation. To apply the methods and procedures developed above in determining the characteristics of demand for, and impact of, outdoor recreation in northcentral New Mexico.

SUPPORTED BY New Mexico State University

2.0053, RANGE AND RANCH MANAGEMENT DECISIONS ON WESTERN LIVESTOCK RANCHES

J.R. GRAY, New Mexico State University, Agricultural Experiment Sta., Las Cruces - University Park, New Mexico 88001

Objectives: 1. To identify the opportunities for profitable changes in land management and livestock practices under existing ranch resource conditions. 2. To determine which ranch management decisions would be profitable as existing management and resource conditions are changed by the introduction of various land improvement practices, feed purchases, land purchases, leases, and other changes in ranch organization or by changes in cost or price levels.

Description of Work Proposed: In New Mexico personal interviews will be made in each of the major range livestock production areas of the state to determine the range land required per animal unit, the kinds and amounts of feed used to supplement livestock, and livestock production rates. Investigations will be made of the effects of changes in size of ranches on costs and returns, and real estate values. As a part of the final regional objective, recreational areas on or adjacent to private ranch holdings will be identified and the changes in organizations, costs, and returns will be determined for those ranches which have adopted a recreational-type enterprise as a part of their ranch operations.

SUPPORTED BY U.S. Dept. of Agriculture

2.0054, LAKE CHAMPLAIN/LAKE GEORGE REGIONAL RECREATION STUDY

D.D. BRANDON, State Off. of Plan. Coord., Albany, New York 12225

Assesses opportunities for developing the winter and summer recreation industry in the region (Clinton, Essex, Warren and Washington Counties).

SUPPORTED BY New York State Government

2.0055, PLANNING ANALYSIS FOR THE NON-MARKET VALUES OF WATER RESOURCES WITH PARTICULAR EMPHASIS ON RECREATION

R.J. KALTER, State University of New York, School of Agriculture, Ithaca, New York 14850

Based upon sample surveys taken both for this specific study and national surveys taken by the Bureau of Outdoor Recreation this project will construct a model of the demand for water based recreation. This model, hopefully, will reflect such factors as the interaction between supply and demand, the developing preferences of young people, shifts in income and population. It will be carried through to the point of actual projection and will be integrated into the planning programs for the Finger Lakes Re-

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gion of New York State. The basis for benefit estimates will be included. Both through the development of the model and through ancillary studies the project will attempt to lay the basis for improved management of the lakes and other waters of the region and their environment. Policy guides which relate the network of environmental influences to institutions for management will be developed. Scheduled for completion in June, 1970. Interim reports available from principal investigator.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

2.0056, ENVIRONMENTAL PERCEPTION - AN ANNOTATED BIBLIOGRAPHY D. LOWENTHAL, Amer. Geographical Society, New York, New York 10032

This project is a companion to the proposal in the previous agenda item. Numerous publications related to the environment exist in diverse places. The disciplines involved range from architecture to ecology and engineering. The present proposal is to compile an annotated bibliography of books, reports and articles on environmental perception and behavior. This would bring together in one place references now widely scattered in periodicals and books of a dozen separate disciplines. The production of such a bibliography would contribute to a much needed convergence and synthesis of ad hoc and often sporadic efforts now carried on by individual scholars and planners working in relative isolation. As things stand today, most persons involved in research on environmental perception are either little aware of each other's work or expend considerable time, energy, and resources in efforts of search for sources. A general annotated bibliography would be a valuable aid for all research in the field and would facilitate collaboration among individuals, disciplines, and institutions working along comparable but hitherto unlinked lines.

Results: All relevant publications in geography, history, economics, sociology, architecture, town planning, and other fields over the past 15 to 25 years will be abstracted, coded on cards, and selected for annotation. An appropriate scheme of classification will be worked out, annotations prepared, and cross references provided in an index. Results will be published in a suitable form. The detail bibliographical and annotation work would be done by staff at the American Geographical Society with Mr. Lowenthal as supervisor.

SUPPORTED BY Resources For The Future Incorporated

2.0057, PUBLIC LAND ACQUISITION IN RELATION TO ECONOMIC AND SOCIAL FACTORS OF THREE RURAL COMMUNITIES IN NEW YORK STATE E.L. SHAFFER, State University of New York, U.S.D.A. Forest Service, Syracuse, New York 13210

To investigate possible effects that public land acquisition may have on selected economic and social factors of three rural communities in New York State, similar with the exception that: (1) community A has a considerable amount of undeveloped public wildlands with a 30 to 40 mile radius of the community. Such land was purchased within the past 20 years; (2) community B has approximately the same amount and distribution of public wildland surrounding it as community A, except that the land has been purchased and developed intensively for recreational purposes during the past 20 years; and (3) community C has had no public land acquisition within 30 to 40 miles.

SUPPORTED BY U.S. Dept. of Agriculture

2.0058, DEMAND ANALYSIS OF SELECTED RECREATIONAL FACILITIES ON NORTH CAROLINA FARMS E.C. PASOUR, Univ. of North Carolina, Agricultural Experiment Sta., Raleigh - N.C. State Univ., North Carolina 27600

Objectives: (1) To inventory the existing farmer-owned and operated recreational facilities on North Carolina farms in order to facilitate the attainment of the subsequent objective and to provide a benchmark for future studies. (2) To ascertain the demand for selected types of farmer-owned and operated recreational facilities and the respective price and income elasticities of demand for such facilities.

Description: This project represents an attempt to determine the characteristics of demand for specific types of recreational facilities on North Carolina farms. Widespread interest in this area stems from: (1) the potential of recreational facilities as a means of boosting the economy in economically depressed areas, and (2) the potential of increasing farm incomes through the introduction of on-farm recreational enterprises. The population to be studied will be determined from an inventory questionnaire. Farm owners and patrons of the recreational facilities studied will be interviewed to secure the data necessary to attain the major objective of the study.

SUPPORTED BY U.S. Dept. of Agriculture

2.0059, RECREATION DEVELOPMENT IN NORTH DAKOTA R.W. COX, North Dakota State University, Agricultural Experiment Sta., Fargo, North Dakota 58102

Objectives: (1) Inventory outdoor recreational resources and facilities in North Dakota and to evaluate them in terms of present and future needs; (2) compare recreational programs in North Dakota with those in other states; (3) determine the economic benefits to the community arising from the utilization of recreational facilities; (4) recommend action programs for selected areas to aid in development and expanded use of these facilities.

Description of Work: Inventory of present recreational resources and facilities. Utilization of resources and facilities identified in terms of present and projected demand. Experience of other states with recreational facility development will be surveyed to provide data on costs and development programs that could be used in North Dakota. Studies of specified North Dakota recreation areas to determine economic benefit to areas and communities will be made.

SUPPORTED BY North Dakota State Government

2.0060, LIABILITY AND INSURANCE PROTECTION PRINCIPLES FOR RECREATION ENTERPRISES J.M. PIERCE, Ohio State University, School of Agriculture, Columbus, Ohio 43210

Written for the layman, the results of a 1968 survey of Ohio law and insurance practices is found in an Extension publication entitled 'Liability and Insurance: Protection Principles for Recreation Enterprises'. The findings are based on work completed in cooperation with the Legal Clinic, the Ohio State University Law College.

Members of the teaching staff, supported in large part by a senior law student at the Ohio State University surveyed the Ohio Statutes, Ohio Case Law and other legal sources to determine what principals and cases govern these specific liability and insurance questions. Research techniques also included interviews and questionnaires.

SUPPORTED BY Ohio State University

2.0061, PUBLIC INVESTMENT CRITERIA FOR WATER-ORIENTED RECREATION IN THE LAKE ERIE BASIN R.A. TYBOUT, Ohio State University, Graduate School, Columbus, Ohio 43210

The project has three parts: 1) The measurement of demand for water-oriented recreation at numerous sites. 2) Analysis of costs of pollution abatement and recreation facilities at the same sites. 3) Evaluation of the relative merits of alternative public investments for recreation enhancement and of selected financial policies.

Each part is assigned a year of research time. Demand will be measured by a simultaneous-origin adaptation of the Hotelling-Clawson method. Shifts in demand due to pollution and income changes will be measured and, in fact, play an important part in the determination of benefits from abatement. The analysis of costs of pollution will seek to relate marginal pollution contributions at recreation sites to costs of abatement. The third, or final part of the analysis will explore the implications of combining the results of the first two parts in a cost-benefit framework with various methods of financing, including pollution taxes, user charges and other revenue sources.

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SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

2.0062, UPLAND GAME INVESTIGATIONS - FORT COBB CROW STUDY

P. MACE, State Dept. of Wildlife Cons., Oklahoma City, Oklahoma

PPS Objective: To measure the recreation and economics associated with the Fort Cobb Crow Roost population.

Procedures: 1. Determine recreation time and harvest by: a. Random field interviews for establishing hours and bag per hunter. b. Number of hunters and hunter days by data processing survey. 2. Determine local daily expenditures determined by random field contacts. b. Average hunter expenditures from random checks projected to total hunters. 3. Determine distribution by banding and tagging with followups of observations and band returns. 4. Estimate roost population by flyway time-counts beginning on September 1. 5. Depredation determined by stomach analysis.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

2.0063, DEMAND FOR RECREATION IN THE WILD-HORSE CREEK WATERSHED

D.D. BADGER, Okla. St. Univ. of Agr. & Sci., Agricultural Experiment Sta., Stillwater, Oklahoma 74075

1. To develop appropriate economic models and methodological procedures applicable to recreation demand analysis for the recreational complex in the Wildhorse Creek Watershed. 2. To assemble primary and secondary data on population, miles traveled, money spent, incomes, hours worked, and other variables needed to estimate the demand for outdoor recreation in the selected area. 3. To estimate demand for both local and nonlocal recreation from which projections will be made as to the number of visitors using the facilities in the Wildhorse Creek Watershed.

Procedure: Major emphasis will be placed on developing methodological procedures and appropriate models for analyzing the data. The various models will be studied and the best technique will be used to measure the demand for recreation. Basic data on population, income, occupations, hours worked and hours of leisure time, transportation networks, mobility, etc. will be obtained from tourist surveys, city records and published data. Concentric distance zones from the Stephens County recreational complex will be established and visitors to the various zones determined. A sample of the users of the various recreational facilities will be surveyed by a questionnaire structured to obtain information on the projected use of all facilities. These will be analyzed by several of the best developed techniques to derive effective demand schedules for the recreational facilities in the area. Interim reports are available.

SUPPORTED BY U.S. Dept. of Agriculture

2.0064, ASSESSING BIG GAME MANAGEMENT ALTERNATIVES THROUGH BIOECONOMIC MODELS

W.G. BROWN, Oregon State University, Agricultural Experiment Sta., Corvallis, Oregon 97331

Objectives - (1) Develop, test, and refine models simulating existing relationships and values of resources related to big game production and use. (2) Determine bio-economic relationships and values in big game production and use needed to develop and test models. (3) Demonstrate application of these models in big game management and related public policy decisions.

Description of Work Proposed - Oregon's research contribution to the regional project, W-97, during the first two years will focus primarily on the problem of estimation of demand for big game. Surveys will be planned and conducted to compute big game oriented expenses, hunter income levels, hunt success ratios, length of stay in hunting area, actual time spent hunting, home location, distance and time of travel to hunt, age of hunter, and other relevant factors. From the survey data collected, estimates of demand for big game will be made. These estimates of demand will then provide a basis for computing the economic value of big game.

SUPPORTED BY U.S. Dept. of Agriculture

2.0065, AN ANALYSIS OF THE DEMAND FOR DIFFERENT RECREATIONAL SERVICES

H.H. STOEVENER, Oregon State University, Agricultural Experiment Sta., Corvallis, Oregon 97331

The proposed project would first classify recreational services related to particular natural features of an area--lakes, mountains, woodlands, unique natural phenomena, etc. Economic and statistical methods would be used to estimate the value of these features singly and in combinations. The methods would be applied to an actual case area--the Bend Ranger District of the Deschutes National Forest in Oregon--which contains a large variety of recreational features. The study will add a new dimension to research on the evaluation of recreation resources by relating values to the specific services rendered by particular attributes of such resources. The results would be published in professional papers or a monograph. Interim papers are available. Scheduled for completion 6/30/72.

SUPPORTED BY Resources For The Future Incorporated

2.0066, ECONOMIC BENEFITS FROM AN IMPROVEMENT IN WATER QUALITY

H.H. STOEVENER, Oregon State University, School of Agriculture, Corvallis, Oregon 97331

The research has the following principal objectives: 1. To determine the relationship between water quality and recreational use, permitting the prediction of the change in recreational use when a substantial improvement in water quality has been made in a large body of water. 2. To determine the economic benefits accruing to society from a postulated improvement in water quality and associated increase in recreational use determined under (1) above. 3. To determine the economic benefits accruing to the local economy in which the water resource is located from the postulated improvement in water quality and associated increase in recreational use.

The accomplishment of objectives 1 and 2 involves the development of a theoretical model to evaluate recreational benefits. Such a model is an extension of the techniques developed by Clawson and others. Water quality characteristics are to be included in the demand analysis to permit the empirical changes in recreational use and values. Interviewing techniques are used to collect data for the research. Recreationists are interviewed in the upper Klamath Lake area and a sample of other recreational sites in nearby regions.

To accomplish objective 3, an input-output model for the Klamath County economy resulting from an improvement in water quality in Klamath Lake and the associated increased use and expenditures made by recreationists. Data for this work are developed through interviews with business firms in Klamath County.

SUPPORTED BY U.S. Dept. of Agriculture

2.0067, THE TRAVEL BUSINESS IN THE SOUTHEAST (ELEVEN STATES)

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the state and from other states. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

The research begins with the characteristics of travelers, who are defined as persons away from home outside their commuting zone during the day or overnight, their origin and destination, their activities in the state, and the market created by their demands. Travel is measured in terms of the number of persons, parties, and vehicles; intercity passenger miles traveled; and their expenditures for various items.

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The volume and trends of travel are analyzed in relation to the facilities for lodging, eating, and recreation; auto and gasoline services; and passenger transportation via railroad, plane, and bus. Business activities associated with travel are measured in terms of volume of sales and receipts, firms at the service of travelers, employment in and income and tax revenues derived from the travel serving business.

Expect this project to be continuous and the sponsor to publish an annual report.

SUPPORTED BY Southern Directors Council

2.0068, THE KANSAS CITY TOURIST TRADE - AN ECONOMIC ANALYSIS

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the area and from other states. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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The volume and trends of travel are analyzed in relation to the facilities for lodging, eating, and recreation; auto and gasoline services; and passenger transportation via railroad, plane, and bus. Business activities associated with travel are measured in terms of volume of sales and receipts, firms at the service of travelers, employment in and income and tax revenues derived from the travel serving business.

SUPPORTED BY Kansas City Government - Kansas

2.0069, KNOXVILLE ANNUAL TOURIST SURVEY

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

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SUPPORTED BY Knoxville City Government - Tennessee

2.0070, THE TRAVEL BUSINESS IN LOUISVILLE, KENTUCKY

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

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SUPPORTED BY Louisville City Government - Kentucky

2.0071, TOURISTS AND ALABAMA BUSINESS - AN ECONOMIC ANALYSIS

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the area and from other states. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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SUPPORTED BY Alabama State Government

2.0072, TRAVEL IN ARKANSAS - AN ECONOMIC ANALYSIS

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the area and from other states. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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SUPPORTED BY Arkansas State Government

2.0073, TRAVEL IN IOWA - AN ECONOMIC ANALYSIS

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

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SUPPORTED BY Iowa State Government

2.0074, SURVEY OF TRAVEL IN KENTUCKY: AN ECONOMIC ANALYSIS

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

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SUPPORTED BY Kentucky State Government

2.0075, TOURISTS AND THE TRAVEL BUSINESS IN LOUISIANA - AN ECONOMIC ANALYSIS

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the area and from other states. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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Report continuous. Sponsor publishes annual report.

SUPPORTED BY Louisiana State Government

2.0076, TRAVEL IN MISSISSIPPI - AN ECONOMIC ANALYSIS

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the area and from other states. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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SUPPORTED BY Mississippi State Government

2.0077, NORTH CAROLINA TRAVEL SURVEY - AN ECONOMIC ANALYSIS

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the state and from other states. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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SUPPORTED BY North Carolina State Government

2.0078, TOURISTS AND THE TRAVEL BUSINESS IN OKLAHOMA - AN ECONOMIC ANALYSIS

L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the area and from other states. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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SUPPORTED BY Oklahoma State Government

2.0079, THE SOUTH CAROLINA TRAVEL TRADE - AN ECONOMIC ANALYSIS
L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

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SUPPORTED BY South Carolina State Government

2.0080, THE TENNESSEE TOURIST TRADE - AN ECONOMIC ANALYSIS
L.C. COPELAND, Univ. of Tennessee, Graduate School, Knoxville, Tennessee 37916

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the area and from other states. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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SUPPORTED BY Tennessee State Government

2.0081, ECONOMIC IMPACT OF THE PROPOSED POTOMAC NATIONAL RIVER PARK
P.R. LOWRY, Memphis State University, Bureau of Bus. & Econ. Res., Memphis, Tennessee 38111

This study was authorized by the National Park Service in June of 1968 to determine the economic impact of the proposed Potomac National River Park on the eleven counties region in Virginia, West Virginia and Maryland to be affected by the proposed Park. The study is scheduled for completion in approximately August 1969.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

2.0082, THE SOCIO-ECONOMIC IMPACTS OF THE PROPOSED POTOMAC NATIONAL RIVER ON THE CONTIGUOUS COUNTIES OF MARYLAND, VIRGINIA AND WEST VIRGINIA

P.R. LOWRY, Memphis State University, Bureau of Bus. & Econ. Res., Memphis, Tennessee 38111

To determine the immediate economic impact and long range effects of the proposed Potomac National River upon the local or regional economies. It would include evaluation of the possible effects upon individuals and business establishments within the proposed area, and it would attempt to develop data concerning direct and indirect benefits which will accrue to the Potomac region with the establishment of the Potomac National River. These benefits will include, but not be limited to, appreciation in land values and the property tax base, increases in the sales tax base, increases in tourist expenditures, and the encouragement of industry to locate in the Potomac region. Consideration would be given to the advantages and disadvantages to local government in using the land for a park as against alternative land uses.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

2.0083, SYSTEMS SIMULATION FOR MANAGEMENT OF A TOTAL WATER RESOURCE
W.L. MEIER, State Water Development Board, Austin, Texas 78711

The objective of this year's research project will be the development of techniques useful in defining the least costly means of supplying municipal, industrial, irrigational, recreational, fish and wildlife, and secondary petroleum recovery water requirements for a selected portion of the proposed Texas Water System to the year 2020. A methodology will be sought to aid planners in decision-making regarding means of providing water at least cost to meet demands among the several source river basins and reservoirs, and along the route of conveyance to terminal storage within the constraints of prospective water sales contracts, alternative project feature sizing, and alternative sequences and timing of construction of project elements.

Specifically, this research will have as its goal the development of the following: (1) a transfer model for optimal allocation of water to meet specified demands to the year 2020 at minimum total cost within the prescribed legal, financial, contractual, and political constraints, (2) an optimal means of sizing, sequencing and timing of the addition of project elements, (3) simulation models for the system, and (4) a support Data Management System.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

2.0084, LOCATION & MANAGEMENT ASSOCIATED WITH FINANCIAL SUCCESS OF REC. CONCESSIONS ON MULTI-PURPOSE RESERVOIRS IN TEXAS, OKLA; ARK (ABBREV)
R.F. DUGAN, Texas A & M University System, Graduate School, College Station, Texas 77843

The study is intended to investigate the relationship between reservoir characteristics and factors assumed to contribute to financial success. Data from Corps of Engineers records pertaining to gross revenues, average capital investment, and annual inventory will be used. Inspection of 300 concessions on 40 reservoirs will produce data on characteristics of the concession site. From Corps of Engineers records and inspection, data on reservoir characteristics will be obtained: size, shape, quality, type of shoreline, scenery, climate. This research study begins in 1968 and will be completed 1970.

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SUPPORTED BY U.S. Dept. of Defense - Army

2.0085, ECONOMIC IMPACT OF WATER IMPOUNDMENT - VALIDITY TESTING OF A COMPARATIVE-PROJECTION MODEL

J.E. PEARSON, Texas A & M University System, Graduate School, College Station, Texas 77843

The proposed research plan involves the accuracy testing of a comparative-projection model designed to measure the economic impact of water impoundment. The model is unique since it contains three time/action phases and uses empirical local data as the basic inputs. A now-being-completed impoundment project in central Texas is to be the primary study area. The projections established for this impoundment project through an earlier study are to be evaluated as data are collected. The projections are to be compared to a synthetic index which has been established earlier for this purpose. An analysis of the economy surrounding the reservoir will be made to detect certain economic developments which can affect the accuracy of the model.

In completing the second phase of the study, a generalized testing of the model will be undertaken. Established impoundment projects across the state of Texas will be selected for testing the model and the results are to be compared to the synthetic index. Modifications and adjustments will be made to the model as needed in order to obtain a generalized form with adequate predictive value.

A recreational phase will be conducted concurrent with the above. This part is to involve on-site interviewing of recreators at reservoirs. The purpose of this phase is to strengthen the third phase (post-fillup) projection of the model.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

2.0086, A STUDY OF STATE TOURISM RESEARCH

L.R. SIMONSON, Texas A & M University System, Graduate School, College Station, Texas 77843

The objective of this study is to collect, study, and analyze all current studies produced by all states pertaining to tourism. The purpose is to determine the extent to which such research is being performed and to discover differences or similarities in scope and methodology between the states. Categories of information to be compared include: number of out-of-state visitors; economic impact from visitors; expenditures per day; expenditure breakdown (food, lodging, transportation, recreation activities, retail sales, misc.); definitions and research approaches. Each official state agency governing tourism activities will be contacted for available current research.

SUPPORTED BY Texas A. & M. University System

2.0087, USE OF ATTITUDE MEASUREMENT AS A METHOD OF PREDICTING RECREATION POLICIES OF LARGE FOREST LANDOWNERS IN EAST TEXAS

J.R. WATERS, Texas A & M University System, Graduate School, College Station, Texas 77843

Increasing land values with a corresponding decrease in lands available for recreation in East Texas has promoted investigation into a method for predicting these policies of forest landowners which may affect recreation.

Objectives: 1) to develop an attitude scale for determining the recreational attitude of the owners of large (1000 acres or more) timber tracts in East Texas; 2) To inventory the past managerial decisions of these owners which have affected recreation; 3) To determine the amount of potential correlation between these decisions and the attitude of the landowner; 4) To formulate a model capable of predicting the availability of forest lands for recreation activities through measurement of attitude toward recreation.

Procedure: The Thurstone method of attitude scale construction will be utilized to develop a scale to measure attitude toward recreation. A personal interview with each of the 100 landowners in the sample will yield information relative to past managerial decisions affecting recreation. Owner attitude toward recreation will then be measured using the scale. Companies and other 'faceless' landowners have been excluded. Analysis of variance and

regression-correlation will be used to estimate relationships between recreation attitude and past managerial decisions.

SUPPORTED BY U.S. Dept. of Agriculture

2.0088, ANALYSIS OF THE OPERATION AND MANAGEMENT OF YOUTH CAMPS IN VERMONT

M.I. BEVINS, Univ. of Vermont, Agricultural Experiment Sta., Burlington, Vermont 05401

1. Conduct a basic descriptive study of the operation and management of all resident youth camps (both institutional and private) in Vermont. 2. Study the financial implications associated with the continuation of youth camp operations as opposed to commercial uses of land and water resources. 3. Investigate the importance of factors that might affect youth camp participation.

The entire youth camp industry in Vermont was surveyed in detail in 1966. For purposes of analysis the camps were divided into two groups -- private and agency. Data have been transferred onto cards, tabulated, and an initial report prepared (Ag. Econ. 67-6). The final publication will be released in late 1969.

SUPPORTED BY Vermont State Government

2.0089, ANALYSIS AND SIMULATION OF A MULTI-ACTIVITY OUTDOOR RECREATIONAL SYSTEM

E.F. THOMPSON, Virginia Polytechnic Institute, School of Agriculture, Blacksburg, Virginia 24051

Lone range planning is becoming commonplace. The U.S. government has adopted PPBS to help make more effective government spending. Budget requests, down through the various agency levels, must be objectively oriented with respect to justification. An originating budget request is faced with making quantitative projection based on certain assumptions with regard to the planning-management situation. The purpose of this research is to examine a case study situation defining it in a general multi-activity and spatially diverse outdoor recreation system's framework, and to examine the sensitivity of assumptions regarding the system operation through planning. Behavior and performance of the system is measured in units of visitor use, which is a result of dollar expenditures (particular budget and system configuration). This is developed through a simulation model. Activity use is internally generated based on a set of assumptions and system configuration through a utilization (%) generator, distributed Beta (Alpha, Beta).

SUPPORTED BY No Formal Support Reported

2.0090, M.S. PROJ. NO. 1914, A METHOD FOR SELECTING PUBLIC RECREATION INVESTMENTS WHICH WILL INCREASE SOCIAL BENEFITS

C.D. MATTSON, Washington State University, School of Agriculture, Pullman, Washington 99163

This study is designed to develop a method of comparing alternative investments in recreation sites. The objectives are: (a) the development of a system of mathematical models which provide quantification of the choice criteria for analyzing specific site proposals, (b) tests of the system by application to specific classes of recreation service, and (c) to develop, test and refine a computer program which will permit rapid evaluation of projects.

A preliminary study has been completed which has identified the criteria now used in most states to select projects. A trial model has been developed which may be used to quantify several of these criteria for project proposals. Arrangements have been made to secure data from the relevant Washington State agencies which will be used in testing and refining the model.

SUPPORTED BY U.S. Dept. of Agriculture

2.0091, ECONOMIC STUDY OF OLYMPIC AND MOUNT RAINIER NATIONAL PARKS

W.B. BEYERS, Univ. of Washington, Graduate School, Seattle, Washington 98122

The economic significance of National Parks to the settlements adjacent to these Federal lands is functionally related to

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the income and employment levels generated by the use of these lands. In the regions of Washington State under study there appear to be five primary sources of income which accrue to communities in the vicinity of these Federal lands: (1) Tourist and recreational expenditures. (2) Commercial (non-recreational) values. (3) Public and private capital development expenditures. (4) Operating expenditures by public agencies. (5) Taxes paid.

It is necessary to measure all of the effects in order to understand the impact of a National Park upon the local and regional economy. The employment and income streams associated with these levels of activity are tied together in an inter-industry structure which may be specified for a region at a point in time. It is planned that each of the factors outlined above will be evaluated for Olympic and Mount Rainier National Parks for the year 1965.

SUPPORTED BY U.S. Dept. of Interior - Natl. Park Serv.

3. USER STUDIES

Participants in Outdoor Recreation: Their Attitudes, Performance and Other Characteristics

3.0001, COOPERATIVE AGREEMENT FOR BEAVER RESERVOIR CREEL CENSUS STUDY

T.O. DUNCAN, U.S. Dept. of Interior, South Cen. Reserv. Invtgs., Fayetteville, Arkansas 72701

Plan of Work: To study angler's catch, effort, and related factors during impoundment of Beaver Reservoir. A cooperative program.

Objective: To estimate: (1) sport fishing harvest as numbers and pounds of fish by species per acre for each season of the census year; (2) fishing success in numbers and pounds by species per angler-hour; and (3) total harvest and effort.

Procedure: Estimates of fishing pressure to be obtained by the progressive count method using observations from aerial flights and from boats. Fishing success estimated by fisherman interviews. Harvest estimates based on information obtained from fisherman's catch. Traffic data counts will be used in comparison of boat and aerial counts.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0002, THE EPIDEMIOLOGY OF SKI INJURIES

J.G. GARRICK, Univ. of California, School of Medicine, Davis, California 95616

The primary objective of the proposed study is to define the differences existing between injured and non-injured skiers and to prove or disprove the numerous unsupported theories in existence regarding ski injuries. The project is studying factors within the direct control of the individual skier as well as the ski area and its ancillary facilities. Information gained from the study offers potential utilization by the skiing public, ski schools, ski patrols, equipment manufacturers, as well as medical personnel dealing with ski injuries.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - P.H.S.

3.0003, CONSUMER CHARACTERISTICS, SATISFACTIONS AND USE AT DAVIS CREEK CAMPGROUND

T.A. STILLE, San Jose State College, Graduate School, San Jose, California 95114

It is the purpose of this study to identify and analyze consumer characteristics, satisfactions and use at David Creek Park.

Sub-problems were: (1) to determine the origin, group size and income of camping consumers, (2) to identify and analyze the reactions of participants to rules and regulations, physical facilities, natural environment, fees, and park personnel, and (3) to analyze camper use in terms of length of stay, number of visits per year and campsite selection.

Two minor problems were: (1) to estimate a demand curve in terms of user days and distance traveled, and (2) to ascertain consumer preferences as to the locations of additional camping areas to be developed in Washoe County, Nevada.

SUPPORTED BY Nevada State Government

3.0004, LEISURE ATTITUDES, ACTIVITIES AND FUTURISTIC PROJECTIONS OF UNIVERSITY STUDENTS

H.W. LUNGSTRASS, Canadian Bur. Mgt. Cons. Serv., Ottawa - Ontario, Canada

Objectives: To determine and analyze leisure attitudes, activities and futuristic projections of University students (N 430)

Procedures: Questionnaires, Interviews, Various computer analyses

Location: Edmonton, Alberta, Canada; Ottawa, Ontario, Canada

SUPPORTED BY University of Alberta

3.0005, LEISURE TIME ATTITUDES AND ACTIVITIES OF INDUSTRIAL WORKERS

H.W. LUNGSTRASS, Canadian Bur. Mgt. Cons. Serv., Ottawa - Ontario, Canada

The project under-way is designed to ascertain the leisure time attitudes and activities of a sample (158) of industrial workers in the oil and chemical industry in and around Edmonton, Alberta, Canada. The research has been completed except for the writing of the final report.

SUPPORTED BY University of Alberta

3.0006, LEISURE ATTITUDES, ACTIVITIES AND FUTURISTIC PROJECTIONS OF FEDERAL GOVERNMENT EMPLOYEES

H.W. LUNGSTRASS, Canadian Bur. Mgt. Cons. Serv., Ottawa - Ontario, Canada

Objectives: To determine and analyze leisure attitudes, activities and futuristic projections of Federal Government (Canada) employees

Procedures: Questionnaires, interviews, various computer analyses

SUPPORTED BY No Formal Support Reported

3.0007, DETERMINATION OF RECREATION CARRYING CAPACITY OF SOME FOREST HABITATS IN B.C. AND THE EXTENT TO WHICH THIS CAN BE MODIFIED BY MANAGEMENT

J.H. SMITH, Univ. of British Columbia, Graduate School, Vancouver - British Columbia, Canada

Subsequent to a study of visitor preferences for various habitats in mountain parks of Alberta and B.C., initiated in 1967 and completed in an M.F. thesis by Apt in 1968, this project was started during the 1968 field season. A total of 40 B.C. Provincial Parks were visited to determine habitat information, park characteristics, and visitor preferences. Field data are being analysed and will form the basis for a B.S.F. thesis by McCallum.

Started in 1968 this project ought to be completed by the end of 1969 unless extended into other areas. Preliminary results suggest that management inputs are likely to be much more important than environment in determining carrying capacity of our habitats for recreation.

SUPPORTED BY University of British Columbia

3.0008, THE ROLE OF LANDSCAPE IN PLEASURE DRIVING

G.B. PRIDDLE, Univ. of Waterloo, Graduate School, Waterloo - Ontario, Canada

The purpose of the study is to obtain a greater insight into the perception of landscape by man when driving for pleasure. Hopefully such basic knowledge would aid in understanding the recreational activity of driving for pleasure as well as providing guidelines for the design creation and preservation of roadways of important scenic value. Several scenery classification systems will be applied and perception tests will be made of people under controlled driving conditions. In light of the perception tests a more

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meaningful scenery classification system will evolve. A telephone questionnaire will be used to measure the where, why and when of pleasure driving of a meaningful sample of people in the cities of Kitchener and Waterloo. The results of this questionnaire will also be used in developing the improved scenic road classification system.

SUPPORTED BY No Formal Support Reported

3.0009, PROVINCIAL PARKS-WHITESHELL, GRAND BEACH, GRASS RIVER, DUCK MT., ST. MALO, ST. AMBROISE, PATRICIA BEACH AND NORQUAY. (ABBREV)
N. NIXON, Manitoba Dept. of Tour. & Rec., Winnipeg - Manitoba, Canada

The survey is undertaken within the scope of the Canada Outdoor Recreation Demand (CORD) Study and is designed to indicate the type of visitors using Manitoba Provincial Parks and Recreation Areas. Information to be gathered by the study includes: origins of the visitors, their length of stay in the area, the activities they take part in, and socio-economic details such as income, age, and education level. Analysis of the data will be undertaken by a Central agency (National and Historic Parks Branch, Ottawa) in conjunction with survey data generated by identical surveys undertaken in the other 9 Canadian provinces.

SUPPORTED BY Manitoba Provincial Government

3.0010, SURVEY OF VISITORS TO MANITOBA TOURIST RECEPTION CENTERS
G.D. TAYLOR, Manitoba Dept. of Tour. & Rec., Winnipeg - Manitoba, Canada

The study is undertaken in order to indicate the pattern in which visitors to Manitoba distribute themselves throughout the province. Information will be gathered by means of short questionnaires completed by visitors to the Tourist Reception Centers. The data will indicate the origins of the visitors, their length of stay in Manitoba, their destination in the province, and the activities and facilities they will be looking for during their stay. Through analysis of the data on the basis of the visitors' destinations and interests it should be possible to indicate the tourist market for each of the 5 tourist regions within the province. The study should be completed by December, 1969.

SUPPORTED BY Manitoba Provincial Government

3.0011, ANALYSIS OF THE 1967 STUDY 'UNITED STATES VISITORS TO CANADA 1967' FROM A PROVINCIAL CONTEXT
G.D. TAYLOR, Manitoba Dept. of Tour. & Rec., Winnipeg - Manitoba, Canada

This analysis of a major national study was undertaken for two purposes: (a) to determine the pertinence of a major national tourist study to the planning purpose of a provincial organization, (b) to outline in a summary form the type of locally applicable data which is contained in such a survey and its relevance to local planning decisions. The analysis determined the characteristics of Manitoba's visitors in terms of tourist parties who entered Canada and visited Manitoba at all, those who had Manitoba as their destination and those who were in transit across the province.

SUPPORTED BY Manitoba Provincial Government

3.0012, PROSPECTIVE LEVELS OF RECREATION ACTIVITIES IN THE SOURIS BASIN, MANITOBA-PROJECTIONS FOR 1980 AND 1990
R.E. CAPEL, Univ. of Manitoba, School of Agriculture, Winnipeg - Manitoba, Canada

Projections will be made of the numbers of day-users of recreational facilities in 1980 and 1990 at the proposed Antler Creek and Gainsborough Creek reservoirs. To do this, projections will be made of participation rates of the relevant population in major outdoor recreation activities. Estimates will then be made, using available economic base studies, of how the 1980 and 1990 populations will allocate recreation activities between the reservoirs in question and competing facilities in Manitoba and adjacent regions.

A postal survey of recreation behavior has been carried out, and the responses are now being analysed. Both urban and rural areas were sampled. Questions related to family characteristics, ownership of recreation equipment, and direction, distance, and frequency of travel to outdoor recreation. Rural areas were selected to sample populations exposed to newly established versus older parks--to examine the time taken by people to learn about new facilities and activities.

Work has been begun on an employment-shift analysis of population in Manitoba and parts of North Dakota and Saskatchewan. The results will be used as projections of potential populations of people who might engage in outdoor recreation.

SUPPORTED BY Canadian Government

3.0013, PUBLIC ACCESS TO PUBLIC DOMAIN LANDS - A STUDY OF LANDOWNER-SPORTSMAN CONFLICT
J.A. MUNGER, Colorado State University, Graduate School, Fort Collins, Colorado 80521

This study deals with the origin, nature, and extent of conflicts arising between landowners and sportsmen over the issue of public access to lands administered by the Bureau of Land Management, USDL. A case study technique is applied to two problem areas, one in Colorado and another in California, where use of public domain lands for recreational purposes is restricted by physical or legal restraints on access. This work is being conducted at Colorado State University, Economics Department, where the Project Director is stationed.

SUPPORTED BY U.S. Dept. of Agriculture

3.0014, THE AMERICAN STRATIFICATION SYSTEM AND THE CONSERVATION MOVEMENT
W.R. BURCH, Yale University, Graduate School, New Haven, Connecticut 06520

An examination of the distribution of power and status within the organized conservation community and its relation to the wider stratification system of American society. Measures of effectiveness and ineffectiveness will be linked to sociometric clusters of conservation leaders, organizational structure and the leader's relationship to 'decision circles' of the wider society. The analysis, sociometric tests and the historical records of significant legislative action. The central interest is to discover the sources of the conservation movement's 'trained incapacities' and to understand the ways in which such incapacities may inhibit attempts to accomplish a quality environment. Scheduled for completion in 1972.

SUPPORTED BY Yale University

3.0015, CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST
W.C. MCKAIN, Univ. of Connecticut, Agricultural Experiment Sta., Storrs, Connecticut 06268

Objectives: (1) To identify and analyze those social, psychological and economic variables which motivate consumers to participate in outdoor recreational activities.

Work Proposed: By means of library research and correspondence an inventory of relevant research and a classification of hikers will be developed. Mailed questionnaires and personal interviews will be used to obtain information regarding hikers and hiking clubs in New England (characteristics of members, areas of activity, etc.). On the basis of this information, hypotheses regarding the motivation of the participants will be set forth and tested by means of interviews in depth using such standardized measures as are applicable. The findings of this research will be utilized in the preparation of guidelines for the orderly development of hiking as a form of outdoor recreation in New England.

SUPPORTED BY U.S. Dept. of Agriculture

3.0016, PERFORMANCE TRAITS OF FOREST RECREATIONISTS
W.T. MOSS, Univ. of Georgia, Agricultural Experiment Sta., Athens, Georgia 30602 (GEO-03-0259)

3. USER STUDIES

OBJECTIVE: Analyze behavioral patterns of forest recreationists cultural, social, educational, and economic backgrounds. Develop recommendations for the adaptation of national and state forest facilities and services to better cope with the nature of the recreational users of the forest. Recommend methods which would enhance the recreational usage of forest areas for both native and transient recreationists.

APPROACH: Examine possible correlations among characteristics of the personal or family background and various manifestations of respect for the land. Analyze recreational performance traits of forest users, along with background statistics, to provide information for planning and for further development of forest facilities for recreational use and for modification of VIS programs and other state and local media to better educate the forest-using public.

PROGRESS: This project is the basis for a number of studies now in progress. One sub-project concerns man's physiological responses to both stress and outdoor recreation activities. Another involves the relationships between outdoor recreation and socio-economic indices. Behavioral traits affecting recreation are being isolated and will continue to be explored. A paper, 'Recreation and Personality' is presently in press with the Journal of Forestry.

SUPPORTED BY Georgia State Government

3.0017, PERFORMANCE TRAITS OF FOREST RECREATIONISTS - A BEHAVIORAL STUDY *W.T. MOSS, Univ. of Georgia, Graduate School, Athens, Georgia 30601*

Performance traits of Forest Recreationists: A Behavioral Study

To analyze behavioral patterns of forest recreationists in consideration of their cultural, social, educational, and economic backgrounds. To develop recommendations for the adaptation of national users of the forest. To recommend methods which would enhance the recreational usage of forest areas for both native and transient recreationists. Interim reports are available.

SUPPORTED BY Georgia State Government

3.0018, RECREATION IN A CORRECTIONAL INSTITUTION *A.R. CASKEY, Univ. of Illinois, Graduate School, Champaign, Illinois 61820*

The objectives of this study are: (1) To assemble pertinent publications concerning recreation in a correctional institution. (2) To analyze and evaluate these publications and publish extracts of pertinent findings. (3) To sponsor and conduct research projects investigating recreation programs in correctional institutions. (4) To develop and publish a series of operational guides for recreation professionals in the correctional field. (5) To conduct research projects into the role of recreation in the prevention, control and treatment of youth and adult criminals.

SUPPORTED BY University of Illinois

3.0019, WATER QUALITY CRITERIA FOR SELECTED RECREATION USES

D.W. BISHOP, Univ. of Illinois, Graduate School, Urbana, Illinois

The research involves laboratory and field investigations directed at the determination of water quality criteria for selected recreation uses; based upon peoples' perceptions, beliefs, attitudes, and behavior.

The objectives of the project are: A. To determine the beliefs and attitudes towards different types and extents of pollution for different activities. B. To determine if choice of site for a particular activity is related to physical measures of water quality. C. To determine if peoples beliefs about water and its characteristics are correct, by comparing their beliefs about kinds and amounts of pollutants to physical, biological and chemical measures of the water. D. To determine types of pollutants which affect peoples choice and use of sites, how the people conceptualize these pollutants, and what the behavioral affect is.

The research will be conducted both on-site and off-site. Survey data will be collected by on-site and telephone interview, by the Survey Research Laboratory of the University of Illinois. The survey area consists of a thirteen county region, which includes eleven major water sites, in east-central Illinois.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

3.0020, STUDY OF RECREATION ON INSTITUTIONALIZED AGED

A.D. PARKER, Univ. of Illinois, Graduate School, Urbana, Illinois

Often a home for the aged is regarded as a place where older adults, having served their purpose in life, are placed in isolation to pass their remaining years in apathy. Many people assume that a home for the aged is about the same as a 'poor house.' Generally, administrators of institutions for the aged are of necessity primarily concerned with the problems related to medical attention and custodial care. Research needs to be undertaken to reveal some specific action which could be taken to enrich the lives of the institutionalized aged and define new areas of study needed to discover further scientific data regarding recreation in the institutionalized setting.

It is the purpose of this investigation to study the influences of recreation on: (1) the amount of nursing care, (2) the amount and kinds of medications, (3) frequency of night wanderings, (4) personal grooming, (5) social adjustment, and (6) patient satisfaction and positive involvement.

In the remainder of this paper the above six indices will be mentioned collectively as the 'criteria' or measures of adjustment.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - P.H.S.

3.0021, NATIONAL CAMPING SURVEY FOR DISADVANTAGED YOUTH

R.E. CARLSON, Indiana University, Graduate School, Bloomington, Indiana 47405

A study to appraise camping opportunities for youth, particularly those disadvantaged youth from central city and rural poverty areas. Included: (a) national estimate of total number of youth in camps during June 15- September 15, 1968, (b) small sample surveys to determine values of camping, substitutes or alternatives, obstacles encountered in serving disadvantaged youth, problems encountered by camp operators, and social agencies, (c) monitoring of selected camps to develop models of camping success, and (d) preparation of a manual of procedures for community action in camping.

SUPPORTED BY U.S. Executive Office - O.E.O.

3.0022, A STUDY OF SOME EFFECTS OF JUNKYARDS SCREENING AND BILLBOARD DENSITY

C.I. MACGILLIVRAY, Purdue University, Joint Highway Research Project, Lafayette - West Lafayette, Indiana 47907

The purpose of this study is to examine some effects of junkyards and concentrations of billboards. The reactions of motorists to various degrees and types of junkyard screening and to various concentrations of billboards is being determined, primarily from an aesthetic viewpoint. The procedure used consists of a color motion picture film, of a selected samples of both junkyards and billboards, being shown to audiences which in turn indicate their reactions to and preferences for the views they see. The film was created to show the view motorists would see as they travel along a road in the area of the sample. Initial results indicated the public has a strong dissatisfaction for billboard densities greater than about nine per mile. The public also was found to have a qualitative preference for increased degrees of screening and a dislike for the obvious presence of junkyards.

SUPPORTED BY U.S. Dept. of Transportation - Public Rds

3.0023, WATERFOWL POPULATIONS AND RECREATIONAL USE PATTERNS IN THE PROPOSED SAYLORVILLE RESERVOIR AREA AS RELATED TO PRE-IMPONDMENT CONDITIONS

A.O. HAUGEN, Iowa State University, School of Agriculture, Ames, Iowa 50010

3. USER STUDIES

Summary of Proposed Work: This study comprises the first phase of what should be considered a two-phase study to determine the impact of the alteration of an environment on waterfowl populations and recreational use patterns at the Saylorville impoundment now under construction on the Des Moines River in central Iowa. The impoundment is expected to dramatically affect wildlife habitat in the area. A measure of these changes and subsequent changes in wildlife recreational use patterns of the areas are major goals of this study.

Use of the area as it now exists, its accessibility, major recreational values and use patterns, and the origin and other characteristics of users will be obtained through field checks, time-lapse cameras, pneumatic car counters, and through questionnaire and interview techniques. The Iowa State University Statistical Laboratory will aid in setting up a sampling system.

Automatic recording devices will record data on daily, weekly and seasonal cycles and fluctuations in recreational activities. Data secured should be of use for planning, zoning or other regulations needed to minimize friction between different types of users on similar impoundments elsewhere.

Scheduled completion date June 30, 1970.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

3.0024. FOREST-RECREATION INVESTMENT OPPORTUNITIES IN IOWA

H.H. WEBSTER, Iowa State University, School of Agriculture, Ames, Iowa 50010

To date this project has identified Iowans' participation rates in approximately 25 different outdoor recreation activities by means of an interview survey. These participation rates were linked to social and economic characteristics of survey respondents through multiple regression analysis. Projects of future participations to 1980 were then made using available estimates of social and economic characteristics of Iowa's population in the specific future years. It was found that intensively developed activities such as golf, bird-watching and nature walks are likely to expand much more rapidly than traditional outdoor recreation activities such as hunting and fishing. It was also found that Iowans' outdoor recreation preferences differ markedly from national averages as reported by ORRRC and BOR.

This project will be revised in the near future. New projections will be made after developing a technique for optimally combining the cross-section analysis mentioned above, and differences between projected and actual participation rates during the period since the first projections were made. Intensity of preferences for particular activities, and the effects of new facilities on participation, will also be explored.

SUPPORTED BY U.S. Dept. of Agriculture

3.0025. POST-SEASON SMALL GAME TELEPHONE KILL-DATA SURVEY

L.K. NELSON, State Dept. of Fish & Wl. Rso., Frankfort, Kentucky 40601

Objectives: To demonstrate the feasibility of obtaining small game kill-data through a post-season telephone survey in Kentucky.

Procedure: Due to a direct-line set-up it is possible to place a telephone call from the Frankfort Central Office, without charge, to any listed phone number in the State of Kentucky. In view of this fact, and the knowledge that telephone surveys have been used successfully to obtain kill and other data in other states (i.e. Louisiana and Tennessee) it was decided to attempt to design and test a survey that would give reasonably accurate small game kill information. The survey was inaugurated during the 1964-65 segment.

This survey has the following advantages over a license stub survey: 1. It samples those hunters who do not have to buy a hunting license (i.e. those over 65 years of age, people who hunt on their own land, tenants who hunt on the land upon which they reside and possibly some who hunt illegally without a license). 2. It eliminates the knotty problem of dealing with two license frames necessitated by the hunting license renewal date falling during the hunting season. 3. It provides kill-data within a reasonable time after the close of the hunting season. 4. An up-to-date list of phone exchanges and total numbers of subscribers will

be obtained from the Southern Bell Telephone and Telegraph Co. and independent companies operating in Kentucky. Assistance of the Institute of Statistics will be required to assemble the exchange listings into a frame, designating the frames to be utilized, and delineating the sampling units. Phone directories will be obtained by project personnel from the telephone companies included in the sample. The sample size will be set by the Institute.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0026. SOCIAL FACTORS IN THE DEVELOPMENT AND USE OF KENTUCKY'S NATURAL RESOURCES FOR OUTDOOR RECREATION

R.J. BURDGE, Univ. of Kentucky, Graduate School, Lexington, Kentucky 40506

1. To determine current patterns and trends in outdoor recreational participation in Kentucky; to measure the extent and patterns of utilization of present facilities; and to assess the implications of these to future outdoor recreational needs, development and utilization. 2. To measure the attitudes of various populations toward outdoor recreation needs and priorities, toward existing and projected facilities and programs and toward natural resource development for recreation and non-recreational purposes. 3. To assess the social and demographic consequences (especially population shift and stratification mix) of projected resource development and recreational projects, such as flood control reservoirs, parks and recreation areas, and special use and preservation projects. 4. To relate socioeconomic and demographic characteristics of outdoor recreation users and potential users to the types of facilities and programs used or desired. 5. From the above to begin the development and limited testing of propositions to form the outline for a model of the sociology of outdoor recreation which would contribute to a comprehensive understanding of recreation and leisure-related behavior and institutions.

SUPPORTED BY University of Kentucky

3.0027. CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

T.J. CORCORAN, Univ. of Maine, Agricultural Experiment Sta., Orono, Maine 04473

In regard to resident and non-resident hunters and fishermen of Maine, it is proposed: 1. To identify and analyze those social, psychological and economic variables which motivate consumers to participate in outdoor recreational activities. 2. To ascertain and evaluate consumer satisfaction with locational and environmental factors as they relate to consumption patterns. 3. To identify and analyze the reactions of participants to rules and regulations, physical facilities, social activities and off-site accessory attractants. 4. To identify and analyze the expenditures incurred by those who actively participate in outdoor recreational activities.

By means of periodic mail question survey of a random sample of license holders, a licensing history, information on consumer characteristics, satisfaction with locational and environmental factors, reactions to regulations and facilities, and expenditures will be collected, analyzed and interpreted.

Project started September 24, 1965 and is to be terminated June 30, 1970.

Interim reports available by contacting Mr. Whittaker.

SUPPORTED BY U.S. Dept. of Agriculture

3.0028. MEASUREMENTS OF THE ANNUAL WATERFOWL HUNTING ACTIVITY

C.H. LOBDELL, U.S. Dept. of Interior, Mig. Bird Population Station, Laurel, Maryland 20810

Objectives: 1. To obtain estimates, by States and flyways, of the total number of potential waterfowl hunters, the percent of adult hunters active (hunted at least once), the average number of days hunted per potential adult waterfowl hunter, and the percent of active adult hunters that were successful (bagged one or more birds). 2. To compute the percentage changes in these estimates from those of the previous hunting season.

3. USER STUDIES

Procedure: To obtain duck stamp sales data from the Post Office Department and to use these in combination with the mail questionnaire sample survey data, to obtain the necessary estimates of hunter activity and success for each State and flyway.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0029, EVAL. AND RE-ANALYSIS OF MAIL QUEST. SURVEY OF WATERFOWL HUNTERS

E.M. MARTIN, U.S. Dept. of Interior, Mig. Bird Population Station, Laurel, Maryland 20810

The purpose of this project is to evaluate and improve procedures for collecting and analyzing mail questionnaire survey data. This evaluation is based mainly on a detailed statistical examination of the accumulated information contained in and related to all the Bureau's mail surveys to date. The goal is the discovery of those data gathering and processing techniques which best satisfy our needs in terms of usefulness, efficiency, reliability, and accuracy, both for application to future surveys and for re-analysis of past survey data to yield the most meaningful and comparable results. The re-analysis will be accomplished when it is felt that the techniques have been sufficiently developed and standardized.

Because of existing priorities, only a little work is done on this unit annually. Emphasis is presently on evaluating the sources of variability in our current mail questionnaire survey data and testing various types of stratification in an attempt to control as much of this variability as possible and keep it from inflating our estimates of sampling error.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0030, CHARACTERISTICS OF HUNTER ACTIVITY AND SUCCESS

E.M. MARTIN, U.S. Dept. of Interior, Mig. Bird Population Station, Laurel, Maryland 20810

The purposes of this study are to establish a basis for more accurately predicting the results of a given set of hunting regulations and thus increase the efficiency of using regulations as management tools, and to measure the amount of recreation which has been provided by waterfowl hunting in terms of its distribution among the people of each State for use in planning for a more adequate distribution in the future.

Data on hunting activity characteristics will be obtained from the Bureau's 1967 Mail Questionnaire Survey of Waterfowl Hunters. These data from the previous three seasons. The findings will then either be presented in a separate administrative report as in previous years or incorporated into the annual Waterfowl Status Report. A decision will be made as to the value of presenting these findings on a yearly basis versus periodic updating every two or three years unless significant changes occur in a particular season. If time permits, an effort will be made to relate hunting regulations to hunter characteristics this year now that data for several seasons are available.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0031, SOURCES OF ERROR IN THE OUTDOOR RECREATION RESOURCES REVIEW COMMISSIONS PROJECTIONS OF PARTICIPATION LEVELS FOR OUTDOOR RECREATION ACTIVITIES

S.P. SHAPLEY, Univ. of Michigan, Graduate School, Ann Arbor, Michigan

The research identifies five possible causes for the Outdoor Recreation Resources Review Commission's under-estimation of the 1960 to 1965 increase in summer participation in sixteen outdoor recreation activities. The data of the 1960 and 1965 National Recreation Surveys will be used to evaluate how much three of these causes contributed to the inaccurate projections. The results will be examined for their significance for improving participation projections. The thesis also discusses how the use of participation projections affects attainment of efficiency in recreation investment decisions. It is concluded that such projections, if used properly, can aid identifying efficient investment decisions.

SUPPORTED BY University of Michigan

3.0032, HUNTER ATTITUDE SURVEYS

L.A. RYEL, State Res. & Dev. Division, Lansing, Michigan 48926

Objectives: To conduct mail and/or interview surveys to determine hunters' attitudes concerning various aspects of hunting.

Procedure: Obtain a statistically adequate sample of licensees from license application files and obtain at least a 90 percent response rate by mail questionnaire or personal interview.

Relatively simple questions will probably be handled through mail contact while more complex situations can best be evaluated through personal interviews. In the case of interview surveys, questionnaire designs and interviewer training will be accomplished in cooperation with a competent survey agency such as the Survey Research Center at the University of Michigan.

Activity on this job will depend on current need for such surveys, particularly in connection with any deer seasons. It is expected that a mail survey of about 1,200 deer hunters concerning opinions on the necessity of hunting antlerless deer, and what factors contribute to deer numbers, will be conducted. Additional deer hunter surveys may be needed depending on final deer hunting regulations. Samples of small game hunters may be interviewed to determine their preference for various types of seasons or regulations and their behavior in certain hunting situations.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0033, RECENT VACATIONS AND PLEASURE TRIPS TAKEN BY TWIN CITIANS

G.D. TAYLOR, Mid Cont. Surveys, Minneapolis, Minnesota

The purpose of the survey was to determine the proportion of twin cities families which take vacations or pleasure trips on which they are away from home for at least one night. More specifically, the objectives were to determine: 1) what activities Twin Cities look for when on vacation 2) How many vacations or pleasure trips were taken in the last 12 months. 3) What mode of transportation was used. 4) What overnight accommodations were used.

A questionnaire form was designed and administered to a sample of 659 Twin Cities households by means of a telephone interview.

SUPPORTED BY Manitoba Provincial Government

3.0034, RECREATION ATTITUDE MEASUREMENT METHODS

R.G. BUCHMAN, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta., Saint Paul, Minnesota 55101

This study will evaluate the effect of several types of photographic displays and of several methods of rating photographs. The results of the several methods of display and of the several types of rating will be related to a number of user characteristics. More specifically: Is the recreationist capable of rating photographs of outdoor recreation situations on an equal-interval subjective scale? How useful in such situations are the paired-comparisons methods, judgments using limited categories, and 'magnitude estimation' judgments with unlimited categories but specified origin? Are the results using a natural background containing the features of interest comparable to the results when a natural background with the features of interest artificially superimposed is used? Are the results using a restricted water passage in the scene comparable to the results when an expanse of water is used? How do the user characteristics such as sex, age, experience, and method of travel relate to the different methods of presentation and to the different response methods?

SUPPORTED BY U.S. Dept. of Agriculture

3.0035, FACTORS AFFECTING THE DISTRIBUTION OF CAMPERS AMONG AUTO-CAMPGROUNDS IN THE SUPERIOR NATIONAL FOREST OF MINNESOTA

D.W. LIME, U.S. Dept. of Agriculture, North Cen. Forest Expt. Sta., Saint Paul, Minnesota 55101

3. USER STUDIES

To determine the distribution of users among 34 auto-campgrounds of the Superior National Forest. To correlate the distribution of users to site and location characteristics of auto-campgrounds. To determine from users what factors affected their decision to choose one auto-campground rather than another. To compare important user factors with significant ones from the use distribution analysis. To suggest additional site and location variables which should be included in the original resource-oriented model.

SUPPORTED BY U.S. Dept. of Agriculture

3.0036, THE CAMPERS AND OUTFITTERS OF THE BOUNDARY WATERS CANOE AREA - THEIR ATTITUDES AND INTERACTIONS

S.F. MCCOOL, Univ. of Minnesota, Graduate School, Saint Paul, Minnesota

To describe the social psychology of the outfitting process. To determine the role of the outfitter in the wilderness experience. To determine user and outfitter attitudes toward the management of the Boundary Waters Canoe Area. To determine communication patterns between the Forest Service and the outfitters.

SUPPORTED BY U.S. Dept. of Agriculture

3.0037, STUDY OF RELATIONSHIP BETWEEN RECREATIONAL LAND MANAGEMENT & USERS SATISFACTION AT SEVERAL MINNESOTA PARK & FOREST RECREATION AREAS

L.C. MERRIAM, Univ. of Minnesota, Agricultural Experiment Sta., Saint Paul, Minnesota

1. To study and analyze the recreational use, development, management objectives of several Minnesota State Forests and state parks. 2. (a) To study recreation areas visitors to determine the imagery they have of nature, the forest, wildland (wilderness), and outdoor recreation, and (b) to find whether city people transpose urban recreation habits to forest environments. 3. To determine how user satisfaction is influenced by management. 4. To determine how these management user interactions influence area and regional recreation planning and programs.

Areas of Study: St. Croix and Scenic State Parks, and other Minnesota parks and forests. The study hypothesis is that urban recreationists transpose their imagery and recreation habits to rural forest and park area as evidenced by choice of activity and development preferences. Study to continue for five years with re-evaluation for further study.

SUPPORTED BY U.S. Dept. of Agriculture

3.0038, RECREATION IN MANAGEMENT OF MINNESOTA MEMORIAL HARDWOOD FOREST (ABBREVIATED)

L.C. MERRIAM, Univ. of Minnesota, Agricultural Experiment Sta., Saint Paul, Minnesota

Objectives: 1. To study the recreation use patterns of the Memorial Hardwood Forest to determine types of uses, users and the attractive features of the Forest as a recreation destination. 2. To study land, forest and general environmental capability in relation to recreation user desires and Forest potentials for recreation in multi-resource use framework. Special emphasis to be placed on the Whitewater drainage with comparison as applicable to the other major drainages. 3. To develop recreation policy guidelines possibly helpful to managers of the Memorial Hardwood Forest.

Work to include field study of Forest in relation to potential and proposed recreation use; study of recreation users. Scheduled for completion 1970.

SUPPORTED BY U.S. Dept. of Agriculture

3.0039, POST-SEASON SMALL GAME HARVEST MAIL SURVEY

F.W. SAMPSON, State Dept. of Conserv., Jefferson City, Missouri 65102

To develop a statistically reliable post-season mail survey suited to our facilities for estimating annual harvests, hunter success and related information for as many small game species as

feasible. This study is intended to serve as background data for more detailed species research and to supplant the hunter contact field bag check.

Systematic randomized samples will be obtained from duplicate copies of the 1969 resident small game hunting and combination hunting and fishing permits for survey of hunters in the 1969-70 season. Statistical specialists will be consulted as to sample size and techniques to be used in deriving projections statewide and for zoogeographic regions. Questionnaire design will request information on hunter activity including number of each species killed, county where hunted and number of days or trips each species was hunted. Species considered for inclusion are rabbit, squirrels, quail, dove, raccoon, woodchuck, ducks, geese, crow and pheasant. An initial mailing will be made at the close of all hunting seasons (early March, 1970) with two follow-up mailings to non-respondents at intervals of three to four weeks. Outside IBM machine and computer service will be used for addressing questionnaires, follow-up finder cards, data cards and processing of data.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0040, STATEWIDE CREEL CENSUS

G.D. HOLTON, State Fish & Game Department, Helena, Montana 59601

The main purpose of this project is to determine the number of fishermen days spent in Montana annually and how they are distributed over the waters of the state. Information will be collected on as many lakes and streams as possible.

The sampling plan has been developed with the assistance of a statistician.

Questionnaires will be mailed to samples of resident fishermen twice a month during the main fishing season and once a month during the remainder of the year. Holders of nonresident one-day, six-day, and seasonal licenses will also be sent questionnaires throughout the year on schedule adapted to the type of license and the season. Nonrespondents will be sent one followup questionnaire.

Unlicensed fishermen (i.e., fishermen under 15 years and residents of certain state institutions) will not be censused.

Data from these surveys will be combined in a program to be written for the IBM 360 computer which will permit storage of these data on magnetic tapes. The data can be added to previously collected data over a period of several years until the sample size is adequate on the smaller bodies of water to estimate pressure.

Also, the fisherman log program will be continued. Cooperating fishermen maintain logs of their fishing in booklets furnished by the Fish and Game Department. In December the booklets are recalled, the data are punched onto IBM cards, and the booklets returned to the individual anglers. The information on fishing effort and success is compiled by individual water and filed in district headquarters and in the Helena fisheries office.

Maintenance of the master lake and stream list and file will be part of this job.

Completion report due: June 30, 1970.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0041, PILOT STUDY FOR A BASIC WILDERNESS USE SURVEY

R.C. LUCAS, U.S. Dept. of Agriculture, Forestry Sciences Laboratory, Missoula, Montana 59801

To test a mail survey approach, based on three trail registration systems, registration responses to each will be observed on the National Forest Wilderness trail in summer, another in fall, and, if possible, on one National Park trail in summer, until a specified number of individuals' reactions to each system have been recorded. Nonregistrants will be personally contacted. Differences will be tested between the three systems. Response rates will be measured for each system and area, with up to four followup reminders used to evaluate the value of followups. Trail registrants will be asked for names and addresses of other party members. Completeness of this data will be measured. A questionnaire will be mailed to each sample individual.

3. USER STUDIES

Nonrespondents will be checked through telephone interviews. Completeness and 'face-validity' of questionnaire responses will be evaluated to refine the form.

SUPPORTED BY U.S. Dept. of Agriculture

3.0042, WILDERNESS USER ATTITUDES AS THEY INFLUENCE TRAVEL PATTERNS IN THE ANACONDA-PINTLAR WILDERNESS AREA S.S. FRISSELL, Univ. of Montana, Graduate School, Missoula, Montana 59801

A basic objective in the management of wilderness areas is the provision of a high-quality experience for the visitor. For many, solitude is an important aspect of the wilderness experience. Meeting excessive numbers of people or even a few of the wrong type of people may seriously reduce the quality of one's visit to a wilderness area.

Data on user attitudes toward crowding and their reactions to meeting people participating in other forms of wilderness use can be valuable in determining the social carrying capacity of a wilderness area. This information can then be used to develop use-dispersal programs designed to prevent user concentration from exceeding the social carrying capacity.

User management programs of the type described above will require a much more complete understanding of wilderness visitors. This study is designed to: 1) describe the patterns of recreation users in the Anaconda-Pintlar Wilderness Area, 2) investigate the factors which may influence or affect the travel patterns, including the attitudes of the various types of users toward one another, 3) evaluate the implications of the study findings on programs for the dispersal of wilderness use and the development of new trails.

SUPPORTED BY University of Montana

3.0043, EVALUATION OF DEMANDS UPON NEW HAMPSHIRE'S GAME RESOURCES H.C. LACAILLADE, State Fish & Game Department, Concord, New Hampshire 03301

Objectives: To make available for larger distribution a popularized version of a 'Mail Questionnaire Survey' report which measures hunting demand for various game species and analyzes the current recreational status of the State's wildlife resources as related to demand by resident and non-resident licenseholders.

Procedure: Assessment of demands which sportsman impose upon New Hampshire's game and freshwater fish resources was determined by a questionnaire mailed to a random sample of 1964 resident and non resident licenseholders. The questionnaire inquired as to the number of times individual respondents fished or hunted during 1964 and their preferences for each species of game and freshwater fish found in New Hampshire. A completion report on this job was submitted in September 1966.

The procedure used in converting this report into a more readable form which benefits the general public has been to single out the most absorbing items and those which best describe the importance of various game species and activities of hunters in this state. These items have been presented in an easy to grasp style with a full measure of charts and illustrations.

The current segment involves publication of this report which includes artwork and printing.

The technical version of the report incorporated data which applied to both fish and wildlife species. This popularized version deals only with game species. A corresponding endeavor relating to fish is contemplated for a later date.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0044, EFFECT OF USER-FEES ON CAMPING FREQUENCIES & DESTINATIONS AMONG REPRESENTATIVE SAMPLE OF 1967 VISITORS TO NEW HAMPSHIRE STATE PARK SYS W.F. LAPAGE, U.S. Dept. of Agriculture, N.E. Forest Experiment Station, Durham, New Hampshire 03824

To determine how fees influence decisions of when, where, and how much to camp and, secondarily, to assess how attitudes

toward fees vary with camper equipment, experience, and participation patterns. The objective of a follow-up survey of these same campers is to assess the interview situation in terms of the sensitivity of the subject and the comparability of different interviews.

SUPPORTED BY U.S. Dept. of Agriculture

3.0045, A PANEL STUDY OF TRENDS IN LEISURE BEHAVIOR AMONG VISITORS TO EIGHT (8) LARGE CAMPGROUNDS IN NEW ENGLAND W.F. LAPAGE, U.S. Dept. of Agriculture, N.E. Forest Experiment Station, Durham, New Hampshire 03824

To trace consumer trends in camping frequency, camping equipment purchases, family size, income, and leisure interests over a five-year period. A secondary objective is to identify the ways in which campers are involved in their camping, and how involvement influences participation.

SUPPORTED BY U.S. Dept. of Agriculture

3.0046, RESOURCE PERCEPTIONS AND DESTINATION DECISIONS OF MAINE COAST CAMPERS W.F. LAPAGE, U.S. Dept. of Agriculture, N.E. Forest Experiment Station, Durham, New Hampshire 03824

The objectives of this study are to determine how campers perceive homogenous recreation regions (in terms of their willingness to make substitutions among campgrounds); where they obtain information about recreation regions, and what factors influence their substitution decisions.

SUPPORTED BY U.S. Dept. of Agriculture

3.0047, SMALL GAME TAKE SURVEY H.F. MAGUIRE, State Div. of Fish & Game, Albany, New York 12226

Objectives: To collect information on small game take and related hunter activities by a prepaid mailed questionnaire sampling of approximately 33,000 holders of New York State 1968-69 Hunting and Fishing (combination) and Hunting licenses.

Procedure: Design of questionnaire -- Research and management personnel suggest questions to be included in the succeeding year's questionnaire each August or September. Conferences are held to decide content of questionnaires. A mock-up of the proposed questionnaire is submitted for approval prior to November.

Preparation of trapping licenses sold through county clerks and through the Division of Law Enforcement are mailed to the Finance Division. The Sample will include a selection of licensees from Citizen-Residents 70 years of age and older who have received free hunting licenses. All copies are made available to the Game Take Survey unit. Resident hunting, and Non-resident/alien hunting copies are separated from other materials and sampled by the Survey unit. These copies constitute the population stock from which the sample is drawn.

Selection of sample -- The Sample is selected by the project leader or assistant leader, assisted by a clerk(s). The sampling interval (n) is the quotient of the total licenses issued divided by the sample size. Every nth stub is selected by using a tickometer with clean, firmly packed stubs or by spade or counting with 'rough' stubs.

Tabulation of and analysis of collected data -- A. Mechanical calculation of standard errors of estimate. B. Manual - Take and days afield for two or three species are manually tabulated by the hunter's county of residence and county of kill.

Presentation of data - Figures for each species on numbers of hunters afield, number of days afield and number taken are published in news releases approximately three weeks after the coding of questionnaires has been completed. An illustrated article then is prepared for the Department's magazine, The Conservationist.

3. USER STUDIES

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0048, BIG GAME HUNTING PRESSURE SURVEY H.F. MAGUIRE, State Div. of Fish & Game, Albany, New York 12226

Objectives: To sample 45,000 holders of big game and archery licenses to obtain information on deer hunter's days afield and success by areas hunted in. Related information has been collected on: (1) other licenses held by the big game and archery licensee; (2) location and number of dead deer seen while afield, and (3) the hunter's expenditures for deer hunting.

Procedures: Data cards have been punched and the programming of the first phase of the tabulations was completed in February-March, 1967. The preparation of a punched card Post Office Master File showing counties, towns, and zones of the licensees' residence and deer zones has been largely completed.

Tabulation and analysis of the collected data: Punched data cards have been prepared for each questionnaire returned by a gun licensee. Tabulations will be made by computer. Archery questionnaires will be manually tabulated in gross categories to provide information by three major zones only for licenses held, type land hunted on, success ratios and expenditures.

Tabulation of the first phase of the mailed questionnaire survey will be accomplished with computer by the Office of General Services.

Tabulations will consist of frequency distributions of data by waves and combinations of waves, on (1) day of month hunted; (2) number of days afield; (3) hours afield each day; (4) deer zones hunted in; (5) success by license and permit held. Each table also will show the hunter's origin by five major sources: a) Urban resident of deer zone hunted in, b) Rural resident of deer zone hunted in, c) Urban state resident who is not a resident of the deer zone hunted in, d) Rural state resident who is not a resident of the deer zone hunted in, and e) Out of state hunters.

Standard errors will be calculated by computer for each series of tabulated data to permit quick and statistically valid comparisons between waves, zones, and license combinations.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.9649, HUNTER AGE-SEX SURVEY H.F. MAGUIRE, State Div. of Fish & Game, Albany, New York 12226

Procedure: 1. Reproducing and interpreting. In the current fiscal year the right side (second record) of each card will be reproduced and the reproduced cards will be interpreted. 2. Sorting and collating. Cards will be sorted by Post Office and matched against a master Post Office file that will supply the appropriate residence code number. These code numbers then will be gang-punched into the address cards. This process saves about fifty man-days of coding and minimizes error. 3. Tabulation and analysis: These operations entail preparation of tables by type license, sex, age by frequency distribution, and by licensees' county or state of residence. Means, medians and standard errors of means will be calculated for each county or state. 4. Presentation. An illustrated article and project reports will be prepared within 3 months after the completion of the tabulations.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0050, AN ANALYSIS OF ENVIRONMENTAL PERCEPTION AND ATTITUDES D. LOWENTHAL, Amer. Geographical Society, New York, New York 10032

The proposed research would extend Lowenthal's reconnaissance study of environmental perception which was supported by a prior RFF grant. Observer perception and associated attitudes will be surveyed for (a) subjects of similar background and education observing basically different visual environments, e.g., rural as opposed to urban and regionally differentiated landscapes (New England and Midwestern), and (b) subjects who are significantly different in terms of their social, cultural, and economic characteristics but who are observing identical landscape forms. With appropriate statistical analysis, the survey results would test whether there are certain attributes of the environment which are

perceived in the same way by all individuals, and other attributes which are perceived variously by observers with different social, cultural, and economic characteristics. These results and their implication for environmental design will be published in an appropriate form.

SUPPORTED BY Resources For The Future Incorporated

3.0051, AN INVESTIGATION OF LEISURE - LEISURE DIMENSIONS & LEISURE TYPES

J. NEULINGER, City University of New York, Graduate School, New York - City College, New York 10031

Eight areas of leisure research are planned: the conceptualization of leisure, the development of leisure questionnaires, the determination of prevailing leisure attitudes, co-variables of leisure attitudes, the development of leisure attitudes, experimental leisure research, leisure as a social problem, and the promotion of leisure.

Present work is concentrated in areas one and two. Five major dimensions of leisure attitudes have been identified through a factor analysis of an extensive questionnaire dealing with issues ranging through the entire leisure domain. In addition, an attempt is made to characterize people through an identification of behavior patterns (i.e., leisure types), emphasizing ipsative procedures to get at intra-personal dynamic aspects of leisure attitudes.

The relationship of birth-order to leisure and work attitudes is also being investigated.

Leisure is viewed in two ways: one, as a situational variable, i.e., a potential satisfier of personal needs; two, as an experimental variable, i.e., as a resultant process of the person-environment interaction.

This project started in February 1968; the first phase was finished in September, 1968; research is presently going on without a definite completion date. Interim reports are available from the principal investigator.

SUPPORTED BY Russell Sage Foundation

3.0052, EFFECTS OF SAMPLING LOCATION, PERIOD, AND METHOD ON FOREST RECREATION SURVEY RESULTS

E.L. SHAFER, State University of New York, U.S.D.A. Forest Service, Syracuse, New York 13210

The primary objective is to determine whether or not periods (summer months) and camping locations significantly influence the sort of camper attracted to Adirondack camping areas. To test whether less expensive survey methods reproduce the results of a personal interview questionnaire.

SUPPORTED BY U.S. Dept. of Agriculture

3.0053, EFFECTS OF TIMBER MANAGEMENT ACTIVITIES ON ESTHETIC VALUES

E.L. SHAFER, State University of New York, U.S.D.A. Forest Service, Syracuse, New York 13210

To determine if various recreation publics can detect a significant esthetic difference between one-half of an Adirondack stand that was subjected to a selected cut 8 to 10 years ago and the other half that was undisturbed. Scheduled for completion in 1969.

SUPPORTED BY U.S. Dept. of Agriculture

3.0054, QUALITATIVE VALUES OF WILDERNESS RECREATION

E.L. SHAFER, State University of New York, U.S.D.A. Forest Service, Syracuse, New York 13210

To determine if there is a significant difference between wilderness users of the Mount Marcy Tract of New York State and the White Mountain National Forest of New Hampshire in terms of attitudes about wilderness recreation values. Scheduled for completion in 1969.

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SUPPORTED BY U.S. Dept. of Agriculture

3.0055, ATTITUDES ABOUT BIG GAME HUNTERS - A COMPARISON BETWEEN VIOLATORS AND NON-VIOLATORS

E.L. SHAFER, State University of New York, U.S.D.A. Forest Service, Syracuse, New York 13210

To determine if violators differ from nonviolators in terms of selected socioeconomic characteristics and attitudes about big game hunting or management practices. Scheduled for completion in 1969.

SUPPORTED BY U.S. Dept. of Agriculture

3.0056, OUTDOOR RECREATION CONSUMER PATTERNS THROUGHOUT A METROPOLITAN-SUBURBAN-RURAL SPECTRUM

E.L. SHAFER, State University of New York, U.S.D.A. Forest Service, Asheville, North Carolina 28802

To test whether seven standard metropolitan statistical areas (SMSA's) in New York state and five resident districts within these areas differ significantly in terms of (1) resident participation rate in selected outdoor recreation activities, (2) maximum distance traveled to participate in these same activities, and (3) preference for particular outdoor recreation facilities. Scheduled for completion in 1969.

SUPPORTED BY U.S. Dept. of Agriculture

3.0057, PILOT TEST OF SAMPLING PROCEDURES FOR ESTIMATING AMOUNT AND TYPE OF RECREATION USE AT VISITOR INFORMATION SERVICE CENTERS

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802

The primary objective is to pilot test a sampling plan for estimating amount and type of recreation use that occurs at visitor information centers and other similar areas. A second objective is to determine, by use of questionnaire, whether a Forest Service visitor information center is attaining some of the interpretive and informational objectives for which it was established. Scheduled for completion in 1969.

SUPPORTED BY U.S. Dept. of Agriculture

3.0058, A STUDY TO DETERMINE USER REACTION OR PREFERENCE TO/FOR SEVERAL LEVELS OF CANOPY REDUCTION ON DEVELOPED RECREATION SITES

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802

To determine user (camper) reaction or preference to/few several levels of canopy reduction (levels of shade) on a developed recreation site in the Southern Appalachians. Scheduled for completion in 1971.

SUPPORTED BY U.S. Dept. of Agriculture

3.0059, RELATIONS BETWEEN BIG- AND SMALL-GAME HUNTING ACTIVITIES, AND USE OF FOREST ACCESS IN NORTH CAROLINA

G.A. JAMES, U.S. Dept. of Agriculture, S.E. Forest Experiment Station, Asheville, North Carolina 28802

The objectives are twofold: (1) to determine the movement and distribution of hunters in relation to forest access, and (2) to determine relations between demographic characteristics of hunters, the use of access, the nature of hunting activities, and hunting success.

SUPPORTED BY U.S. Dept. of Agriculture

3.0060, A STUDY OF HUNTING METHODS, BEHAVIOR, AND ATTITUDES OF GOOSE HUNTERS IN THE DAKOTAS

G.A. SHERWOOD, U.S. Dept. of Interior, Northern Pr. Wildlife Res. Ctr., Jamestown, North Dakota

Objectives: 1. to evaluate hunting methods, performance, capabilities and attitudes of goose hunters in the Dakotas. 2. To analyze the effect of flyway-wide and local area goose hunting regulations on the kill of geese and on the attitudes and performance of goose hunters. 3. To determine land-owner attitudes and land management practices as they relate to the geese and to goose hunters.

Procedures: 1. Randomly selected hunters will be interviewed concerning their personal hunting history, attitudes regarding hunting regulations and goose identification abilities. Slides of the common species of geese and 'mistake' species will be shown with a desk-top projector for an identification test. 2. Spy-blind observations, photography, hunter contacts and bag checks will be employed to determine hunter compliance, capability and performance. Tape recorders and other specialized audio-visual equipment will be used to determine altitudes geese are shot at, number of shots fired, and crippling and kill rates of geese relative to these factors. Similar records will be kept on 'mistake' species. 3. Land owners will be interviewed to determine their attitudes and problems concerning the geese and the goose hunters. Subjects of leasing and blind fees will be discussed. 4. Land management practices will be determined by periodic checks on selected areas. Recorded items will include type of field (crop, pasture, non-use) and acreage (a) available for goose feeding use, (b) plowed, (c) burned, (d) grazed, (e) open to free public hunting, (f) open to fee hunting, and (g) closed to hunting.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0061, SOCIO-CULTURAL IMPACTS OF WATER RESOURCE DEVELOPMENT IN THE SANTIAM

T.C. HOGG, Oregon State University, Graduate School, Corvallis, Oregon 97331

This project is to examine the effects of Santiam water resource development projects on social organizational (behavioral) and cultural (attitudinal) patterns of Santiam inhabitants. It is to focus on such effects just following the construction phase of the Foster and Green Peter Reservoirs and to test a socio-cultural model of a water resource development project in its institutional phase.

The research will make use of written documents and interview data to ascertain the social and attitudinal characteristics of the people of the Santiam as they relate to the dams. Checks on interview data are to be obtained through the use of a participant observation technique in special community settings.

Comparisons are to be made with on-going and proposed projects in the Western Region. These will include aspects related to the project's developmental cycle, i.e., planning, construction, institutionalization, and evaluation, and those of public recreation and education, political restructuring and economic reorientation, and social and attitudinal adjustments. Interim reports are available.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

3.0062, SOME GEOGRAPHIC ASPECTS OF THE TOURIST INDUSTRY IN METROPOLITAN WASHINGTON

B.F. HOLMES, Penn. State University, Graduate School, University Park, Pennsylvania 16802

Of 800 questionnaires mailed to tourists subsequent to their visits to Metropolitan Washington, 660 were completed and returned. The pattern of commercial recreation and tourism, residence of tourists, means of travel, destinations, volume, length of trips, length of stays, accommodations used, characteristics of visitors, major attractions, revenue, the cultural setting, the historical scene, regionalization, problems potentialities will be analyzed and conclusions formulated. The work is being performed in Metropolitan Washington. Work started in FY 1965, and will be completed in FY 1967. The study endeavors to explain how the use of recreation and tourist attractions in Washington is associated with actual geographical location and spatial relationship. Both empirical and theoretical approaches are employed.

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SUPPORTED BY No Formal Support Reported

3.0063, THE DEMAND FOR WATER BASED RECREATION IN SOUTHWEST PUERTO RICO
R.B. RAMGOLAM, Univ. of Puerto Rico, Water Resources Research Inst., Mayaguez, Puerto Rico

This study will be centered on an estimation of the present and future demand for water based recreation in the southwestern area of Puerto Rico. The primary objectives of the study are: 1) to evaluate the use of water based recreational facilities. 2) To determine people's willingness to pay for the use of the areas and facilities. 3) To examine the characteristics of recreational uses and the effect of these characteristics on demand for various areas and facilities. 4) To determine the satisfaction of visitors with the areas and facilities. 5) To make recommendations, if any, for the improvement of existing areas and facilities and the establishment of new ones.

A questionnaire will be designed to acquire the relevant data by random sampling of use of water-based recreation areas. The data collected will be arranged for analysis by computer to prepare the findings and conclusions for study.

SUPPORTED BY U.S. Dept. of Interior - O. Wtr. Res. Rch.

3.0064, CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST
C. GRATTO, Univ. of Rhode Island, Agricultural Experiment Sta., Kingston, Rhode Island 02881

Objectives: 1. To identify and analyze those social, psychological and economic variables which motivate consumers, to participate in outdoor recreational activities. 2. To ascertain and evaluate consumer satisfaction with locational and environmental factors as they relate to consumption patterns. 3. To identify and analyze the reactions of participants to rules and regulations, physical facilities, social activities, and offsite accessory attractants. 4. To identify and analyze the expenditures incurred by those who actively participate in outdoor recreation activities.

Procedure: This study will focus on one activity, camping in public and private campgrounds. The unit of observation is the party (family, group, individual, etc.) using camp sites in Rhode Island campgrounds. The population is the camp site users who occupy sites in Rhode Island campgrounds for one or more nights during the 1965 season. Analysis will be based on data obtained from a systematic sample of users. Both on-site interviews and mailed questionnaires will be employed. Data will be obtained on camping activity, social and economic characteristics of participants, expenditures, attitudes toward the site, the campground and the area, attitudes toward the rules and regulations under which the campground is operated, and opinions regarding camping facilities wanted and the pricing of such facilities. Standard statistical techniques will be used in analysis of the data. Completion date 6/30/69.

SUPPORTED BY U.S. Dept. of Agriculture

3.0065, AN ANALYSIS OF FACTORS RELEVANT TO THE DEVELOPMENT OF RECREATIONAL RESOURCES
I.A. SPAULDING, Univ. of Rhode Island, Agricultural Experiment Sta., Kingston, Rhode Island 02881

Objective: To analyze social and motivational characteristics of participants in selected outdoor recreational activities using natural resources; priority is given to boating, hunting, fishing, and hiking.

Work proposed: Through Rhode Island's registries and licensing agencies for power boats and hunting and fishing, samples of power boat owners and licensed hunters and fishers will be secured, questionnaires will be used to secure data pertaining to social characteristics, motivation, and response to participation. Hiking clubs will be contacted, and relevant data will be secured by questionnaire and/or interview from members. When desired, intensive case studies relevant to each activity will be made.

SUPPORTED BY Rhode Island State Government

3.0066, CHANGING CONSUMPTION PATTERNS OF THE AGED, 1950-1960
S. GOLDSTEIN, Brown University, Graduate School, Providence, Rhode Island 02912

The proposed research is designed to insure completion of the analysis, on a comparative basis, of the income, expenditures, and savings data from the Bureau of Labor Statistics Survey of Consumer Expenditures, 1950, and Survey of Consumer Expenditures, 1960-61. The overall purpose is to: (1) identify the consumer behavior of the aged in 1960-61 and to compare these patterns with those of younger segments of the population; (2) ascertain the changes in the patterns of income, expenditures, and savings of the aged between 1950 and 1960; and (3) explore means for comparing the behavior of the aged in 1960 with the same cohorts of units ten years earlier in order to identify the patterns of change which take place among given cohorts as they proceed from one stage of the life cycle to another. In all these analyses, special attention will be given to the implications which the housing, medical care, recreation, and other categories of goods and social and psychological adjustments of the aged.

Scheduled for completion in 1969. Interim reports are available from principal investigator.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - P.H.S.

3.0067, PATTERNS OF VACATION TRAVELING, SWEDEN
B. JANSSON, Kungliga Universitetet i Umea, Umea, Sweden

Problem: To investigate patterns of travel during summer vacations with an attempt to isolate factors determining the patterns.

Method: As the nature of the problem is one of interaction and interdependence, the analysis will be based upon the concepts of interaction. Data are being collected through interviews and from statistical material from tourist centers.

SUPPORTED BY No Formal Support

3.0068, DEMAND FOR OUTDOOR RECREATION IN TENNESSEE
J.A. MARTIN, Univ. of Tennessee, Agricultural Experiment Sta., Knoxville, Tennessee 37916

Objective: To determine and describe the demand for specific kinds of outdoor recreation opportunities in Tennessee.

Procedures: Surveys of users and potential users of outdoor recreation facilities will be conducted to determine: 1) the need or desire for additional facilities; 2) what services do users want provided in association with various types of recreation facilities; 3) how much people would be willing to pay for various types of recreation services; 4) how far people would travel to use various types of recreation facilities.

Data for the study will be secured by personal interview with: 1) a sample of urban population stratified by income, occupation and race, and 2) a random sample of population in selected rural areas.

SUPPORTED BY University of Tennessee

3.0069, EFFECTS OF AN EXERCISE PROGRAM ON EMOTIONAL AND PHYSICAL HEALTH AND ON SOMATIC ANXIETY
J.J. WITTRIG, U.S. Veterans Administration, Hospital, Murfreesboro, Tennessee 37130

This study describes psychological changes, including altered emotionality and attitudes, which accrue to men who are given a comprehensive physical fitness training program similar to the one outlined by Cooper.

Subjects for this study are a group of patients in this hospital who have been chosen as the best candidates for an 'Incentive Therapy' program. This program entails a limited work-for-pay schedule, and ultimate hope is that these patients, most of whom

3. USER STUDIES

are chronic hospitalized veterans, may be so benefited that they will in due time become suitable for employment outside this hospital. One of the investigators of this study, Mr. Gordon, is in charge of this program, and it has been his observation that some men previously in the program sometimes have been unable to maintain outside employment because of physical unfitness. Some of these experienced easy fatigability and had strong somatic complaints after a few hours or a few days on the job.

It is proposed that all subjects be given comprehensive physical examinations including blood-pressure, weight, pulse, respiration, EKG, and vital capacity measures. These measures will serve two purposes. First, they will provide clearance for placing men in a comprehensive fitness training program. Second, they will be considered base measures for the detection and quantification of changes in physical characteristics and fitness which may result from fitness training. Then all subjects will be given the test for fitness outlined by Cooper and placed in an appropriate training program. Participants will be subjected to measures of emotionality and somatic anxiety at the beginning of the program, in the middle, and at the end. Other measures will also be taken at the beginning and at the end of the program. These individuals will be studied for a minimum of sixteen weeks. Then all data will be evaluated and decisions concerning further study will be made.

SUPPORTED BY U.S. Veterans Administration

3.0070, RELATIVE EFFECTIVENESS AND VISITOR PREFERENCE OF THREE AUDIO-VISUAL MEDIA USED FOR INTERPRETATION OF AN HISTORIC AREA B.D. MAHAFFEY, Texas A & M University System, Graduate School, College Station, Texas 77843

Various kinds of interpretive audio-visual media are used for historical interpretation without being field tested for user preference or effectiveness in terms of perception and retention of correct factual information. More effective interpretation is needed, locally and nationally, and additional knowledge of media effectiveness and preference could improve present techniques.

The objectives of this study: Test the relative effectiveness of leaflets, signs, and message recorders used for self-guiding tours; investigate the relationship between selected socioeconomic characteristics of the users and the effectiveness of each medium tested; investigate the users' preference for the three media; compare the users' expressed preference for the media with the relative effectiveness of the media.

The site of the experiment is Fort Parker State Historic Site, Texas. An experimental historic tour to be established and questionnaire to be administered to determine socioeconomic background, media preference and information retention.

SUPPORTED BY Texas A. & M. University System

3.0071, PREDICTIVE MODEL TO MAXIMIZE AMENITIES FROM ENVIRONMENTAL DESIGN FEATURES EMPLOYED IN DEVELOPMENT OF MULTIPLE ACTIVITY RESERVOIR RECREATION SITES J.D. MERTES, Texas A & M University System, Graduate School, College Station, Texas 77843

The objective of this study is to measure environmental response of users to certain recreation site amenities and develop a predictive model based upon user preferences. More specifically, the objectives include: a comparison of designer's objectives and users' response to specific micro-environments; the degree of perceptive response of users; relationship between activity and perception of environment surrounding that activity; and the development of a predictive model based upon the above results.

The research will employ inspection of sites and implementation of semantic differential scales during visitor use.

The work will be performed on selected multiple use reservoirs controlled by the Corps of Engineers within the Fort Worth District.

SUPPORTED BY U.S. Dept. of Defense - Army

3.0072, SURVEY OF RECREATIONAL PATTERNS AMONG TEXAS A&M UNIVERSITY GRADUATE STUDENTS W.V. STELL, Texas A & M University System, Graduate School, College Station, Texas 77843

This study is designed to test for differences among the recreational patterns of graduate students as classified by selected socio-economic characteristics in an effort to define the role of the university in alleviating existing recreational problems and providing impetus in establishing a recreation and park program for the university campus. The study will survey, by use of a mailout questionnaire, the graduate students enrolled and residing at Texas A&M University during the 1969 Spring semester.

SUPPORTED BY Texas A. & M. University System

3.0073, INVESTIGATION OF LOCATION, SUPPLY, & SOCIO-ECONOMIC VARIABLES AS FACTORS INFLUENCING PREFERENCES FOR WATER-BASED RECREATION IN EAST TEXAS J.C. STRIBLING, Texas A & M University System, Graduate School, College Station, Texas 77843

The purpose of this research is to investigate reasons underlying differential magnitudes of preference for fresh water water-based recreation activities in East Texas as opposed to those occurring on salt water, through identification and measurement of selected variables affecting participation decisions regarding choice of recreation destination.

In order to accomplish the above, several sub-objectives must be included. (a) To formulate a socio-economic profile of a test population, including pertinent information regarding participation in recreational boating. (b) To investigate actual participation of a test population in terms of frequency of use, locational aspects, and preferred destinations. (c) To quantify differential preferences for salt water versus fresh water boating opportunities among the test population. (d) To isolate those variables which relate to demonstrated preference for specific boating opportunities among the test population.

SUPPORTED BY No Formal Support Reported

3.0074, OHIO RECREATIONAL BOATING SURVEY C.S. VANDOREN, Texas A & M University System, Graduate School, College Station, Texas 77843

A spatial analysis of boaters trips to publicly owned lakes was the first of a three-phase analysis based on data collected during the Summer of 1966 in the Ohio Recreational Boating Survey. The overall objective of Phase One was to analyze the spatial behavior of boaters. This phase is completed.

Phase Two of the study will include an analysis of the social characteristics of boaters as related to their choices of lakes and boating activities.

Phase Three of the survey is directly concerned with the environment of the lakes in terms of how boaters perceive and react to variation in the quality of the resources for boating. Work is being performed primarily at Ohio State University. Project started June, 1966 - anticipated completion, 1969.

SUPPORTED BY Ohio State University

3.0075, A TEST OF VISITOR-USE ESTIMATION BASED ON SELF REGISTRATION AT DEVELOPED RECREATION SITES J.A. WAGAR, Utah State University, U.S.D.A. Intermt. For. Sta., Logan, Utah 84321

This study uses a system of self-registration cards and sample counts of recreational use to estimate the amount of visitor use in each activity on a recreation area. Regression methods are used to relate on-the-hour counts of visitors to the registration record. Relationships are then used to estimate visitor use for an entire season. All computations are programmed for computer handling.

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SUPPORTED BY U.S. Dept. of Agriculture

3.0076, CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST.

M.I. BEVINS, Univ. of Vermont, Agricultural Experiment Sta., Burlington, Vermont 05401

Objectives: 1. Primary objective: To identify and analyze social motivations, attitudes, and economic factors which move consumers to participate in specific forest-oriented recreational activities. 2. Secondary objectives: (a) Ascertain and evaluate consumers satisfaction with locational and environmental factors and relate this to consumption patterns. (b) Identify and analyze the reactions of participants to regulations, physical facilities, entertainment programs, and offsite attractions. (c) Identify and analyze expenditures incurred by participants in outdoor recreational activities.

Description of Work Proposed: Participants in a selected activity (such as hunting or fishing) will be surveyed by a mail questionnaire, personal interview, or controlled observations (as is deemed most appropriate) in an attempt to isolate those consumer attributes related to participation in that activity. Marketing areas will be identified and samples of participants will be drawn from these areas. Analysis of data will yield information on magnitudes of influence which variables have on participation rates and patterns. Scheduled completion date 6/30/70. Interim reports are available.

SUPPORTED BY U.S. Dept. of Agriculture

3.0077, DEVELOPMENT OF A QUESTIONNAIRE TO DETERMINE TROUT FISHERMAN PREFERENCE

K.B. CUMMING, Virginia Polytechnic Institute, School of Agriculture, Blacksburg, Virginia 24061

A survey of Virginia's licensed fishing population was conducted during 1967 fiscal year by means of a questionnaire, titled 'Virginia Fishermen' that was sent to 5000 Virginia fishermen. Very few statistics concerning this population were known prior to this survey. The mail questionnaire along with a telephone sampling of non respondents were used. The fishermen were stratified by license type and geographical region.

Various descriptive characteristics were noted in addition to the expenditure patterns. The distribution of both the number of trips taken and annual expenditures showed a very skewed distribution. Further analysis of the distribution is needed.

It was noted that approximately twenty-two percent of the fishermen who held city-county combination (hunting and fishing) licenses also held a state resident fishing license.

SUPPORTED BY Virginia State Government

3.0078, DETERMINING GUIDELINES FOR RECREATION IN MULTIPLE USE LAND MANAGEMENT

C.D. MATTSON, Washington State University, School of Agriculture, Pullman, Washington 99163

This study proposes: 1. To determine the kinds and amounts of recreation use of the Colockum Research Area. 2. To learn the location and pattern of recreation activities engaged in on the area. 3. To learn the motivations, preferences, and satisfactions of users: e.g., origin, group make-up, socio-economic characteristics, equipment used, et al. 5. To identify problems encountered: (a) by users; (b) managers attempting to integrate recreation with other uses of the area. 6. To complete an inventory of presently used and potential recreation sites on the area.

Recreation use patterns covering 18 months have been studied for an 11,000 acre multiple-use research area administered by the Department of Forestry and Range Management at Washington State University. The area covers the complete watershed of a small stream on the east slope of the Cascade Mountains in central Washington. Elevation varies from 2,000-5,500 feet m.s.l. and supports a variety of cover from sagebrush and grass to dense timber.

Recreation use of the area is almost exclusively centered on the native big game, elk and mule deer. Large numbers of visitors are concentrated in the 5-6 week hunting season in October-November. These hunters use the area on both day visits from nearby towns and by camping for periods of 1-10 days. Both visitor classes have been studied to learn: use patterns of the area, characteristics of visitor groups, management problems created and opportunities for harmonizing recreation use with other management purposes of the area.

Field procedures are of four general types: 1. Tallies and meter counts of visitors entering and leaving by several roads. 2. Interviews of samples of visitors leaving the area at several points. 3. Interviews of camping visitors at their camps. 4. Mapping of camping use.

Analysis of data is scheduled for early 1967. Project was begun in FY 66; field work will be completed in FY 67, report and publication in FY 68.

SUPPORTED BY U.S. Dept. of Agriculture

3.0079, TOWARD A THEORY OF RECREATION USE

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To prepare an annotated bibliography of all previous recreation users studies and to index these studies according to the major human behavior variables investigated and the magnitude, form, and reliability of interrelations discovered among them. To code this information for storage and retrieval in a computerized system.

SUPPORTED BY U.S. Dept. of Agriculture

3.0080, DEPRECIATIVE RECREATION BEHAVIOR--ITS INCIDENCE AND CONTROL

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To describe and interpret those recreation behaviors which are inappropriate or depreciative in their effects on recreation environment as perceived by recreation users and managers. To design a system of observation techniques to monitor such behavior for experimental study and to identify and test for the feasibility and effectiveness of some potential management techniques to control such behavior.

SUPPORTED BY U.S. Dept. of Agriculture

3.0081, ORGANIZATIONAL INVOLVEMENT OF CONSERVATION GROUP MEMBERS

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To explore the following aspects of conservation group and outdoor club members: 1. Multiple membership in different conservation organizations. 2. Membership by conservation group members in other unrelated organizations. 3. Relationships between membership in conservation organizations and participation in outdoor recreation. 4. Levels of participation in internal and external operations by members of different types of conservation groups and outdoor clubs.

SUPPORTED BY U.S. Dept. of Agriculture

3.0082, THE EUGENE LADIES OUTDOOR RECREATION EDUCATION PROGRAM AND ATTITUDE CHANGE

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To determine the direction and extent of change in attitude toward the natural environment as a result of participation in a ladies outdoor recreation program.

SUPPORTED BY U.S. Dept. of Agriculture

3.0083, THE ATTRIBUTES OF THE RECREATIONISTS PREFERRED DIFFERENT MANAGEMENT AGENCIES,

3. USER STUDIES

CAR CAMPGROUNDS, OR WILDERNESS IN THE PACIFIC NORTHWEST

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To determine differences in the characteristics of recreationists who habitually visit different types of recreation areas managed by different agencies within the Pacific Northwest.

SUPPORTED BY U.S. Dept. of Agriculture

3.0084, OUTDOOR RECREATIONISTS MEMBERSHIP IN CONSERVATION GROUPS AND OUTDOOR CLUBS IN THE PACIFIC NORTHWEST

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To identify the proportion of different types of recreationists who belong to conservation groups or outdoor clubs in the Pacific Northwest and to compare them with recreationists in general and the population at large.

SUPPORTED BY U.S. Dept. of Agriculture

3.0085, USE AND CONSTRUCTION OF QUESTIONNAIRES FOR RECREATION RESEARCH

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

1. To review and annotate all studies and pertinent literature on the use of mailed questionnaires for reference by recreation researchers. 2. To prepare guidelines to assist recreation researchers and managers wishing to use the questionnaire method to collect information from users.

SUPPORTED BY U.S. Dept. of Agriculture

3.0086, ACTIVITY PREFERENCES OF OUTDOOR RECREATIONISTS IN THE PACIFIC NORTHWEST

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To compare the characteristics of users who participate in certain groups of common activities to determine future trends in recreation participation.

SUPPORTED BY U.S. Dept. of Agriculture

3.0087, MANAGERS PERCEPTION OF WILDERNESS VISITORS ATTITUDES

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To determine what dimensions of wilderness user behavior norms and management preferences are correctly or incorrectly perceived by managers and the source and implications of manager bias.

SUPPORTED BY U.S. Dept. of Agriculture

3.0088, FORESTERS PERCEPTION OF SPECIAL INTEREST GROUP EXPECTATIONS

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

To analyze and compare foresters' perceptions of special interest group expectations and those of their organizations, and the legitimacy foresters attach to these expectations.

SUPPORTED BY U.S. Dept. of Agriculture

3.0089, RURAL-URBAN DIFFERENCES IN OUTDOOR RECREATION PARTICIPATION AND ENVIRONMENTAL PERSPECTIVES

J.C. HENDEE, U.S. Dept. of Agriculture, Pac. Nw. For. & Rg. Expt. Sta., Seattle, Washington

1. To identify and define theories explaining reasons for expecting rural-urban differences in outdoor recreation participation and environmental perspectives. 2. To test the plausibility of as many of these theories as possible with available data. 3. To compare variance in recreation participation explained by rural

versus urban residence versus other demographic variables such as age, sex, education, occupation, etc.

SUPPORTED BY U.S. Dept. of Agriculture

3.0090, CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

K.D. MCINTOSH, West Va. University, Agricultural Experiment Sta., Morgantown, West Virginia 26506

(1) To identify and analyze those social, psychological and economic variables which motivate consumers to participate in outdoor recreational activities. (2) To ascertain and evaluate consumer satisfaction with locational and environmental factors as they relate to consumption patterns. (3) To identify and analyze the reactions of participants to rules and regulations, physical facilities, social activities and off-site accessory attractions. (4) To identify and analyze the expenditures incurred by those who actively participate in outdoor recreational activities.

A random sample of hunting and fishing license holders will be drawn and by use of personal interviews or mail questionnaires, or both, information will be generated to be used in the analysis. Multiple correlation analysis will be used based upon such variables as income, age, education, experience, residency, sex, rural background, and leisure time and the frequency of hunting and fishing. The attitude of hunters and fishermen with regard to hunting and fishing facilities, rules and regulations, attitudes toward landowners and their willingness to pay for the privilege of hunting and fishing on privately-owned lands will be investigated. Interim reports are available.

SUPPORTED BY U.S. Dept. of Agriculture

3.0091, INVESTIGATION OF EFFECT OF PERCEIVED WATER POLLUTION ON PARTICIPATION IN THREE OUTDOOR REC ACTIVITIES - FISHING, BOATING & SWIMMING

E. DAVID, Univ. of Wisconsin, School of Agriculture, Madison, Wisconsin

An investigation of the effect of perceived water pollution on participation in three outdoor recreation activities: fishing, boating, and swimming. The intent is to put perceived pollution into context among other deterrents to participation such as distance, family composition, family income, etc. A sample of adults in Wisconsin will be interviewed in a household study.

SUPPORTED BY University of Wisconsin

3.0092, AN INVESTIGATION OF THE DETERMINANTS OF & DETERRENTS TO PARTICIPATION IN OUTDOOR RECREATION

E. DAVID, Univ. of Wisconsin, School of Agriculture, Madison, Wisconsin

An investigation of the determinants of and deterrents to participation in outdoor recreation. A cross section of adults in the state of Wisconsin were interviewed about their participation in swimming, fishing, boating, canoeing, camping, hunting, picnicking, pleasure driving, winter sports and walking for pleasure. Regression analysis was performed relating participation in each sport to socio-economic characteristics. These characteristics were identical in all the analyses enabling the researcher to trace the influence of one, for example income, through the range of outdoor recreation activities. The results of the study are available in preliminary form.

SUPPORTED BY University of Wisconsin

3.0093, ASSESSING AND IMPROVING THE ABILITY OF HUNTERS TO IDENTIFY FLYING WATERFOWL

J.O. EVARD, Univ. of Wisconsin, Graduate School, Madison, Wisconsin

The success of management of waterfowl by individual species depends significantly upon the ability of hunters to identify birds in flight. The objectives of this study were (1) to determine present levels of ability among duck hunters with respect to

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identifying flying waterfowl, and (2) to determine if such hunter abilities could be improved through the use of a particular identification training program. Twenty experienced and 20 novice hunters from the Madison, Wisconsin area completed field tests in 1967. The experienced hunters correctly identified 74 percent of 166 waterfowl flights, and the novice hunters identified 52 percent of 129 flights. In 1968, a group of 33 'average' hunters from the Horicon, Wisconsin, area completed identification tests in the field. Twenty-four of the 33 hunters were exposed to three training sessions before undergoing field tests. The 'trained' average hunters identified correctly 82 percent of 372 waterfowl flights, and the 'untrained' average hunters identified 70 percent of 308 flights. The data suggest that the majority of duck hunters cannot identify waterfowl on the wing to the degree assumed by present species management regulations, but that the field identification ability of duck hunters can be measurably improved by a training program. Interim Reports are available from principal investigator.

SUPPORTED BY U.S. Dept. of Interior - Bu. Sport Fish.

3.0094, DETERMINATION OF WATERFOWL IDENTIFICATION ABILITIES OF HUNTERS AND EXPLORATION OF POSSIBLE IDENTIFICATION TRAINING AND TESTING PROGRAMS

J.O. EVRARD, Univ. of Wisconsin, Graduate School, Madison, Wisconsin

The success of management of waterfowl by individual species depends significantly upon the ability of hunters to identify birds in flight. The objectives of this study were (1) to determine present levels of ability among duck hunters with respect to identifying flying waterfowl, and (2) to determine if such hunter abilities could be improved through the use of a particular identification training program. Twenty experienced and twenty novice hunters from the Madison, Wisconsin area completed field tests in 1967. The experienced hunters correctly identified 74 percent of 166 waterfowl flights, and the novice hunters identified 52 percent of 129 flights. In 1968, a group of 33 'average' hunters from the Horicon, Wisconsin, area completed identification tests in the field. Twenty-four of the 33 hunters were exposed to three training sessions before undergoing field tests. The 'trained' average hunters identified correctly 82 percent of 372 waterfowl flights, and the 'untrained' average hunters identified 70 percent of 308 flights. The data suggest that the majority of duck hunters cannot identify waterfowl on the wing to the degree assumed by present species management regulations, but that the field identification ability of duck hunters can be measurably improved by a training program. Interim Reports are available from Principal Investigator.

SUPPORTED BY University of Wisconsin

3.0095, ATTITUDES TOWARD WILDERNESS - SOCIOLOGICAL PERSPECTIVE

T.A. HEBERLEIN, Univ. of Wisconsin, Graduate School, Madison, Wisconsin

The object of this research is to develop a comprehensive set of measures of attitudes toward wilderness. Attitudes are seen as being composed of three components (1) cognitions or beliefs about the object, (2) affect or the degree of liking or disliking,

and (3) a behavioral disposition. Development of such an instrument would allow examination of such basic sociology questions as (1) the nature of attitudes, (2) the dynamics of attitude change, (3) the relationships between attitudes and behavior, (4) the relationships between attitudes and group process, and such policy issues as (1) the assessment of attitudinal means of social control of wilderness users as an alternative management choice, (2) distinctions among types of users and (3) assessment of the attitudinal effect of both policy changes and education programs.

Items to measure the major sets of beliefs regarding wilderness will be constructed from use of depth interviews, content analysis, and expert judgment. Affect will be assessed via semantic differential ratings of concepts generic, or closely related to the meaning of wilderness. These preliminary instruments will be administered to general samples (rather than limited to wilderness users). Standard item analytic techniques will be applied to the belief items, and the matrix of item intercorrelation will be factor analyzed. Factor scores from the emergent clusters will be related to affect measures. Several replications on separate samples are proposed, and such basic validity checks will be examined. These measures will then be made available for general use. Projected completion date is June, 1970.

SUPPORTED BY University of Wisconsin

3.0096, DEMOGRAPHIC CORRELATES OF HUNTING PARTICIPATION & SELECTED ATTITUDINAL CHARACTERISTICS OF HUNTERS WITH EMPHASIS ON WATERFOWL HUNTERS

L.L. KLESSIG, Univ. of Wisconsin, Graduate School, Madison, Wisconsin

Objectives: 1. to compare nonhunters, former hunters, and present hunters on several demographic variables. 2. to ascertain the motives underlying hunting participation and the attitudes of hunters toward salient issues. 3. to obtain information on the activities of hunters. 4. to obtain information on the attitudes of waterfowl hunters toward issues related to species management.

Procedures: 1. Interview survey of a random stratified sample of Wisconsin adults. 2. Mail questionnaire survey of a random sample of purchasers of resident hunting licenses.

SUPPORTED BY U.S. National Science Foundation

3.0097, WINTER TOURISM IN YUGOSLAVIA

A. ZOR, Urbanistic Inst. S.R. Slovenia, Ljubljana, Yugoslavia

Problem: Investigate natural conditions and the market for further development and planning of winter tourism in Yugoslavia.

Method: In addition to standard research and analysis, the investigators will compare data for Yugoslavia with that of other countries.

SUPPORTED BY No Formal Support Reported

3.0098, HEALTH TOURISM IN YUGOSLAVIA

A. ZOR, Urbanistic Inst. S.R. Slovenia, Ljubljana, Yugoslavia

Problem: Examine the concept of tourism for health, regarding its actual stage of development in Yugoslavia, as well as actual trends and tendencies connected with this concept in other parts of the world.

SUPPORTED BY No Formal Support Reported

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