

# **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



aSD11  
. A42  
Reserve

Cost / word / sta



United States  
Department of  
Agriculture

Forest Service

Rocky Mountain  
Forest and Range  
Experiment Station

Fort Collins  
Colorado 80526

General Technical  
Report RM-176



# A Description of Forest Service Programs and Responsibilities

## A Technical Document Supporting the 1989 USDA Forest Service RPA Assessment

U.S. FOREST SERVICE  
ALL INFORMATION CONTAINED  
HEREIN IS UNCLASSIFIED  
DATE 12-12-99 BY SP-5  
JAN 12 1999  
SIGNALS RANCH  
FORDS





## Preface

The Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), P.L. 93-378, 88 Stat. 475, as amended, directed the Secretary of Agriculture to prepare a Renewable Resources Assessment by December 31, 1975, with an update in 1979 and each 10th year thereafter. This Assessment is to include "an analysis of present and anticipated uses, demand for, and supply of the renewable resources of forest, range, and other associated lands with consideration of the international resource situation, and an emphasis of pertinent supply, demand and price relationship trends" (Section 3.(a)).

The 1989 RPA Assessment is the third prepared in response to the RPA legislation. It is composed of 12 documents, including this one. The summary Assessment document presents an overview of analyses of the present situation and the outlook for the land base, outdoor recreation and wilderness, wildlife and fish, forest-range grazing, minerals, timber, and water. Complete analyses for each of these resources are contained

in seven supporting technical documents. There are also technical documents presenting information on interactions among the various resources, the basic assumptions for the Assessment, a description of Forest Service programs, and the evolving use and management of the Nation's forests, grasslands, croplands, and related resources.

The Forest Service has been carrying out resource analyses in the United States for over a century. Congressional interest was first expressed in the Appropriations Act of August 15, 1876, which provided \$2,000 for the employment of an expert to study and report on forest conditions. Between that time and 1974, Forest Service analysts prepared a number of assessments of the timber resource situation intermittently in response to emerging issues and perceived needs for better resource information. The 1974 RPA legislation established a periodic reporting requirement and broadened the resource coverage from timber to all renewable resources from forest and rangelands.

# **A Description of Forest Service Programs and Responsibilities**

## Contents

	Page
INTRODUCTION .....	1
FOREST SERVICE RESEARCH PROGRAMS .....	2
Authorization for Forest Service Research .....	2
Scope and Goals of Forest Service Research .....	3
Program Areas .....	4
Forest Protection Research .....	4
Resource Analysis Research .....	5
Timber Management Research .....	6
Forest Environment Research .....	6
Forest Products and Harvesting Research .....	7
International Forestry .....	8
Forest Service Research Administration and Organization .....	8
Competitive Grants .....	9
Joint Planning and Coordination of Research .....	9
Relationships with Other Forest Service Programs .....	9
Relationships with State Agricultural and Forestry Institutions .....	10
Relationships with Other USDA Agencies .....	10
Relationships with Other Federal Agencies .....	12
Relationships with Industrial Research Agencies .....	13
Relationships with the General Public .....	13
COOPERATIVE FORESTRY PROGRAMS .....	14
Authorization for Cooperative Programs .....	14
Scope and Goal of Cooperative Forestry Legislation .....	15
Forest Service Responsibilities for Cooperative Forestry Programs .....	17
Forest Service Cooperative Forestry Program Areas .....	17
Forest Pest Management .....	17
Fire Protection .....	18
Forest Management and Utilization .....	19
Special Projects .....	19
Transfer Funds .....	19
Forest Service Cooperative Programs	
Administration and Organization .....	20
Relationships With Other Forest Service Programs .....	20
Relationships with Other Agencies .....	20
Relationships with the General Public .....	23
NATIONAL FOREST SYSTEM PROGRAMS .....	24
Authorization for the National Forest System .....	24

(Continued)

	Page
Scope and Goals of the National Forest System .....	25
Program Areas .....	25
Mineral Resource Management .....	26
Real Estate Management .....	28
Land Line Location .....	28
Maintenance of Facilities .....	28
Forest Fire Protection .....	29
Fighting Forest Fires .....	29
Cooperative Law Enforcement .....	29
Forest Road Maintenance .....	30
Forest Trail Maintenance .....	30
Timber Sales Administration and Management .....	30
Reforestation and Stand Improvement .....	32
Recreation Use .....	32
Wildlife and Fish Habitat Management .....	33
Range Management .....	34
Soil, Water and Air Management .....	34
General Administration .....	35
Construction .....	35
Land Acquisition .....	36
Other Appropriations .....	36
Permanent Appropriations Programs .....	37
Trust Funds Programs .....	38
National Forest System Administration .....	38
Sharing of National Forest System Receipts with States and Local Governments .....	38
Relationships with Other Forest Service Programs .....	39
Relationships with Other Agencies .....	39
Relationships with the General Public .....	42
HUMAN RESOURCE PROGRAMS .....	42
Youth Conservation Corps .....	42
Job Corps .....	42
Senior Community Service Employment Program .....	43
Volunteers in the National Forests .....	43
Hosted Programs .....	43
ENDNOTES .....	43





# A Description of Forest Service Programs and Responsibilities

## INTRODUCTION

This study describes the programs and responsibilities of the Forest Service, as called for in Section 3(a)(3) of the Forest and Rangeland Renewable Resources Planning Act of 1974 as amended.<sup>1</sup> This Act directed the Secretary of Agriculture to prepare each tenth year after 1979 an updated Renewable Resource Assessment which would include:

“A description of Forest Service programs and responsibilities in research, cooperative programs, and management of the National Forest System, their inter-relationships, and the relationship of these programs and responsibilities to public and private activities.”

This study is in response to that legislative direction. It is a part of the 1989 RPA Assessment of the Forest and Range Land Situation in the United States. The research, cooperative assistance, and land management programs conducted by the Forest Service affect almost all forest lands in the United States including timberlands, woodlands, brushlands, grasslands, and alpine areas; rangelands; and the associated waters. These lands and associated water areas total some 1.6 billion acres, or about 70% of the total area of the United States.

About 483 million acres of this area is classified as timberland, i.e., suitable and available for production of timber crops. These lands are generally managed or held for uses such as recreation, wildlife, grazing, water production, and watershed protection. Nearly three-fourths of this area is privately owned in several million private ownerships, with the remaining one-fourth in federal, state, or local public ownerships. The other forest and rangelands are primarily valuable as watersheds and for recreation, wildlife habitat, grazing of livestock, mining, or other nontimber uses.

Forest Service activities are also concerned with the management of trees, forests, and associated resources in and near urban areas. In addition, forest research and cooperative programs include substantial efforts to develop and apply new technology in products utilization and to provide help to thousands of operators and loggers in wood-using industries and to millions of consumers who use forest products for housing and other purposes.

The programs conducted by the Forest Service represent the major effort to protect and manage the Nation's forest resources, and a significant part of federal action to protect and manage rangelands and water resources. Providing national leadership in forest conservation policies and programs is also a basic function of the Forest Service, as directed in the National Forest Management Act of 1976:<sup>2</sup>

The Forest Service...has both a responsibility and opportunity to be a leader in assuring that the Nation maintains a natural resource conservation posture that will meet the requirement of our people in perpetuity.

In carrying out its responsibilities, the Forest Service engages in a wide diversity of activities that have been grouped into four major programs:

1. Comprehensive research programs aimed at the solution of problems relating to the management of all types and ownerships of forests, rangelands, and associated waters; and to the industrial, environmental, and other uses of these natural resources.
2. Nationwide cooperative forestry programs conducted with state forestry agencies in efforts to protect and improve nearly a billion acres of forests, rangelands, and associated water resources in private and nonfederal public ownerships.
3. Direct administration of 191 million acres of national forests, national grasslands, and Land Utilization Projects, and the management of their resources for the use of people.
4. Participating in programs aimed at developing employment and training opportunities for disadvantaged people and the support of human and community values.

The relative size of the major Forest Service programs, as indicated by the availability of supporting funds in fiscal year 1988, is as follows:

Program	Supporting funds (thousand dollars)
Forest research	138,418
Cooperative rorestry	89,699
National Forest System	1,960,204
Human resource programs	82,400
Total	2,270,721

These figures include both direct appropriations to the Forest Service and transfers of funds from other public agencies and private sources. Some funds appropriated to the Forest Service, particularly for State and Private Forestry activities, are allocated to states and other cooperators for locally administered programs.

Other agencies also manage federally owned forest and range resources, provide assistance to state and private owners of forests and rangelands, or conduct research on forest and range problems. Federal environmental protection programs also affect all resource management agencies and resource uses. Similarly, state agencies play an important role in forest land management, in forest and range research, and in environmental protection programs on private forests and rangelands. Many industrial and conservation organizations conduct programs that influence the use of the Nation's forests and related resources.

The development of cooperative relationships between the Forest Service and other federal and state resource agencies and private organizations is of major importance in developing and carrying out forest and range conservation programs. In both the formulation of forestry policies and in the management of forest and associated resources, the Forest Service works in partnership with many agencies and organizations, and with continuing involvement of the concerned people. The text that follows describes such interrelationships between the Forest Service and other organizations, and those activities for which the Forest Service has direct responsibility.

Most of the following material has been taken from "A Description of Forest Service Programs and Responsibilities" in "An Assessment of the Forest and Range Land Situation in the United States," 1981;<sup>3</sup> "The Principal Laws Relating to Forest Service Activities";<sup>4</sup> "Report of the Chief of the Forest Service, Fiscal Year 1987";<sup>5</sup> and the 1989 Budget Explanatory Notes for Committee on Appropriations."<sup>6</sup> The material was prepared in collaboration with the American Forestry Association.

Additional details on Forest Service programs, administrative regulations, and other pertinent data may be found in Federal laws concerning the Forest Service and its activities, in the Code of Federal Regulations, the Forest Service Manual and Handbooks, and in other material referred to in the following text.

## FOREST SERVICE RESEARCH PROGRAMS

The purpose of Forest Service research is twofold; first, to develop new scientific knowledge and technologies that will enhance the management, productivity and use of forests, rangelands and the associated waters; second, to utilize the products and services in ways that increase the economic, social and environmental benefits from these resources.

The definition of "forestry and range" research is somewhat arbitrary, however. Private research dealing with basic problems of equipment development or markets often contributes in important ways to the solution of forestry and range problems. Resource surveys and collection of useful statistical data are usually classified in research programs, whereas limited surveys and planning for specific project work are usually part of project operations or action programs. Some activities involve inseparable mixtures of research, development, education, and demonstration work.

Most of the forest and rangeland research in the United States is publicly supported, with Forest Service research accounting for roughly two-thirds of the public funding. The public responsibility for forestry and range research largely reflects factors such as:

- the large number and small size of most private forest and rangeland ownerships and operations and the consequent inability to organize and finance effective research programs.
- the broad societal nature of benefits obtainable from increased productivity of forests and rangelands and the associated waters, and the increased supplies of timber and other goods and services.
- the lack of conventional markets and market prices for research results.
- the need for information and improved technology by public resource agencies that manage large areas of public lands and administer public assistance programs to promote improved resource management on private lands.
- the need for information by many sectors of the public concerned with management and utilization of forests and other natural resources.

### Authorization for Forest Service Research

Public research in forestry began in 1876 with the establishment of a Division of Forestry in the U.S. Department of Agriculture. This new agency was charged with



conducting a broad investigation of the Nation's forest resources as a basis for evaluating forestry problems and identifying needed policies and conservation programs.

With the creation of the Forest Service in 1905 in the Department of Agriculture, forestry research received new emphasis under the Department's general charter, along with the strengthening of protection and management of the newly designated national forests. A regional forest experiment station was set up in 1908 in the Southwest, and pioneering studies were undertaken on experimental forests, ranges, and watersheds. Other experiment stations were established later in other regions. The Forest Products Laboratory was set up in 1910 in cooperation with the University of Wisconsin. In 1915, a branch of research was organized in the Forest Service to plan and direct an expanding program of studies both on National Forests and on other lands. The Clarke-McNary Act of 1924<sup>7</sup> included specific authorization for studies of problems of forest taxation and insurance of standing timber.

With the passage of the McSweeney-McNary Act of 1928<sup>8</sup> the Forest Service was:

Authorized and directed to conduct a comprehensive program of investigations to determine, demonstrate, and promulgate the best methods of reforestation and of growing, managing, and utilizing timber, forage, and other forest products, of maintaining favorable conditions of water flow and the prevention of erosion, of protecting timber and other forest growth from fire, insects, disease, or other harmful agencies, of obtaining the fullest and most effective use of forest lands, and to determine and promulgate the economic considerations which should underlie the establishment of sound policies for the management of forest lands and the utilization of forest products....

Authorization was included for a system of regional forest experiment stations, for cooperation with public and private agencies in the United States and abroad, and for receipt of cooperative contributions. The broad scope of investigations that has evolved under this basic charter and related legislation is indicated in these descriptions of current Forest Service research activities.

Further congressional direction of Forest Service research was incorporated in the Forest and Rangeland Renewable Resources Planning Act of 1974, which provided for periodic assessments of all the renewable resources on America's forests and rangelands, together with development of program alternatives for the conservation and development of these resources. The required analyses included present and prospective demands for the products and services obtainable from forests and rangelands, present and prospective re-

source supplies, and opportunities for improving yields of the goods and services obtainable from these lands through resource management and development programs. This work is closely coordinated with related assessments of soil, water and related resources of the nation, conducted by the Soil Conservation Service.

The National Forest Management Act of 1976<sup>2</sup> contained further direction for studies relating to forest and range resources by including provisions for reports on opportunities for increasing use of fiber and wood wastes on National Forest lands.

In 1978, the Forest and Rangeland Renewable Resources Research Act<sup>9</sup> replaced the McSweeney-McNary Act of 1928 with a broader charter for research on forest and range renewable resources in rural, suburban, and urban areas. The Act also incorporated related legislation applying to research grants and funding, provided guidance for the conduct of research programs, removed limitations on research appropriations, and authorized cooperative research in other countries.

### **Scope and Goals of Forest Service Research**

This legislation directs the Forest Service to conduct, support, and cooperate in investigations, experiments, tests, and other activities necessary to obtain, analyze, develop, demonstrate, and disseminate scientific information about establishing, protecting, managing, and utilizing forest and range land resources in rural, suburban, and urban areas. Research must include, but not be limited to:

1. Protection research related to protecting vegetation and other forest and range land resources, threatened and endangered flora and fauna and wood products from fires, insects, diseases, noxious plants, animals, and air pollutants. It also includes research related to protecting people, natural resources, and property from fires in rural areas.
2. Analysis and assessment research related to development and application of scientific knowledge required to make and keep current a comprehensive survey and analysis of the present and prospective requirements for renewable resources of forests and range lands and the supplies of such renewable resources. The research must also include a determination of present and potential land productivity, and such other facts as may be useful in determining methods needed to balance the supply and demand of these renewable resources as well as their benefits and uses for the people of the United States.

3. Management research related to managing, reproducing, planting, and growing vegetation on forests and rangelands for timber, forage, water, fish and wildlife, esthetics, recreation, wilderness and energy production, and conservation.
4. Environmental research related to understanding and managing surface and subsurface water flow, prevention and control of erosion, and the restoration of damaged or disturbed soils on forest and range land watersheds. It also includes research related to maintenance and improvement of wildlife and fish habitats; management of vegetation to reduce air and water pollution; and the understanding, prediction and modification of weather, climate and other environmental conditions which affect the protection and management of forest and range lands.
5. Utilization research related to harvesting, transporting, processing, marketing, distributing, and utilizing wood and other materials derived from forest and rangeland renewable resources. It also includes research related to the recycling and utilization of wood fiber, the production and conservation of energy, and the testing of forest products.

### Program Areas

Research in the Forest Service has been classified into several program areas for budgetary and administrative purposes. It has been increasingly recognized, however, that many research problems and projects transcend the boundaries of any particular subject areas, and that solutions of most problems require coordinated study by a variety of scientists and disciplines. Thus, some of the work in each of the program areas described below have relevance in solving problems in other areas of research.

The funds for each major Forest Service Research program are shown in table 1 for fiscal year 1988.

#### Forest Protection Research

The largest appropriation was for the forest protection program; research designed to increase the productivity and health of forest and range resources through improved knowledge of fires, atmospheric factors, and insect and disease pests. The program is divided into two parts: Forest fires and atmospheric science, and forest insect and disease.

Table 1.—Forest Service funds for forest research programs, by fiscal year 1988.

Program	Funds (thousand dollars)
Forest protection research:	
Forest fires and atmospheric science	8,945
Forest insect and disease	22,545
Subtotal	31,490
Resource analysis research:	
Forest inventory and analysis	17,664
Renewable resources and economics	4,977
Forest recreation	2,712
Subtotal	25,353
Timber management research	26,548
Forest environment research:	
Watershed management and rehabilitation	16,692
Wildlife, range and fish habitat	12,567
Subtotal	29,259
Forest products and harvesting research	19,860
Total forest research appropriations	132,510
Competitive grants	3,000
Research construction	2,908
Grand total	138,418

**Forest fires and atmospheric science.**—The basic objectives of the forest fires and atmospheric science research program are: to develop improved knowledge of the initiation, behavior, and effects of fire on forest and range environments; to apply that knowledge by developing better methods of preventing and controlling wildfires, and using prescribed fires for enhanced forest resource protection and production; and to better understand atmospheric factors affecting forest productivity and health as well as biosphere/atmosphere relationships. Research also aims at developing fire-behavior prediction systems, fire safety and prevention guidelines, and fire-suppression tools for use in adjoining wildland/urban areas.

Current research includes efforts to:

- increase basic knowledge regarding the physics and chemistry of forest and range fuel, combustion, as well as the behavior of fire under different environmental conditions.
- develop methods to reduce and prevent forest and range fires, (both lightning and human-caused) by new and improved technology, including such measures as cloud-seeding.
- devise practical methods to reduce fire hazards by measures such as prescribed burning or timber salvage.
- improve methods for forest fire control to reduce fire suppression costs and losses of resources on



both forests and range lands, including more efficient planning for fires, fire attack, and improvement of fire control equipment.

- develop procedures for situating weather stations to most effectively diagnose threatening fire or weather conditions.
- develop systems to predict the atmospheric capacity to disperse forest fire smoke and to select the best times for using prescribed fires, i.e., times when smoke particles will rapidly disperse.
- develop standards for characterizing and measuring the effects of pollutants such as sulfur and photochemicals deposited from the atmosphere on wild and planted forest lands, and for monitoring how land and water resources affected by these pollutants change over time.

**Forest insect and disease research.**—The forest insect and disease research program is directed at developing technology that prevents or reduces forest and rangeland damage by insect and disease pests and that protects wood in use and storage from insects and decay. It is also directed at developing environmentally safe and effective strategies for pest management and integrating pest management with forest resource management.

Current research includes efforts to:

- increase basic understanding of the physiology and nutritional requirements of insects and plant disease.; and the role of biological and environmental factors influencing outbreaks of destructive forest insects and infectious pathogens such as fungi, bacteria, viruses, nematodes, and mistletoe.
- develop specific microbial, parasitic, or other biological agents for control of the Douglas-fir tussock moth, the gypsy moth, and similar major pests.
- develop ways for rapidly testing and propagating trees naturally resistant to disease.
- develop survey techniques and methods for evaluating and predicting biological and economic impacts of destructive insects and diseases on forest resources and on wood products in storage and use.
- develop means of identifying organisms such as fungi, bacteria, insects, and other organisms that cause deterioration of forests and forest products.

- identify safer chemicals for suppressing pest populations such as systemic fungicides, insect attractants, repellents, or other behavioral chemicals and nonpersistent toxicants.
- develop specialized equipment and improved techniques for safe and efficient application of pesticidal materials to trees and other cover on forest and rangelands and to wood products in processing, storage, or consumer uses.
- develop integrated control systems for minimizing losses to insects and diseases or other pests through combinations of decision support systems, silvicultural practices, and biological or improved chemical control methods.

## Resource Analysis Research

The Forest Service resource analysis research is designed to provide comprehensive, continuing inventory information on the forest land resources of the United States; to determine the effects of economic and institutional forces on domestic and international forest products markets and forest management strategies; and to develop improved methods for managing outdoor recreation and wilderness resources, including forests in and near urban areas.

In a broad sense this research provides a scientific basis for assessing the current condition and outlook for forest land resources, forest product investments and markets, and outdoor recreation opportunities. It also provides methods for improving recreation services. The three major components of this research are summarized as follows:

**Forest inventory and analysis.**—The purpose of this research program is to provide comprehensive and continuing information on the extent, location, ownership, condition, and productivity of timberlands and timber inventories together with information on timber product markets; past and prospective trends in forest and rangeland resources are investigated, as well as opportunities to increase and extend supplies of renewable resources.

Current research includes:

- periodic surveys of the forest resources of each state. The 1987 surveys were carried out on 45 million acres.
- analyses of past and prospective changes in timber resources in the South and of all resources in all forest and rangeland regions of the country.



- work to develop improved and lower cost ways of inventorying and analyzing changes in renewable resources.
- analyses of economic opportunities to increase timber supplies.

**Renewable resources and economics.**—This research program is primarily concerned with analyzing the responses of domestic and international forest product markets to economic and institutional forces and structuring economically efficient forest management programs for both public and private forests.

Current research includes work to:

- evaluate the economic and social costs and benefits of alternative methods of timber growing, harvesting, processing, marketing, and product distribution to improve efficiency of operations and enhance benefits from use of available resources.
- provide economic and social guidelines for multiple-use management of forests and rangelands for production of water, recreation, livestock, fish and wildlife, esthetics, and timber.
- analyze alternate government policies and programs for improving management of forests, rangelands, and related resources and to evaluate the economic and social costs and benefits and the responses of private landowners, industry, and the public.
- provide economic information on markets for forest products in western Europe and the Pacific Rim countries.
- determine the costs and benefits of forestry research.

**Forest recreation.**—The forest recreation research program is concerned with developing technology to manage wildland resources, including those in and near urban areas, and to supply more and higher quality outdoor recreation opportunities.

Recreation research now underway includes studies to:

- increase understanding of interactions between people and wildland resources and to evaluate social, economic, or other factors which affect use and enjoyment of wilderness and other recreation resources.
- develop practical methods to maintain, restore or improve developed recreation sites, including those on fragile ecosystems.

- determine ways of designing and developing small natural areas to achieve the perception of spaciousness desired by visitors.

### Timber Management Research

The timber management research programs seek to improve silvicultural alternatives, to develop guidelines for increased productivity and multiple-use benefits from forest lands, to maximize the growth and quality of trees, and to maintain land productivity. The research includes work to:

- develop or improve methods for the establishment, culture, and harvesting of timber and related crops for commodity uses.
- apply genetics and advanced biotechnology to forestry problems. Topics investigated include: determination of genetic variation in forest trees; seed selection; and the development of strains or hybrids characterized by superior growth rates, wood quality, resistance to insects diseases or other damaging factors, or of special value for environmental improvement in urban areas.
- develop techniques of timber measurement and for determining growth and yields of forests, including the influence of site, culture, or other factors on timber production and quality.
- determine the effects of herbicides used to control unwanted vegetation on ground water supplies.
- improve methods of tree establishment and culture in shelterbelts for soil and water conservation, and in urban and suburban areas for esthetic and other environmental purposes.
- develop more cost efficient site preparation and forest management practices, principally for the benefit of smaller, nonindustrial forest owners.

### Forest Environment Research

Forest environment research provides knowledge and technology for management and enhancement of forest and range nontimber resource values. Of particular attention are wildlife and fish habitats, water quality and quantity, and forage.

**Wildlife, range, and fish habitat research.**—This research aims at developing knowledge and technology

for maintaining or improving wildlife and fish habitat; for improving soil stability, vegetative cover, and the condition of rangeland; and for integrating wildlife, fish, and livestock with other forest and rangeland uses.

Current research includes work to:

- devise methods for maintaining or improving the natural habitat for wildlife and fish through such measures as prescribed burning, planting for wildlife food or cover, fertilizing, stream shading, or modification in timber and range management practices to increase production and diversity of big game, song birds, fish, and other wildlife.
- develop resource management methods to assure maintenance of required habitat for endangered or threatened species of animals and plants.
- apply knowledge of genetics to improve browse and other forage plants in order to enhance carrying capacity for both livestock and wildlife.
- increase basic knowledge of ecological, physiological, and nutritional requirements of forest wildlife and fish populations and habitat.
- improve systems of range management on forest-related rangelands in both western and southern areas, with the aim of increasing forage and livestock production while protecting other uses and environmental values.
- improve methods for evaluating trends in range conditions and livestock production potential, and the costs and benefits of range management and capital improvement.
- develop effective methods for range improvement, including such practices as the conversion of brush or low-value trees to grass cover; reseeding of improved species of forage; control of undesirable plants by fire, chemicals, or other means; and revegetation of devastated areas.

**Other nontimber resource research.**—The water related research aims to develop and test new cost-effective methods for rehabilitating lands disturbed by surface mining and to protect, manage and improve forest and rangeland watersheds.

Current research includes studies to:

- increase basic knowledge of forest soil characteristics, erosion hazards, nutrient cycles, and vegetation-water relationships on forests and rangelands.

- determine the responsiveness of lakes to atmospheric deposition.
- determine the effects on soils and water flows of various land use and management practices such as logging, grazing, and forest fertilization.
- develop methods for managing forests and rangelands to stabilize soils; limiting erosion and sedimentation; improving yields, timing, and quality of water flows; and rehabilitating degraded landscapes.
- develop techniques for reducing water losses from plants, soils, snow, and water surfaces to enhance usable supplies of water.
- develop ways to restore and stabilize forest lands disturbed by strip mining and to reduce acidity, sedimentation and flooding in affected streams.
- evaluate the effects of coal and other mineral mining on forests and rangelands; on forest uses; on associated communities; and on environmental values.
- develop effective methods to minimize adverse effects of surface mining on resources and environmental values.
- test and demonstrate alternative methods for the planning of mining operations and for the rehabilitation of mined areas in cooperation with other U.S. Department of Agriculture agencies, Department of Interior agencies, states, and other groups.

## Forest Products and Harvesting Research

Products and harvesting research aims to provide technology to harvest and use timber more efficiently. Topics being investigated include: development of timber harvest and transport systems which are at once economically efficient and environmentally acceptable; improvement of wood product performance in use; expansion of wood product export; reduction of waste, costs, and energy consumption in wood processing; and facilitation of forest management and environmental protection through improved harvesting and use of wood.

Current research includes efforts to:

- determine the fundamental characteristics as well as the mechanical, physical, and chemical properties of the many tree species which have present or potential importance for commercial uses.



- develop new or more efficient processes for wood product manufacture, and for such wood-based products as pulp, paper, and wood chemicals.
- develop improved techniques for engineering and using wood products in construction and in other applications. This topic includes development of improved methods for extending the service life of wood products by wood preservatives or other methods.
- develop new technology for using wood waste materials for energy or other purposes, and for minimizing water and air pollution.
- develop new or improved products and uses, such as laminates or wood chemicals, to enhance values of available wood resources and related benefits to society.
- develop improved technology and equipment for timber harvest and transport systems which will be more efficient and environmentally acceptable; especially for use in mountainous areas, including such logging systems as skyline, highlead, balloon, or helicopter.
- develop more efficient technology and equipment for regeneration of timber and forage, for related silvicultural operations, and for watershed and recreation area management.
- improve planning of forest road systems, locations and standards, to provide both efficient transportation and minimum impact on the forest environment.

### International Forestry

The Forest Service also provides leadership and cooperation with forestry organizations and scientists throughout the world, together with such cooperative services as the training of foreign nationals and the furnishing of information, services, and tree seeds.

The Forest Service also cooperates with the U.S. Agency for International Development (AID) and the U.S. Department of Agriculture, Office of International Cooperation and Development (OICD), to help developing countries with forest, range, and watershed projects.

A Forestry Support Program provides technical assistance to AID's natural resource projects worldwide and to Peace Corps foresters, helping to design, execute, and evaluate a wide range of field projects.

The Forest Service, along with universities and other United States research organizations, also cooperates in

various joint research projects with foreign members of the International Union of Forest Research Organizations (IUFRO). Participation in the work of the North American Forestry Commission, organized by the Food and Agriculture Organization of the United Nations, similarly involves studies and interchange of information on a wide range of forestry problems.

### Forest Service Research Administration and Organization

The Forest Service Research Program is directed at the national level by a Deputy Chief of the Forest Service for Research. This Deputy Chief and headquarters staff have responsibility for the formulation and administration of national programs of forestry and range research by the Forest Service; for coordination with other research agencies in the U.S. Department of Agriculture, states, and other organizations; for investigations of national and international problems; and for program review and overall direction of the work carried out at Regional Forest Experiment Stations and other centers of Forest Service research.

Most of the Forest Service research program is carried out through a system of Regional Forest Experiment Stations located at:

Asheville, NC	Ogden, UT
Berkeley, CA	Portland, OR
Fort Collins, CO	St. Paul, MN
New Orleans, LA	Broomall, PA

The Forest Products Laboratory is located at Madison, WI.

Forestry and related investigations are conducted at 76 different centers of Forest Service research. Most of these are located on or near the campuses of cooperating universities. Some 83 experimental forests and ranges are used for studies of representative plant and animal communities. Research is also conducted on 150 research natural areas, and on numerous experimental sites on the lands of public, industrial, or other cooperators.

Several State forest products laboratories also supplement the work of the Forest Service's Forest Products Laboratory at Madison, WI, the national center for research on wood and wood products.

Forest and range management and utilization involves complex technical and economic factors; most problems in the field arise from multiple and competing demands for various products and services. Recognizing the consequent need for multidisciplinary studies, the Forest Service employs a wide spectrum of trained scientists in the biological, physical, chemical, economic, and social fields.

The scope of this effort is suggested by the fact that in 1988 the Forest Service carried on 713 scientist-years of research. At some 61 state universities and land grant colleges conducting forestry related research, there were 630 additional nonfederal scientist-years of research on forestry and associated range problems. Related research, in genetics and physiology for example, also contribute to the relevant pool of knowledge of various aspects of forestry and range problems. Industrial and other research organizations employ additional scientists to conduct investigations on forestry and range problems.

### **Competitive Grants**

Part of the research carried on outside the Forest Service is funded by Competitive grants. The Forest and Rangeland Renewable Resources Research Act of 1978<sup>9</sup> authorizes the Secretary of Agriculture to make competitive grants to federal, state, and other governmental agencies, public or private agencies, institutions, and universities. Two chief objectives of the competitive grants program are to support fundamental research to promote the advancement of scientific wood utilization, and to further knowledge of biological mechanisms of forest organisms and their ecological relationships which contribute to the health and productivity of forest resources.

The Competitive Research Grants Office of the USDA's Cooperative State Research Service administers the program. Scientists selected from the research community serve as program managers or members of peer-review panels. Federal employees serve as associate program managers.

Procedures for awarding grants are based on a competitive evaluation process similar to that used by the National Science Foundation, a process concerned primarily with the scientific merit of a proposal. In 1987, 83% of the funds went to principal investigators working at colleges and universities, 14% to principal investigators with the Forest Service, and 3% to principal investigators in private industry. Often, scientists from different institutions cooperate on research projects.

### **Joint Planning and Coordination of Research**

With the expansion of forestry and range research programs in the Forest Service and in state research agencies, there has been increasing recognition of the need for coordinated planning and cooperation in research projects. To this end, joint research planning efforts are carried on by the U.S. Department of Agriculture agencies and the National Association of State

Universities and Land Grant Colleges to direct and provide balance in agricultural and forestry research programs.

As a further means of promoting coordination of related research activities, the Department of Agriculture in cooperation with states and other agencies has developed a computer-based information system that provides data information on active agricultural and forestry research of both federal and state research agencies. Use of this system helps avoid duplication and facilitates coordination of related research projects.

Another device to coordinate and apply related research efforts is illustrated by a recent (1974-80) forest pest research and land development program in which several USDA agencies, several universities, and state forestry organizations pooled resources to develop and test new technology for suppressing three major insect pests: the gypsy moth, the Douglas-fir tussock moth, and the southern pine beetle. Other research has been developed and carried out through research consortiums involving several universities and the Forest Service.

The state forestry departments also cooperate in various aspects of the Forest Service research program. Of particular importance is state cooperation in the testing and development of fire fighting technology, and in financial or other participation in the periodic forest surveys and resource assessments that are conducted by the Forest Service.

### **Relationships with Other Forest Service Programs**

Within the Forest Service, the research program is closely coordinated with related programs for management of the National Forest System and Cooperative Forestry Assistance Programs with states and private forest owners and operators. All branches of the Forest Service participate in research to help solve forestry and range problems. Research scientists and National Forest System personnel often cooperate in the installation of studies on experimental forests or other National Forest System and private lands. Pilot tests and field application of new technology by State and Private Forestry personnel also supplement the work of research staffs.

New technology and other research findings are transferred through issuance of a wide variety of research publications and such other devices as symposia and field demonstrations on specific problems and subjects. Prompt application of research findings is facilitated by close association of researchers with National Forest System staffs, state forestry agencies, forest industries, and conservation organizations. Research activities also are linked with other major programs of the Forest Service through the Resources Planning Act process of long-range planning and program budget development.



Although the Forest Service has long been responsible for a major portion of publicly financed forestry and associated range research in the United States, federal, state, and private organizations also conduct or support research in forestry and rangeland management and utilization or closely related fields. Of particular importance, in this respect, is a coordinated federal-state program of research involving state agricultural experiment stations and forestry schools. Other agencies in the Department of Agriculture and other Departments also conduct or support some forestry or related research. The forest industries similarly play a major role in research and development dealing with the processing, marketing, and use of forest products and, to a more limited extent, with management of forest resources.

Cooperative research and memoranda of understanding are of considerable importance in correlating the research work of the Forest Service with that of other organizations, particularly the state universities and other United States Department of Agriculture agencies. The Forest Service provides cooperative grants and contracts for research by other federal, state, or private organizations in cases where special skills can be enlisted to help solve forestry problems. In fiscal year 1987, some 514 research agreements were made by the Forest Service: 437 with colleges and universities, 15 with nonprofit research institutions, 15 with federal, state, and local governments, and the remaining 47 with industrial or other private researchers. Twenty eight of the grants were for small business innovation research. Forest Service funds used for these studies totaled \$14.6 million.

Conversely, a significant amount of Forest Service Research on a variety of problems is conducted under cooperative agreements with funding from other agencies such as the Environmental Protection Agency, the National Aeronautics and Space Administration, the Department of Energy, and private organizations.

### **Relationships with State Agricultural and Forestry Institutions**

For many years, state agricultural experiment stations and forestry schools have conducted agricultural and forestry research with federal funding authorized in the Agricultural Experiment Station Act of 1887, commonly known as the Hatch Act.<sup>10</sup> This program has included many studies related to forestry and range management and use, although limited funds have been allocated for specific forestry projects.

The Cooperative Forestry Research Program Act of 1962, commonly known as the McIntire-Stennis Act,<sup>11</sup> provided the legislative basis for expanded federal funding of state institutions for research specifically

related to forestry and related rangeland problems. Under this Act, federal funds are made available through the U.S. Department of Agriculture's Cooperative State Research Service to help in carrying programs of forestry research at (a) land grant colleges or agricultural experiment stations, and (b) other state-supported colleges and universities offering graduate training in the sciences basic to forestry and having a forestry school.

The McIntire-Stennis allotments now support research at 61 state agricultural experiment stations and forestry schools. Estimated funding in fiscal year 1988 included \$17.5 million of federal funds. Nonfederal research funds available to the states for forestry and related research in this program have been about five times the federal allotments.

Apportionment of available federal funds among participating states is determined by the Secretary of Agriculture after consultation with a national council. The council is comprised of representatives from federal and state agencies concerned with developing and utilizing the Nation's forest resources, the forest industries, the forestry schools of the state-certified eligible institutions, state agricultural experiment stations, and volunteer public groups concerned with forests and related natural resources.

The broad definition of research in the McIntire-Stennis Act embraces investigations relating to management of forest and related range and watershed lands for the production of timber, livestock, forage, wildlife habitat, water and recreation, as well as to the harvesting, utilization, and marketing of forest products.

Additional authorizations for federal assistance to state and other research institutions have also been provided in other laws, including the Granger-Thye Act of 1950.<sup>12</sup> This Act sought to use the talents of university and other scientists in cooperation with Forest Service researchers. "Coop aid" grants are advanced to other institutions from Forest Service research appropriations for mutually agreed-upon investigations.

The Research Grants Act of September 6, 1958<sup>13</sup> also authorized federal agencies to enter into contracts for basic scientific research and to make grants for the support of such research. The Food and Agriculture Act of 1977<sup>14</sup> authorized grants to colleges and universities for research relating to production and marketing of alcohol and industrial hydrocarbons from agricultural commodities and forest products, together with loans for pilot plants for production of these products.

### **Relationships with Other USDA Agencies**

Other agencies in the U.S. Department of Agriculture also conduct research or other investigations that are closely related to the research program of the Forest



Service. These activities are coordinated by formal memoranda of agreement, joint budget analyses and planning, project reviews, and on a variety of informal working arrangements among scientists.

**Agricultural Research Service.**—The comprehensive program of the Agricultural Research Service, dealing for example with such complex problems as photosynthesis, plant genetics, and plant physiology, provides knowledge that can be applied more or less directly to forestry and range problems. Other related investigations include:

- Investigations to improve range forage by breeding, selection, and testing of forage plants, by range fertilization and by range grazing practices. The Forest Service is assigned responsibility for research on management of ranges for livestock and wildlife, including both "forest ranges" and adjacent or associated nonforest ranges, i.e., rangelands commonly used by the same animals that use forest lands.
- Research relating to the culture of trees and shrubs for ornamental purposes, the culture and genetic improvement of lawn and street trees, the culture of farmstead windbreaks, and studies to evaluate environmental impacts of "field" shelterbelts. The Forest Service is assigned responsibility for establishment, management, and protection of native or introduced forest trees in forest areas, in "field" shelterbelts, and in urban and suburban areas.
- Research on soil and water management, largely oriented to agricultural watersheds but also including investigations related to Forest Service watershed research of forests and associated lands. Among these are studies of strip mine reclamation, including effects of using fertilizers and industrial wastes.

**National Agricultural Pesticide Impact Assessment Program.**—The Forest Service, along with the Agricultural Research Service, the Animal and Plant Health Inspection Service, the Economics, Statistics and Cooperative Service, and the Office of the General Counsel, provides scientific expertise and other support to the United States Department of Agriculture/States/ Environmental Protection Agency assessment teams. Together, they compile use, exposure, and benefits information on pesticides subjected to EPA's Rebuttable Presumption Against Registration (RPAR). The information is provided to the Environmental Protection Agency in a formal report transmitted to them by the Secretary of Agriculture.

**Soil Conservation Service.**—Resource surveys, assessments, and watershed investigations conducted by

the Soil Conservation Service are closely related to the forest surveys and renewable resource assessment conducted by the Forest Service. The Forest Service cooperates with the Soil Conservation Service in these programs.

Nationwide data on soils, water, and related resources are collected by the Soil Conservation Service as a basis for periodic status reports on erosion and land treatment needs. The National Resource Inventory (NRI) is updated periodically to provide a nationwide inventory of resources including land/cover use, soil erosion, potential cropland, conservation needs, land capability, water bodies and streams, flood prone areas, conservation practices, riparian vegetation, pasture land conditions, rangeland condition, and other vegetation data.

The National Cooperative Soil Survey also provides basic data on kinds of soils in each county or other designated areas, together with data on limitations and potentials for alternative uses. The Soil Conservation Service has national leadership for this Soil Survey program but works in cooperation with land grant colleges and universities, with the Forest Service for soil surveys on the National Forest System lands, and with other organizations.

The Soil and Water Resources Conservation Act of 1977<sup>15</sup> authorizes the Secretary of Agriculture through the Soil Conservation Service to conduct periodic appraisals of the soil, water, and related resources of the Nation, and to evaluate and develop resource conservation programs. The Act is a companion measure to the Forest and Rangeland Renewable Resource Planning Act of 1974<sup>1</sup> administered by the Forest Service. These two laws direct the U.S. Department of Agriculture to make a total assessment of America's renewable natural resources and to develop programs that will protect and improve these resources.

The Soil and Water Resources Conservation Act of 1977 is aimed at furthering the conservation of soil, water, and related resources by:

1. Appraising on a continuing basis the condition and problems of soil, water, and related resources of the Nation.
2. Developing and updating periodically a program for furthering the conservation and enhancement of soil, water, and related resources, consistent with the roles and program responsibilities of other federal agencies and local and state governments...

Under the provisions of the Soil and Water Conservation Act the appraisal and program must include:

- the nature and extent of soil, water, and related resources in the United States, including fish and wildlife habitat.

- the capability and limitations of these resources for meeting current and projected demands on the resource base.
- the effectiveness of continuing soil and water conservation programs, laws, and policies.
- evaluation of alternative methods for the conservation, protection, environmental improvement, and enhancement of soil, water, and related resources.
- the costs and benefits of alternative soil and water conservation practices.
- investigation and analysis of the practicability, desirability, and feasibility of collecting organic waste materials, including logging and wood manufacturing residues.

Various measures have been adopted to assure close coordination of Forest Service and Soil Conservation Service activities relating to resource assessments and program evaluations. Thus, a joint Soil Conservation Service/Forest Service liaison committee has been established to coordinate the basic assumptions and data used in the appraisal and assessment.

Other agreements have been developed between the Forest Service and the Soil Conservation Service; the Economics, Statistics and Cooperatives Service; and the Bureau of Land Management; and the Fish and Wildlife Service in the Department of the Interior to provide for coordinated development of needed techniques for multiresource inventories, land classification, and resource evaluations.

In both the Forest Service and Soil Conservation Service programs of resource assessment and program development, public participation is solicited from landowners and operators, conservation and environmental organizations, state forestry agencies, and other concerned people and groups.

The Soil Conservation Service has leadership responsibility for watershed surveys and investigations that cover forests and rangelands and other agricultural and related resources. These investigations are conducted in cooperation with other agencies in the Department of Agriculture and with other federal and state agencies.

Much of the work on river basin surveys and investigations is conducted under the Watershed Protection and Flood Prevention Act of 1954,<sup>16</sup> commonly referred to as the P.L. 566 Program. This Act provided for cooperative surveys and investigations of specified river basins to serve as a guide for agricultural and other rural development programs. Forest Service cooperation with the Soil Conservation Service includes responsibility for the "forestry aspects" of river basin

planning for both federal and nonfederal forest lands, for planning related to rangelands within or adjacent to the National Forest System, for analyses and projections of economic activity relating to multiple uses and industrial or other production from forest lands, for appraisals of the capability of forest lands to meet future demands for goods and services, and for estimates of amounts and costs of forest conservation practices. This participation in investigations and planning is supplemented by participation in related resource action programs referred to in the following section on Cooperative Forestry Programs.

The Soil Conservation Service has responsibility for inventories of forage resources on most nonfederal lands. The Forest Service conducts range inventories on the National Forest System. It is the policy of both agencies to coordinate resource inventories, jointly determine data needs and procedures, avoid duplication, and assure that data collected are mutually usable.

**Economic Research Service.**—This agency conducts investigations dealing with the conservation and development of natural resources and their contribution to local, regional, and national economic growth. It also has responsibility for research in range economics and other agricultural economics research. Cooperation with the Forest Service includes analyses of demand for livestock and grazing uses used in preparing renewable resource assessments. Studies are also conducted in coordination with the Soil Conservation Service and the Forest Service in river basin and related water investigations, and in other intradepartmental studies such as pesticide impact evaluations.

The National Agricultural Statistics Service (NASS) cooperates with State agencies in reporting prices of timber and timber products.

## Relationships with Other Federal Agencies

The Forest Service has long cooperated with other federal agencies, particularly in the Department of the Interior, to help assure coverage by Forest Service research scientists of problems that are of concern to these other agencies. A portion of this Forest Service research effort, conducted for the most part at western Forest Experiment stations, has been financed by these cooperating agencies. Other research on forest and rangeland problems also is conducted or supported by these other federal agencies, as indicated below.

**Bureau of Land Management.**—The Bureau of Land Management in the U.S. Department of the Interior supports a limited program of research and development projects relating to forests and rangelands under authorizations in the Federal Land Policy and Management Act of 1976.<sup>17</sup> Studies are largely conducted



through cooperative agreements with universities and federal research agencies. These studies largely involve problems encountered in the management of federal lands relating to watershed protection, timber production, range forage production, wildlife habitat improvement, and rehabilitation of lands damaged by fire. Inventories of range, timber, and other resources on lands under the administration of the Bureau of Land Management also are conducted by the agency as a basis for management programs. As with other land management agencies, many environmental analyses also are prepared for "major" activities, as required by the National Environmental Policy Act of 1969.<sup>18</sup>

**National Park Service.**—The Park Service conducts studies concerning the development and management of outdoor recreation and the associated land and water resources. These supplement Forest Service work and contribute to the management of outdoor recreation and the Forest Service preparation of renewable resource assessments and programs.

**Fish and Wildlife Service.**—This agency conducts biological and economic research on fish and wildlife problems. Cooperation with Forest Service research is provided for in cooperative agreements under which the Fish and Wildlife Service emphasizes the animal phases of problems while the Forest Service emphasizes the vegetation and land use or habitat phases. Cooperative studies of wildlife and habitat problems also are conducted by scientists from the agencies.

**Other agencies.**—Other federal agencies also conduct or finance forestry or forest-related research that supplements the research efforts of the Forest Service.

The *Geological Survey* in the U.S. Department of the Interior administers a cooperative program of contracts and grants with University Water Resources Research Institutes, under the Water Resources Research act of 1974.<sup>19</sup> Related responsibilities of this agency include the transfer of technology relating to water resources of federal water research.

The *Environmental Protection Agency* finances a substantial program of cooperative research, including studies by the Forest Service and other research organizations. Examples of Environmental Protection Agency sponsored research in the Forest Service include studies concerning the effects of ultraviolet radiation on growth and development of forest trees, the impact of air pollutants on forests, problems of water quality and reclamation of strip-mined areas, assessments of technology for determining water pollution from forested watersheds, and the development of management guides for minimizing nonpoint source pollution in forested areas.

The *National Science Foundation* provides some grants for research projects which relate to forestry and range problems. The Tennessee Valley Authority con-

ducts studies of regional problems of forest management and utilization. The National Aeronautics and Space Administration has financed both university and Forest Service research to improve methods for remote sensing of natural and artificial resources. The Department of Housing and Urban Development has allotted funds to the Forest Service for housing research. The Department of Energy has funded Forest Service studies of forest residues and opportunities for production of energy from wood material.

## Relationships With Industrial Research Agencies

Research by the forest industries, particularly the pulp and paper industry, directly complements the Federal-State forest research programs, chiefly in investigations concerning the processing, marketing, and consumer use of wood products. Other industries, such as the chemical and machinery industries, also conduct research that is of benefit in the solution of certain forestry or range problems. Much of the industrial research is related to product development and is proprietary.

Industry usually looks to public research organizations such as the Forest Products Laboratory and universities for more basic investigations. It also cooperates with the Forest Service in many research areas such as forest protection, tree improvement, and forest productivity.

## Relationships With the General Public

Public involvement in forestry and range research programs is achieved, in part, using advisory committees by the Department of Agriculture, the Forest Service, universities, and other research agencies and organizations. Thus, the Food and Agriculture Act of 1977<sup>14</sup> directed the Secretary of Agriculture to establish a Joint Council on Food and Agricultural Sciences to foster coordination of the agricultural research, extension, and teaching activities of the Federal Government and other institutions. This Act also provided for a National Agricultural Research and Extension Users Advisory Board to review policy, plans, and goals of programs for agricultural research and extension, and to provide recommendations regarding program responsibilities and funding.

Regional Experiment Stations of the Forest Service have used advisory committees, composed of representatives of state agencies, forest industries, and other groups concerned with forestry and related problems, to review current and proposed research. As noted earlier, an advisory committee provides counsel and advice to

the Secretary of Agriculture in carrying out the McIntire-Stennis forestry research program.

Panels of industry representatives are consulted periodically to review and help coordinate planned research on timber utilization problems at the Forest Products Laboratory and at other utilization research centers. Special committees of experts and concerned organizations are sometimes formed to coordinate research by different agencies on such problems as use of pesticides, range brush control, or other problems of land management.

The use of such committees, panels and groups represents a part of a general effort by the Forest Service to obtain broad public involvement to guide the formulation and conduct of forestry and related resource programs.

### COOPERATIVE FORESTRY PROGRAMS

Forests and rangelands in private and nonfederal public ownerships constitute the major part of the Nation's 1.5 billion acres of forests and rangelands. Of the total area of some 483 million acres of timberland, for example, 57% is in nonindustrial private ownerships, including farmers and a wide variety of other people. About 15% of the timberland is owned by forest industries, and 7% by states and local governments. Much of the remaining forest land which is more suitable for uses other than timber production, and most of the Nation's rangeland, is also in private ownership.

The nonindustrial private and nonfederal public lands provide more than half of the timber harvested in the United States. Industrial forest lands furnish nearly 30% of the total. These private lands also provide major portions of livestock grazing, hunting and other outdoor recreation, and water supplies. Most of these lands are of high site quality and are favorably located for protection of timber and for other uses.

Despite these favorable factors, there have been problems in maintaining and increasing timber supplies. In the United States, the economy largely relies on a system of markets and prices to bring about changes in the supplies of goods and services. For timber, however, the problem and the basic obstacle to increasing and extending supplies is that this system does not work very well.

This may be due, in large part, to market imperfections in the forestry sector. The market system that so effectively guides the production of most goods and services responds in only a limited way to increasing timber supplies. The best quantitative measure of market imperfection for timber supplies is the coefficient of price elasticity of supply. This coefficient is a measure of the percentage change in stumpage (timber) supply resulting from a percentage change in stumpage prices.

For example, with a 10% increase in stumpage prices, if stumpage supplies increase 3%, the coefficient of price elasticity would be 0.3. In simpler terms, it is a measure of the responsiveness of forest owners to price changes. The further the coefficient falls below 1.0, the more unresponsive or imperfect the market. The best data shows that for each 10% increase in stumpage prices there is less than a 4% increase in supplies.

There are five major causes of imperfections in timber markets:

1. The short time-preference of individual land-owners which constrains investments in management options yielding rewards after an extended period of time.
2. Lack of investment capital and market and management knowledge among private timber owners.
3. Ownership objectives which limit or constrain timber production.
4. Limited competition among timber buyers.
5. Failure of the stumpage market price to reflect all benefits associated with the forest such as the provision of wildlife habitat, scenic beauty, and improved water quality, as well as costs such as the pollution resulting from the use of chemicals and fires.

The market system also has no means of adequately recognizing societal interests in the protection of the forest investment, and in the maintenance of the resource base and the productive capability of forest lands.

### Authorization for Cooperative Programs

In the past, society has taken action to increase timber supplies by supplementing market forces through various kinds of legislation and funding of programs including those of protection and technical and financial assistance for nonindustrial forest owners. Alternative courses of actions such as federal regulation of the use and management of private forests have not been generally accepted by society as a means of achieving intensified management and enhanced productivity and increased timber supplies.

Gifford Pinchot proposed a federal program to help forest owners in the management of timberlands as early as 1898. Shortly after he took office as the first Chief of the Division of Forestry (now the Forest Service), Circular 21, "Practical Assistance to Farmers, Lumbermen,



and Other Owners of Forest Land," was issued, beginning the first of many efforts in federal cooperative forestry.

For many years, however, the assistance offered to private timberland owners and operators was very limited. The Weeks Law of 1911<sup>20</sup> authorized cooperation with the states in forest fire control on private and state lands. The Smith-Lever Act of 1914<sup>21</sup> provided for a cooperative system, including the U.S. Department of Agriculture, state land grant colleges and universities, and county extension services, to extend results of research to farmers and other rural people.

In 1924, the Clarke-McNary Act<sup>7</sup> provided further authorization for cooperative fire control and authorized federal funding on a matching basis with the states to aid farmers by providing information on management and utilization of forest resources. This Act stimulated the appointment of the first full time professional foresters providing assistance to private timberland owners.

In 1937, the Norris-Doxey Cooperative Farm Forestry Act<sup>22</sup> provided some federal funding and direct technical assistance to individual farm woodland owners and for extension education. During World War II, the Forest Service also established a forest utilization service at forest experiment stations to help improve sawmill operations, help locate timber for special needs, and otherwise help the war effort.

The Cooperative Forest Management Act of 1950<sup>23</sup> greatly strengthened the technical forestry assistance programs conducted by state forestry organizations and the Forest Service. This Act broadened the program to include all private landowners, forest operators, wood processors, and public agencies with respect to multiple-use management of forest lands, the utilization of forest products, and urban forestry.

Title IV of the Rural Development Act of 1972<sup>24</sup> authorized a cooperative Rural Community Fire Protection program to help rural towns and communities of less than 10,000 population to acquire needed firefighting equipment and to train firefighting personnel.

Finally in 1978, the Cooperative Forestry Assistance Act<sup>25</sup> consolidated and expanded the authority for federal assistance on nonfederal forest lands. It authorized the Secretary of Agriculture to cooperate with state foresters or equivalent state officials in providing this assistance.

### Scope and Goal of Cooperative Forestry Legislation

The goals under this legislation, for nonfederal lands, are to assist in:

- the advancement of forest resources management;
- the production of timber;

- the encouragement of prevention and control of insect and diseases affecting trees and forests;
- the prevention and control of rural fires;
- the efficient utilization of wood and wood residues including the recycling of wood fiber;
- the improvement and maintenance of fish and wildlife habitat; and
- the planning and conduct of urban forestry programs.

The scope of the programs authorized under the legislation are quite broad. They include:

**Rural forestry assistance.**—Under the rural forestry assistance provisions of the Act, the Secretary is authorized to provide financial, technical, and related assistance to state foresters to:

- develop genetically improved tree seeds.
- procure, produce, and distribute tree seeds and trees to establish forests, windbreaks, shelterbelts, woodlots, and other plantings.
- plant tree seeds and trees for the reforestation or afforestation of nonfederal forest lands suitable for production of timber and other benefits associated with the growing of trees.
- plan, organize and implement measures on nonfederal forest lands, including but not limited to, thinning, prescribed burning, and other silvicultural practices designed to increase the quantity and improve the quality of trees and other vegetation, fish and wildlife habitat, and water yielded therefrom.
- provide technical information, advice, and related assistance to private forest landowners and managers, vendors, forest operators, wood processors, public agencies, and individuals regarding the:
  - harvesting, processing, and marketing of timber and other forest resources, and the marketing and utilization of wood and wood products;
  - conversion of wood to energy for domestic, industrial, municipal, and other uses;
  - management planning and treatment of forest land, including, but not limited to, site preparation, reforestation, thinning, prescribed burning, and other silvicultural practices



designed to increase the quantity and improve the quality of timber and other forest resources;

- protection and improvement of forest soil fertility and the quality, quantity, and timing of water yields; and
- effects of forestry practices on fish and wildlife and their habitats.

**Forestry incentives.**—Section 4 of the Act authorizes the Secretary to develop and implement forestry incentive programs to encourage landowners to:

- apply practices that will provide for afforestation of suitable open lands;
- reforest cutover or other nonstocked or understocked forest lands;
- implement timber stand improvement practices including thinning, prescribed burning, and other silvicultural treatments; and
- improve forest management and protection.

**Insect and disease control.**—The insect and disease control provisions of the Act authorize the Secretary to:

- conduct surveys to detect and appraise insect infestation and disease conditions affecting trees;
- determine the biological, chemical, and mechanical measures necessary to prevent, retard, control, or suppress incipient, potential, threatening, or emergency insect infestations and disease conditions affecting trees;
- plan, organize, direct, and perform measures necessary to prevent, retard, control, or suppress any incipient, potential, threatening, or emergency insect infestations and disease epidemics affecting trees;
- provide technical information, advice, and related assistance in managing and coordinating the use of pesticides and other toxic substances applied to trees and other vegetation, and to wood products, stored wood, and wood in use; and
- take any other actions the Secretary deems necessary to protect from insects and diseases trees and forests, wood products, stored wood and wood in use.

**Urban forestry assistance.**—Cooperative urban forestry assistance began in 1972 when the Cooperative

Forest Management Act of 1950<sup>23</sup> was amended to include urban forestry. Funds were first appropriated for urban and community forestry in fiscal year 1978. Section 6 of the Cooperative Forestry Assistance Act established the Urban Forestry Assistance Program. This authorizes financial, technical, and related assistance to state foresters to provide information and technical assistance to units of local government and others that will encourage cooperative efforts to plan urban forestry programs and to plant, protect, maintain, and use trees in open spaces, greenbelts, roadside screens, parks, woodlands, curb areas, and residential developments in urban areas. Direct cooperation with local governments is also authorized if the state forester agrees that would better achieve the goals of the Act.

**Rural fire prevention control.**—Under the rural fire prevention and control provision of the Act (Sec. 7) the Secretary has authority under whatever conditions he may prescribe, to:

- cooperate with state foresters in developing systems and methods for the prevention, control, suppression, and prescribed use of fires on rural lands and in rural communities that will protect human lives, agricultural crops and livestock, property and other improvements, and natural resources;
- provide financial, technical, and related assistance to state foresters and through them to other agencies and people, for the prevention, control, suppression, and prescribed use of fires on nonfederal forest lands and other nonfederal lands; and
- provide financial, technical, and related assistance to state foresters in cooperative efforts to organize, train and equip local firefighting forces, including those of Indian tribes or other native groups, to prevent, control, and suppress fires threatening human lives, crops, livestock, farmsteads or other improvements, pastures, orchards, wildlife, rangeland, woodland, and other resources in rural areas.

The Act also provides for the establishment of a special rural disaster fund to be used in rural fire emergencies.

**Management assistance, planning assistance and technology implementation.**—Section 8 of the Act authorizes:

- financial, technical, and related assistance to state foresters for the development of stronger and more efficient state organizations including matters related to organization management, program planning and management, budget and

fiscal accounting services, personnel training and management, information services, and recordkeeping.

- financial, technical, and related assistance to state foresters in the assembly, analysis, display, and reporting of state forest resources data; in the training of state forest resources planners; and in participating in natural resources planning at the state and federal levels.
- a program of technology implementation to ensure that new technology is introduced, new information is integrated into existing technology, and forest resources research findings are promptly made available to potential users.

### Forest Service Responsibilities for Cooperative Forestry Programs

Several agencies in the Department of Agriculture have important responsibilities in carrying out the cooperative forestry programs authorized by the Cooperative Forestry Assistance Act and the other related legislation. The Forest Service, through its branch of State and Private Forestry, provides leadership in land and resource protection on both nonfederal and federal lands. In addition the Forest Service has the responsibility for carrying out prevention and suppression activities directly on federal lands and providing assistance for these activities on state and private lands. It also

provides leadership for a coordinated fire protection network composed of federal, state, and private fire organizations which can be quickly mobilized to combat wildfires.

The Forest Service works cooperatively with state forestry organizations to provide land management assistance to owners of nonindustrial forest lands. It also coordinates with the many agencies and organizations whose programs affect private forest lands in this country. The State and Private Forestry branch co-chairs a Private Forestry Issues Working Group within the U.S. Department of Agriculture that coordinates all the Department's programs that deal with private forest lands. This branch also has the lead responsibility for transferring new and existing knowledge, information, or capabilities both inside and outside the Forest Service to improve forest resource management, utilization, and protection.

### Forest Service Cooperative Forestry Program Areas

There are active State and Private Forestry programs in the following five areas: forest pest management, fire protection, forest management and utilization, special projects, and transfer programs. The funding available for these programs in fiscal year 1988 is shown in table 2. Congress appropriates funds to the Forest Service for the first four categories. The Soil Conservation Service and other federal agencies provide funds for the transfer programs.

Table 2.—Forest Service funds for cooperative forestry programs, fiscal year 1988.

Program	Funds (thousand dollars)
<b>Appropriated funds:</b>	
Forest Pest Management	44,441
Fire Protection	13,770
Forest Management and Utilization	10,783
Special Projects	10,875
Subtotal	79,869
<b>Transfer funds:</b>	
Rural Community Fire Protection	3,091
Watershed and Flood Prevention	2,777
Watershed Planning and Operations	241
River Basin Surveys and Investigations	852
Resource Conservation and Development	803
Forestry Incentives Program	1,189
Agriculture Conservation Program	1,769
Pesticide Assessment	369
Subtotal	10,722
<b>Total, Appropriated and Transfer Funds</b>	<b>90,591</b>

<sup>1</sup>Initial allocations subject to increases depending upon Conservation Reserve sign ups and emergencies.

### Forest Pest Management

The basic purpose of the Forest Pest Management program is to help land managers protect forest resources from insects and diseases on all forested lands—federal, state and private. The program provides for surveys and technical assistance, suppression and special projects for technology transfer.

The Forest Service conducts surveys to detect and evaluate pest populations or vegetative damage on National Forest and other federal lands. State forestry organizations conduct similar surveys on private lands. The affected land managers are provided the results, along with advice and recommendations about suppression options.

The Forest Service pest management specialists provide technical assistance to federal land managers and to state pest management specialists through consultation, seminars and workshops. The assistance covers a range of problems from survey techniques to pest identification, as well as pesticide selection and application. Furthermore, the state pest management specialists



provide technical assistance to state and private land managers. In recent years the major pest-suppression projects were directed at gypsy moths, Southern pine beetles, western spruce budworms, dwarf mistletoes and mountain pine beetles.

Special projects for technology transfer cover a variety of subjects. In fiscal year 1988, special projects have been undertaken on southern pine beetle management; acid deposition assessments; gypsy moth control; training of federal employees in the handling, application, storage and disposal of pesticides; and the National Agricultural Pesticide Impact Assessment Program.

## Fire Protection

The Forest Service's Cooperative Fire Protection Program aims to improve the efficiency and effectiveness of wildland fire protection by providing assistance to the states. Several types of assistance are provided: training, information gathering and dissemination, technical expertise, coordination and equipment.

The Cooperative Fire Protection Program is made up of several parts: rural fire prevention and control, rural community fire protection, federal excess personal property, Smokey Bear Program, federal disaster assistance, wildland/urban interface fire protection initiative, and fire prevention.

**Rural fire prevention and control.**—The Rural Fire Prevention and Control Program provides for most of the funding to administer and carry out the Cooperative Fire Protection program. It also provides financial assistance to States for accomplishing tasks agreed to in regional plans that have been recognized as being in the national interest.

**Rural community fire protection.**—The Rural Community Fire Protection program is funded by Farmers Home Administration and is administered by the Forest Service and state foresters. It is intended to help strengthen volunteer fire departments in communities of less than 10,000 people. The funding is used for organizing, training and equipping rural fire departments. This program is important because without adequate local fire protection, the task of both wildland and structural fire fighting fall to state and federal wildland agencies.

**Federal excess personal property.**—This program provides for the recycling of excess federal equipment obtained from the military and other federal agencies, including the Forest Service. Items are loaned to state forestry agencies for use in wildfire protection. States will either use them directly or may redistribute them to rural fire departments. These items remain the property of the Federal Government with the Forest Service retaining title. Some items may be usable as is, while

others may require extensive reconditioning or modification. Typical is the conversion of excess military truck chassis for use as fire trucks.

**Smokey Bear program.**—This program serves the needs of federal, state and local governments engaged in wildland fire prevention. It is a public awareness program with a simple message appealing to a broad audience—"Only You Can Prevent Forest Fires." The message may take many forms often aimed at youth.

**Federal disaster assistance program.**—This program provides assistance to the states for emergency fire suppression when life and property are threatened in an extreme fire emergency. The program is administered and funded by the Federal Emergency Management Agency (FEMA). Usually, Forest Service Cooperative Fire Protection personnel serve in a technical advisory capacity to FEMA during emergency situations.

**Wildland/urban interface fire protection initiative.**—Beginning early in 1986, the Forest Service forged a partnership with other federal agencies, the National Fire Protection Association, and the National Association of State Foresters for the specific purpose of tackling the growing wildfire threat in what has become known as the wildland/urban interface. The intent is to reduce the potential fire hazard associated with the increasing number of homes in areas where forest and homes intermingle. As population and the desire to live in natural settings have increased, so has the fire threat. The program seeks to educate the public about the problem, stimulate State and local governments to implement preventive measures, and provide professional expertise in this area for creating a more fire-safe environment.

**Fire Prevention.**—Both the Smokey Bear program and the Wildland/Urban Interface Fire Protection Initiative are major components of fire prevention, but a further crucial aspect of the program is the prevention of fire starts in all areas of the forest and wildlands. Little can be done to reduce natural causes such as lightning ignitions; however most fires are person-caused, and a large part of them are arson-related. Efforts are directed at identifying the causes and developing efforts to reduce them.

All the programs described are aimed at improving the states' ability to manage their fire problems. Fire protection on state and private land is basically a state and local responsibility. However, without adequate protection, the Federal Government is often called to provide assistance. A federal role is often necessary to efficiently transfer the latest technology, coordinate and encourage interstate cooperation, access national trends and disseminate information efficiently. It is also in the Federal Government's best interest to have reliable fire fighting forces available for extreme situations where federal forces are not adequate. This is required by the



variability in fire seasons. It is efficient for all emergency organizations to plan for the norm and to rely on outside cooperation and assistance when appropriate.

### **Forest Management and Utilization**

In its cooperative management program, the Forest Service provides technical and financial assistance to state forestry organizations. These state organizations, in turn, provide technical advice to private landowners.

In the Utilization Program the Forest Service carries on a variety of activities concerned with the utilization and marketing of timber and timber products. It works with state forestry and other state and federal agencies to increase the export of timber products. It works to develop and introduce new technologies which use low quality timber, while improving the quality and composition of timber stands.

The Forest Service also works to develop and use technology such as microcomputer programs, for improving the efficiency of timber harvesting, wood processing and use. Additionally, it sponsors training workshops and conferences to improve market development. In addition it participates in rural development programs, including those that provide technical and financial assistance to rural landowners, communities, and forestry organizations, where there is the potential for increasing forest-based employment and income.

The Forest Service nursery and tree-improvement program provides technical and financial assistance to the states for upgrading the quality of seedlings in their nurseries. This assistance is aimed at long-term investments and activities that protect soil and water resources while leading to more economical and productive reforestation of nonfederal lands.

The Urban and Community Forestry Program aims to improve the quality of life in communities through the planting and management of trees, shrubs, and other vegetation. Technical assistance is provided to communities through a partnership with state forestry agencies and professional organizations, such as the American Forestry Association, the National Urban Forestry Council, the National Association of State Foresters, the National Arbor Day Foundation, and the International Society of Arboriculture.

The Forest Service Statewide Forest Resource Planning Program provides technical and financial assistance to states for forest resources planning.

### **Special Projects**

The Forest Service conducts several special projects as part of its State and Private Forestry programs. The Boundary Waters Canoe Area Wilderness Act of 1981<sup>26</sup>

authorizes the Forest Service to cooperate with the State of Minnesota to intensify forest management on forest lands owned by the State, its counties and its private citizens. The Act seeks to mitigate the loss of timber production caused by incorporating forest lands in the State into the Boundary Waters Canoe Area.

The Burton-Santini Act authorizes the Secretary of Agriculture to make financial assistance grants to local governments within the Lake Tahoe Basin for the purpose of reducing soil erosion and water pollution.

As one of the special projects, the Forest Service manages as a National Historic Landmark the Grey Towers estate in Pennsylvania, former home of Gifford Pinchot, first chief of the Forest Service. Grey Towers houses the Pinchot Institute for Conservation Studies. The landmark maintains active programs for outreach to the public, interpretation of natural resources, and a historical presentation of Forest Service heritage through its link to the Pinchot family. Grey Towers' personnel also provide on-the-job experience in historic site management to other Forest Service employees and share their skills with community groups and state and local governments.

### **Transfer Funds**

The preceding programs are carried out with funds directly appropriated to the Forest Service. There are other programs and activities administered with funds transferred from other agencies (table 2).

For example, the Forest Service administers the rural community fire protection program using funds transferred from the Farmer's Home Administration. Funds are made available to small rural communities to organize, train, and equip fire protection forces. Matching funds from states and community fund-raising efforts provide an efficient and effective rural fire protection resource.

The Forest Service provides technical leadership for the forestry aspects of the small watershed and flood prevention programs—The Watershed Protection and Flood Prevention Act of 1954<sup>16</sup> commonly referred to as P.L. 566, and the Act of December 1944<sup>27</sup> (P.L. 534). The Forest Service also handles emergency watershed protection projects including the treatment of hazards to life and property on National Forest lands. The Soil Conservation Service administers these programs.

The Forest Service is also responsible for the forestry provisions of the Resource Conservation and Development Program administered by the Soil Conservation Service. This program provides assistance to leaders of conservation and development areas in planning and implementing local forestry goals and objectives. The technical assistance includes such activities as feasibil-

ity studies, demonstrations and training, and the development of markets for timber products.

More detail on the Forest Service responsibilities and programs carried out with transfer funds follows under the discussion of relationships with other agencies.

### **Forest Service Cooperative Programs Administration and Organization**

The Forest Service cooperative programs are directed at the national level by a Deputy Chief of the Forest Service for State and Private Forestry. This Deputy Chief and the supporting headquarters staff have the responsibility for formulation and administration of the cooperative programs at the national level; for coordination with other agencies in the U.S. Department of Agriculture, states, and other agencies and organizations; for international activities; and for program review and general direction of the work carried out at Forest Service regional offices and other centers in the field concerned with cooperative programs.

The Forest Service cooperative program responsibilities are carried out by an Area Director of Northeastern Area State and Private Forestry located in Broomall, PA and by regional foresters located at:

Missoula, MT	San Francisco, CA
Lakewood, CO	Portland, OR
Albuquerque, NM	Atlanta, GA
Ogden, UT	

Many of the state and private cooperative programs, especially those concerned with technology transfer, involve complex problems requiring a wide array of technical skills. The personnel involved have advanced training in biological, physical, educational, and social sciences.

In total, about 510 people were employed in the Forest Service State and Private programs, in 1987. Most of them were directly involved in some form of technology transfer. Many more state people were involved in the cooperative programs.

### **Relationships With Other Forest Service Programs**

The cooperative forestry programs are closely integrated with the Forest Service research program and with administration of the National Forest System. In the transfer of technology from researchers to users of new knowledge, federal and state foresters and subject matter specialists are important links. They participate with research scientists and user groups in the selection of research projects and the planning of research. They conduct pilot tests of new techniques and materials on

diverse subjects such as fire and insect control and improved wood utilization. They transfer technical information to a wide variety of owners, operators, and users of forest and range resources.

These cooperative forestry programs similarly have direct impacts on the protection and management of National Forest System lands that are typically interspersed with or adjacent to private or other nonfederal ownerships. Thus, cooperative programs of rural fire prevention and control are essential to protection of many lands in the National Forest System. State and Forest Service fire organizations have many reciprocal protection agreements, close working relationships, and frequent joint control efforts. The insect and disease control program likewise illustrates joint action by the Forest Service and state and other operators. In activities relating to watershed planning and flood control operations, State and Private Forestry specialists also work directly with National Forest System personnel in coordinated projects.

### **Relationships With Other Agencies**

The Forest Service cooperative forestry programs represent a major part of federal assistance to promote and improve forestry on private and nonfederal public lands, but other agencies also have substantial responsibilities for related programs.

The Forest Service and the agencies conducting these related programs have developed many memoranda of agreement and other arrangements to assure program coordination and continuing cooperation in administering related activities. Within the Department of Agriculture, the Secretary provides delegations of authority to departmental agencies, guidelines for forestry planning and formulation of budget proposals, and definitions of agency roles in delivery of programs of education, technical assistance, and other forestry incentives.

Staffs of the Forest Service, the Soil Conservation Service, the Extension Service, the Agricultural Stabilization and Conservation Service, the Cooperative State Research Service, and the Farmers Home Administration work together in coordinating programs. These staffs also work closely with cooperating organizations that are directly concerned with forestry programs, including the National Association of State Foresters, the Association of Farmers Elected Committeemen, and the National Association of Conservation Districts.

The responsibilities of other agencies for cooperative forestry related programs are as follows:

**Soil Conservation Service.**—The Soil Conservation Service is assigned responsibility for several programs that apply to forests and rangelands to croplands, pas-



turelands, or other resources "related" to soil and water. A Secretarial delegation of authority to the Agency provides for "national leadership in the conservation, development and productive use of the Nation's soil, water and related resources."

Some of the activities for which the Soil Conservation Service has responsibility or leadership assignments are closely related to Forest Service research programs, and have been described in the preceding section dealing with forest and range research interrelationships. These include resource inventories and monitoring; national appraisals of soil, water and related resources; river basin surveys and investigations; and range inventories on nonfederal lands.

As part of its program of "conservation operations," the Soil Conservation Service, in cooperation with some 13,000 conservation districts, provides technical aid to farmers, ranchers, and other land users in planning and carrying out locally adapted soil and water conservation measures. This assistance, provided under the Soil Conservation and Domestic Allotment Act of 1936<sup>28</sup> is available in all 50 states, Puerto Rico, and the Virgin Islands. Conservation districts now cover some 97% of the Nation's farm and ranch lands. Thus, they include much of the private forests and rangeland that is also covered in cooperative Forest Service-state forestry programs, in Forest Service-university forest research programs, and to some extent in administration of the National Forest System.

Guidelines developed by the Secretary of Agriculture provide that the Forest Service in cooperation with state foresters, and the Soil Conservation Service in cooperation with conservation districts, have lead roles in the "service" component of technology transfer, including on-the-ground assistance to individuals as their primary clientele. Forestry assistance is provided by the Soil Conservation Service as a part of total technical assistance to private landowners and land users when such services are an integral part of land management and such services are not available from a state agency. The agency also provides forestry services concerning windbreaks and shelterbelts. In carrying out this technical assistance program, Soil Conservation Service technicians work directly with landowners and farm operators in developing conservation plans for farms, ranches, and other land units. They also help carry out recommended conservation practices, including such measures as planting trees shrubs or grass on eroding areas, thinning and other timber stand improvement, prescribed burning, improving grazing systems, wildlife habitat management, and recreation area improvement.

The Watershed Protection and Flood Prevention Act of 1954,<sup>16</sup> (P.L. 566) includes provisions for cooperation between the Federal Government, the states and local

subdivisions in both planning and operations programs for the protection and improvement of individual watersheds not exceeding 250,000 acres. Planning assistance is provided in response to requests from local sponsoring organizations. The dominant objectives in this planning program have been watershed protection and flood prevention, but multipurpose projects can also include water supply, irrigation, outdoor recreation, and fish and wildlife habitat features.

In carrying out these local planning projects, the Soil Conservation Service is assigned the administrative leadership responsibility. The Forest Service is assigned responsibility for administering the forestry aspects of these projects on National Forest System lands, on adjacent lands administered by the Forest Service under formal agreement, and on nonfederal forest lands.

The Economic Research Service and the National Agricultural Statistics Service participate in this program by development of criteria and economic analyses of project plans. The Science and Education Administration conducts studies that are related to and used in watershed planning and action programs. State and local units of government also participate in watershed planning and provide about a third of the total costs of this watershed program.

Besides assistance in watershed planning, the U.S. Department of Agriculture also helps finance and install works of improvement and land treatment measures specified in individual watershed plans. These watershed operations are conducted under:

1. the Act of December 22, 1944<sup>27</sup> (P.L. 534), which provided for works of improvement for runoff and waterflow retardation and soil erosion prevention on 11 major watersheds.
2. the Watershed Protection and Flood Prevention Act of 1954<sup>16</sup> (P.L. 566), which provided for cooperation between the Federal Government and the states and political subdivisions in the installation of facilities and land treatment measures to prevent erosion, flood and sediment damage, further the development and utilization of water, and improve conservation and proper utilization of the land. Both works of improvement, and particularly the land treatment measures installed in the areas covered by these watershed projects, supplement other forestry and range programs conducted by the Forest Service and other federal and state agencies.

While the Soil Conservation Service has general responsibility, the "forestry aspects" of these programs are carried out by the Forest Service in cooperation with the

Soil Conservation Service and state foresters. Cooperative arrangements, outlined in memoranda and agreements between the Soil Conservation Service and the Forest Service, provide that the two agencies will jointly prepare an annual program activity plan and budget for the forestry aspects of watershed planning and operations, under general program criteria and procedures established by the Soil Conservation Service.

The Act of June 28, 1938<sup>29</sup> and various appropriation acts provide for emergency action where forest fires, floods, or other natural disasters have caused sudden impairment of watersheds. Emergency work includes such measures as reestablishment of trees or other vegetative cover on denuded lands, clearing stream channels, and land stabilization. The Soil Conservation Service administers these programs on nonfederal lands, provides technical assistance, and contracts for needed installations. The Forest Service is responsible for installations and land treatment measures on National Forest System lands and on adjacent lands administered by the Forest Service, and for forestry practices on lands of all ownerships.

Section 102 of the Food and Agriculture Act of 1962<sup>30</sup> provided for assistance from U.S. Department of Agriculture Agencies to Resource Conservation and Development Areas that are organized and sponsored by units of state and local governments. Local program sponsors direct a continuing planning process and install planned conservation measures. The Soil Conservation Service, the Forest Service and other U.S. Department of Agriculture agencies provide technical, financial or loan assistance to local sponsors under the leadership of the Soil Conservation Service.

The technical assistance includes such activities as compilation of soils information, market analyses, wood utilization studies, planning and construction of flood prevention structures and water-based recreation facilities, and identification of sources of public assistance for local area development. The Farmers Home Administration also provides loan services to local program sponsors in connection with planned activities. Other assistance has been provided in selected program areas through arrangements with State Cooperative Extension Services and the Economic Research, Statistics, and Cooperative Services.

The Clean Water Act of 1977<sup>31</sup> authorized the Secretary of Agriculture, with the concurrence of the Environmental Protection Agency, to establish and administer a program of long-term contracts with rural landowners and operators to install and maintain measures incorporating "best management" practices to control nonpoint source pollution for improved water quality. States or areas having an approved Section 208 plan under the Federal Water Pollution Control Act Amendments of 1972<sup>32</sup> may qualify for technical and cost-sharing assis-

tance in carrying out conservation practices on farm, ranch, or other land. This program applies to "rural lands," which are defined as privately owned agricultural lands, including cropland, pastureland, forest land, rangeland, and other associated lands for which the Soil Conservation Service has responsibility.

**Extension Service.**—The Extension Service of the U.S. Department of Agriculture, in cooperation with State Extension Services, has the lead role in the "education" component of forest technology transfer, with group audiences as the primary clientele. Service to individual landowners and users also may be provided to meet demonstration or similar opportunities.

Agricultural extension activities were initially established under the Smith-Lever Act of 1914,<sup>21</sup> which authorized the Secretary of Agriculture, through the land grant colleges, to provide instruction and practical demonstrations in agriculture and related subjects. The Rural Development Act of 1972,<sup>33</sup> the Farmer to Consumer Direct Marketing Act of 1976,<sup>34</sup> and the Food and Agriculture Act of 1977<sup>14</sup> also provided authorizations for extension programs. In 1978 the Renewable Resources Extension Act<sup>35</sup> specifically authorized education programs for private forest and range landowners, wood processors, and users of forest and range renewable resources.

The Extension Service furnishes program leadership and assistance to state and county extension services, and administers a program of federal grants to the states for agricultural and forestry extension.

Extension programs provide landowners and resource users with information on technology for protecting and managing forests and rangelands and for timber, livestock, recreation, or other goods and services. Assistance in urban forestry is made available to officials and others involved in forestry work and tree problems. Information also is provided to the general public regarding the importance of forest and rangeland resources for production of economic and environmental benefits.

**Agricultural Stabilization and Conservation Service.**—The Agricultural Stabilization and Conservation Service is involved in forest and range programs primarily through administration of cost-sharing activities provided through the Agricultural Conservation Program, the Forestry Incentives Program and the Conservation Reserve Program. These forestry programs are conducted in coordination with the technical assistance and education activities of other U.S. Department of Agriculture and state forestry agencies. The Agricultural Stabilization and Conservation Service may provide technical information to landowners who, or may refer them to the appropriate technical agencies.

Under the Soil Conservation and Domestic Allotment Act of 1936,<sup>28</sup> federal funds have been appropriated to



provide cost-sharing to farmers for a variety of conservation and land treatment measures. This Agricultural Conservation Program is administered by the agency through a system of state and county committees. A limited part of the funds available in this program has been assigned for forestry practices such as tree planting, stand improvement, wildlife habitat improvement, and fencing against livestock. The Forest Service and state forestry agencies provide advice and assistance in developing programs and in monitoring cost-sharing contracts with participating forest owners.

The Forestry Incentives Program is specifically designed for federal sharing of the costs of forestry practices with nonindustrial private landowners. The program was authorized in the Agricultural and Consumer Protection Act of 1973<sup>36</sup> and subsequently in the Cooperative Forestry Assistance Act of 1978.<sup>25</sup> The purpose of this program is to encourage improved forest management for production of timber along with associated forest commodities and uses. The Agricultural Stabilization and Conservation Service has administrative responsibility for this program and handles eligibility, waiver procedures, and payments to participants. The Forest Service provides technical input, such as specifications for forestry practices and recommendations on apportionments of available funds. State forestry agencies and cooperating private foresters and consultants provide technical assistance to landowners, in helping develop individual forest management plans and inspecting installed practices to ensure compliance with guidelines and contracts.

The Forestry Incentives Program involves both short- and long-term cost-sharing agreements with private landowners to plant trees or otherwise improve stands of forest trees by thinning, pruning of crop trees, prescribed burning, or release of desirable seedlings and young trees on sites suitable for production of products such as sawlogs and veneer logs. Cost-sharing can be provided for up to 75% of the costs of tree planting and other stand improvement measures, depending on the cost-share rate set by the Agricultural Stabilization and Conservation Service in consultation with a committee of state foresters or equivalent state officials. Eligible landowners must own 1,000 acres or less, or up to 5,000 acres if significant public benefits can be expected.

The Forest Service also cooperates with the Agricultural Stabilization and Conservation Service by providing technical assistance for the Conservation Reserve Program. The Food Security Act of 1985<sup>37</sup> established the Conservation Reserve to remove highly erodible cropland from agricultural production. Participants receive annual rental payments for 10 years to keep land out of production. They also receive up to 50% of the cost of establishing permanent cover on these lands. Under the legislation establishing the Conservation

Reserve, Congress established a goal of 12.5% for tree planting out of a total goal of 40 to 45 million acres of land in the Reserve. Tree planting under this program is proving to be the largest single tree-planting program in the United States.

**Farmers Home Administration and Land Banks.**— The loan program of the Farmers Home Administration provides for limited loans to farmers unable to obtain reasonable credit elsewhere including:

- soil and water loans to farmers, associations, and others for resource development, including improvement of forest resources;
- operating loans to farmers, including loans for harvesting and processing timber products;
- grazing loans, generally made to associations of three or more ranchers for the purchase of grazing land; and
- recreational loans to farmers for converting portions of farms or ranches to income-producing recreation enterprises.

Loans from the Federal Land Banks also include credit to landowners offering forest resources as collateral. Such loans have steadily grown in importance, particularly in the southern states and the Pacific Northwest.

Other federal and state Agencies also conduct programs relating to management and use of private forest and range lands:

- The Fish and Wildlife Service in the Department of the Interior provides financial and technical assistance to states for the restoration and improvement of habitat for fish and wildlife, including forest and range habitats.
- The Environmental Protection Agency and related state agencies administer programs for water and air quality that include specifications for "best management practices" that forest owners and operators must follow in silvicultural and related activities. The Agency also is responsible for the registration and certification of the use of pesticides, including those widely used in forestry.

## Relationships with the General Public

A variety of federal and state programs are thus in operation to inform and help private owners and operators of forest and range land in the management and development of forests, ranges, and related resources

and in the operation of forest-based industries. Most of the technical assistance, extension education, and cost-sharing programs of the U.S. Department of Agriculture agencies and state forestry and extension agencies are directed toward nonindustrial private forest ownerships held by farmers and other miscellaneous owners. These technical assistance and technology transfer programs also benefit large numbers of small timber businesses.

Transfer of knowledge and technology is one of the important responsibilities of Cooperative Forestry. This is carried out in a wide variety of ways including training, symposiums, preparation and distribution of publication and consultations.

Part of the involvement of Cooperative Forestry is in areas where urban growth is taking place in wildland areas. Here information on forest management, forest health and fire protection is provided. Cooperative programs are also concerned with improving the quality of life in urban areas by providing assistance for planting and management of trees, shrubs, and other vegetation.

## NATIONAL FOREST SYSTEM PROGRAMS

The National Forest System lands includes some 191 million acres of federal land, or about 13% of the total forest and range lands in the Nation. These lands are located in 43 states, Puerto Rico, and the Virgin Islands. They include 156 national forests, containing 186 million acres and 19 national grasslands, containing 4 million acres. The remaining acreage is in land utilization projects, research and experimental areas, and other areas.

The national forest lands comprise some 160 million acres reserved from the public domain under the Creative Act of 1891,<sup>38</sup> plus 23 million acres of lands acquired by purchase, donation, or exchange under the Weeks Law of 1911,<sup>25</sup> the Clarke-McNary Act of 1924,<sup>2</sup> and related legislation.

The land in the National Forest System made up of national grasslands and land utilization projects represents areas of "submarginal" land acquired by the Federal Government under the Bankhead-Jones Farm Tenant Act of 1937<sup>42</sup> for purpose of resettlement and land conservation. These lands are managed by the Forest Service with conservation and demonstration objectives and multiple-use and sustained yield policies similar to those applicable to national forest lands.

The societal justification for public ownership and management of the National Forest System lands is much the same as that for public cooperative and research programs. For timber, water, wildlife and fish and most other renewable resources products of forests and rangelands, the market system for producing goods

and services does not work very well. This reflects institutional and societal forces that are very difficult to change or manage.

Here and in many other countries, wildlife and fish are considered public property. This is largely because of the mobile nature of most species of wildlife and fish—it is difficult or impossible to control movement across property and jurisdictional lines. As a result of such characteristics, there is no price in a market sense on most wildlife and fish.

Water at its source in a stream or lake or underground is a free good—costs and prices develop as it is transferred from its point of origin or stored for future use. Many forms of outdoor recreation are also free or available at prices below the providing cost.

The lack of market prices is partly due to the mobile nature and public ownership of the resource. It also results from the broad societal nature of the benefits. For example, there seems to be no practical way to establish a market price for scenic beauty, water quality, songbirds, or the enjoyment associated with nature walks.

Some products of forest and range lands, especially timber and forage, do have established markets and prices. But the problem with these goods, particularly timber, is the limited response to price changes. In the case of timber, for example, for each 10% increases in price there is less than a 4% increase in supplies.

Because of the problems associated with supplying the desired quantities of most of the resources of forest and range, society has taken action to supplement market forces. The establishment and maintenance of the National Forest System, nearly all forestry legislation, as well as the public programs of protection, technical and financial assistance, research, and education are all societal adjustments designed to supplement the market system, serving to increase and protect national supplies of timber, water, wildlife and fish, and many forms of outdoor recreation.

## Authorization for the National Forest System

Forests have been a matter of public concern since settlement began and has intensified with time. After the Civil War, forests were being cut at very rapid rates. Part of the cutover lands were used for crops and pasture. Because of such use and due to uncontrolled fires which burned each year, only a part of cutover land came back to forests. Floods and erosion were becoming serious problems over large areas and timber supplies were becoming economically scarcer.

In the 1870's and 1880's there were a series of studies, articles, and other material describing the situation, including the comprehensive 1878 "Report upon Forestry" by Franklin B. Hough.<sup>39</sup> New organizations, in-



cluding the American Forestry Association, were formed and began to build support for action. Influential members of the Federal Government and other concerned groups actively promoted the idea of "forest reservations" to protect part of the remaining forested public lands. As a result of these efforts Congress, in the Creative Act of 1891,<sup>38</sup> authorized setting aside public lands as timber reserves. This was followed by the Organic Administration Act of 1897.<sup>40</sup> This Organic Act remained essentially unchanged until the passage of the Multiple-Use Sustained Yield Act of 1960.<sup>41</sup> The National Forest Management Act of 1976<sup>2</sup> established additional Congressional standards and guidelines for the National Forest System. It also added specific direction for public participation in National Forest System planning and management.

The setting aside of public lands was supplemented in 1911 by the Weeks Law<sup>20</sup> which for the first time authorized the purchase of private lands in the headwaters of navigable streams in the eastern United States for inclusion in the National Forest System. The Clarke-McNary Act of 1924<sup>7</sup> provided broader authorization for the purchase of private lands for the National Forest System. Some lands purchased under the Bankhead-Jones Farm Tenant Act of 1937<sup>42</sup> were also in time transferred to the National Forest System.

### Scope and Goals of the National Forest System

The goals of the National Forest System as defined in the Organic Administration Act of 1897<sup>40</sup> were to "improve and protect the forest within the reservation, or for the purpose of securing favorable conditions of waterflows, and to finish a continuous supply of timber for the use and necessities of the United States." From the beginning the National Forest System lands were managed not only to provide timber and watershed protection but other economic and social benefits: grazing, wildlife and fish, outdoor recreation, minerals and many other goods and services. Although the Organic Act, the Weeks Law and appropriation acts made clear in general ways that this was the will of Congress, the policy was not brought together formally until the Multiple-Use Sustained Yield Act of 1960.<sup>41</sup>

This act states:

It is the policy of the Congress that the National Forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes....The Secretary of Agriculture is authorized and directed to develop and administer the renewable surface resources of the National Forests for multiple use and sustained yield of the several products and services obtained therefrom....

The National Forest Management Act of 1976<sup>2</sup> established additional Congressional standards and guidelines for the administration of the National Forest System, including directives for comprehensive multiple-use resource planning.

Under this Act, the Forest Service is developing long-range integrated management plans for each national forest. This involves use of interdisciplinary planning teams and continuing public participation. A committee of scientists made up of representatives of the various disciplines which bear on land management planning has also furnished scientific and technical advice in drafting regulations that prescribe standards and guidelines for resource planning.

Part of the National Forest System land is managed for designated purposes. The most important areas in size of this kind are those designated as wilderness.

The first area of wilderness in the United States was established in 1924 by administrative order of the Forest Service on the Gila National Forest in New Mexico. By the time Congress enacted the Wilderness Act of 1964,<sup>43</sup> some 9.1 million acres of wildland areas in the National Forests had been designated under U.S. Department of Agriculture regulations as wilderness, wild or canoe areas, and some 5.4 million acres as primitive areas. The Wilderness Act of 1964 established a National Wilderness Preservation System:

...to be composed of Federally owned lands designated by Congress as "wilderness areas"...administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness...wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

The Eastern Wilderness Act of 1975<sup>44</sup> added certain areas in eastern National Forests to the National Wilderness Preservation System and designated additional wilderness study areas for review of wilderness potentials. Other acts of Congress, including the Endangered Wilderness Act of 1978,<sup>45</sup> also made additions to the wilderness system in the national forests. Small areas of National Forest System Lands are also designated as administrative sites, experimental areas, wild and scenic rivers, campgrounds, and other limited uses.

### Program Areas

At any given time within the existing framework of legislation and goals, National Forest System programs are largely determined by appropriations. These appropriations reflect the current priorities of the Administra-

tion and of Congress and provide a means of changing the National Forest System programs in accord with consensus views of the time. Thus, the way the National Forest System lands are used and managed reflects, as well as a democratic system can, the desires and expectations of the people.

The fiscal year 1988 appropriations for National Forest System programs are shown in table 3. The appropriations have been grouped for budgetary and administrative purposes into major resource and management categories shown in the table. All the resource and management activities are interrelated, however, and require integration through multiple-use planning and balanced management of often conflicting uses.

### Mineral Resource Management

National Forest System lands are of major and increasing importance for production of a variety of metals and other minerals. These lands contain an estimated 50 billion tons of coal. These lands have potential for oil, gas, geothermal, uranium, phosphate, lead, gold, silver, sand and gravel, and many other minerals.

Part of the Forest Service minerals program involves evaluating applications or proposals of industry to explore and develop energy and mineral resource on National Forest System lands. This is done in cooperation with the Bureau of Land Management, the Bureau of Mines, the Office of Surface Mining Reclamation and Enforcement, and the Geological Survey in the U.S. Department of the Interior. The Forest Service and the Bureau of Land Management also cooperate in the preparation of documents required by the National Environmental Policy Act of 1969.<sup>46</sup>

The Forest Service develops procedures and requirements for mineral activities in coordination with other resource values and uses. The Forest Service's minerals program also involves the authorization and administration of ancillary projects such as roads and pipelines that are part of mineral development projects. Furthermore, where privately-owned minerals underlie the federal surface, the Forest Service manages surface activities associated with the exploration and development of the private mineral estate.

Federal mineral and energy resources are categorized as leasable, locatable, and mineral materials. The Forest Service has programs for each.

**Leasable minerals.**—Under the Mineral Leasing Act of 1920<sup>47</sup> the Secretary of the Interior, through the Bureau of Land Management, is authorized to issue permits or leases, for prospecting and development of "leasable" minerals on public lands, including National Forest System lands reserved from the public domain or acquired by certain land exchanges where "public land"

Table 3.—Forest Service funds, for National Forest System programs, fiscal year 1988.

Program	Funds (thousand dollars)
<b>Appropriated Funds:</b>	
Minerals Area Management	26,683
Real Estate Management	21,834
Land Line Location	26,651
Maintenance of Facilities	16,533
<b>Forest Fire Protection:</b>	
Fire suppression	156,477
Fuels management	8,552
Subtotal	165,029
Fighting Forest Fires	125,000
Cooperative Law Enforcement	9,669
Forest Road Maintenance	83,740
Forest Trail Maintenance	20,026
<b>Timber Sales Administration and Management:</b>	
Sales preparation	98,432
Harvest administration	44,333
Timber resources inventory planning	16,177
Silvicultural examination	26,619
Subtotal	185,561
Reforestation and Stand Improvement	54,923
<b>Recreation Use:</b>	
Recreation management	96,945
Wilderness management	12,581
Cultural resource management	14,216
Subtotal	123,742
<b>Wildlife and Fish Habitat Management:</b>	
Wildlife habitat	5,634
Inland fish habitat	3,846
Anadromous fish habitat	4,123
Endangered, threatened, and sensitive species habitat	4,489
Administration and resources coordination	29,352
Subtotal	47,444
Range Management	29,225
Soil, Water and Air Management	35,271
General Administration	268,660
<b>Construction:</b>	
Construction of facilities	24,735
Forest road construction	171,764
Trail construction	14,671
Subtotal	111,170
Land acquisition	49,076
<b>Total Appropriated</b>	<b>1,500,237</b>
<b>Permanent Appropriations-Working Funds:</b>	
Brush Disposal	54,438
Timber Roads, Purchaser Elections	4,551
Timber Salvage Sales	61,502
Tongass Timber Supply Fund	50,007
Operation and Maintenance of Forest Service Quarters	5,500
Other	200
<b>Total Permanent Appropriations</b>	<b>176,194</b>
<b>Trust Funds:</b>	
Knutson-Vandenburg (K-V) Reforestation	114,123
Timber Stand Improvement	31,131
Other	55,453
Cooperative Work (Other)	58,332
Reforestation Trust Funds	30,000
<b>Total Trust Funds</b>	<b>289,039</b>
<b>Total National Forest System</b>	<b>1,965,470</b>



or timber thereon was granted in exchange. These minerals include coal, oil, oil shale, native gas, phosphate, sodium, asphalt, bitumen and bituminous rock, potassium, and sulphur.

The Mineral Leasing Act for Acquired Lands of 1947<sup>48</sup> grants similar authority to the Bureau of Land Management to lease deposits of "leasable" minerals on acquired lands in the National Forest System. Regulation of surface coal mining operations and rehabilitation of mined areas by the Department of the Interior also are provided for in the Surface Mining Control and Reclamation Act of 1977.<sup>49</sup> The Geothermal Steam Act of 1970<sup>50</sup> similarly requires that geothermal leases on National Forest System lands are subject to the consent and conditions of the Secretary of Agriculture to protect lands for purposes for which they were withdrawn, or acquired.

In accord with the legislative direction, the Forest Service Leasable Minerals Program involves:

- Acting on leasing applications and related proposals and forwarding recommendations/consents to the Bureau of Land Management with stipulations to improve coordination with surface resources.
- Determining terms and conditions to be included in plans of operation to be approved by Forest Service or by Bureau of Land Management.
- Ensuring that mineral exploration, development, production, and reclamation activities comply with applicable laws and regulations.
- Ensuring coordination with surface resources and other land uses.
- Monitoring activities for compliance with an approved plan of operation, prospecting permit, and exploration license requirements.
- Issuing and administering special use permits associated with leasable minerals.

**Locatable mineral.**—Most national forest public domain lands are open to location of mining claims under the Mining Law of 1872.<sup>51</sup> Mining claims may be located by citizens for all minerals which are not subject to disposal under the leasing laws or the Minerals Materials Act. Included in these "locatable minerals" are such minerals as gold, silver, copper, lead, and zinc. Locatable mineral operations such as exploration or production are subject to the Forest Service locatable minerals regulations which require operators to obtain Forest Service approval of their plans of operation. On

mining claims located after July 23, 1955, and before patent, the Forest Service may manage and dispose of vegetative resources under provisions of the Multiple Use Mining Act of 1955.<sup>52</sup>

The Forest Service locatable minerals program involves:

- Ensuring compliance with the U.S. Mining Law of 1872 and applicable regulations.
- Ensuring coordination with surface resources and other land uses.
- Processing plans of operation.
- Monitoring mining activities for compliance with requirements in approved plans of operation.
- Examining the validity of mining claims.

**Mineral material.**—The Secretary of Agriculture has the authority to dispose of mineral materials from National Forest System lands. Mineral materials include, but are not limited to most occurrences of sand, stone, gravel, pumice, pumicite, cinders, and clay. The Secretary's authority to dispose of these materials stem collectively from the Materials Common Varieties of Mineral Act of July 1947<sup>53</sup> and the Transfer Act of June 11, 1960<sup>54</sup> and other special acts. Mineral materials are sold outright, granted free of charge to qualified users, or used to build and maintain Forest Service road systems and other facilities.

The Forest Service Mineral Materials Program involves:

- Complying with laws and regulations.
- Administering sale and free-use disposals.
- Inventorying the mineral materials resource.
- Conducting appraisals.
- Developing and implementing forest-wide Mineral Material Management Plans and site development plans.
- Ensuring coordination with surface resources and other land uses.
- Monitoring operations, including reclamation applicable to all disturbing activities.

**Geology.**—Besides mineral resource management, the Forest Service has the responsibility to provide and interpret geologic and minerals resource information for land management planning, environmental protection, mined-land reclamation, and other agency or state cooperative management programs. More specifically the geology program:

- Provides geologic support personnel to gather, interpret, and present information about geologic conditions and mineral resources for resource evaluation and land management planning.
- Gathers, interprets, and reports geologic factors that affect the design, construction, and maintenance of Forest Service facilities.
- Gathers and interprets geologic information needed to develop and protect such resources as ground water, underground spaces, and minerals.

## Real Estate Management

The Real Estate Management Program of the Forest Service is concerned with land exchange and adjustment, land classification and status, title claims, landownerships planning, special land uses, and mapping.

**Land exchange.**—The Land Exchange Program involves exchange of land between the National Forest System and other ownerships under authority of the General Exchange Act of 1922,<sup>55</sup> the Weeks Law of 1911,<sup>20</sup> and several special acts. The objectives of the Land Exchange Program are to consolidate ownerships, improve administration of the properties involved, reduce the costs of protection and administration, and resolve claims and trespass problems. In the western states, many land exchanges involving large acreages have been transacted with state and local governments, railroads, timber and mining companies and ranchers. The properties often involve “checkerboard” landownership patterns resulting from 100-year-old land grants. Exchanges are a means of solving problems caused by fragmented ownership. Many exchanges help local communities by exchanging isolated tracts of nonfederal land for federal land adjacent to expanding communities. Recent wilderness acts include provisions directing acquisitions of nonfederal land by exchange to preserve the wilderness character.

**Land classification and status.**—The program, concerned with classification and status, aims to record the land area, location, and interests in the National Forest System lands in order to improve protection, management, and development of resources. Additionally, it seeks to ensure proper administration of lands subject to reservations, outstanding rights, mineral withdrawals, other conditions of title and laws that direct or affect land management. Further concerns of the program involve resolution of land title claims and planning for landownerships adjustments.

**Special land uses (nonrecreational).**—This program is directed at authorizing and monitoring the use of

National Forest System lands by federal, state, and local agencies, by private industry including utilities, and by individuals for a wide variety of special purposes. These include rights-of-way for power, oil and gas lines; microwave towers and other communication facilities; and water power developments. Most users are charged a fee based on the fair market value of the use.

A major part of the program is concerned with the processing of hydroelectric development proposals. The Forest Service is responsible for developing terms and conditions for protecting National Forest System lands which must be included in licenses granted by the Federal Energy Regulatory Commission. Some special uses, such as hydroelectric facilities, can result in significant changes in the management and use of an area. To help assess these changes, the Forest Service completes a detailed review of the proposal, alternatives to the proposal, and the impacts of the proposal on the environment. Authorizations are not granted until the review process is completed and the Forest Service is satisfied that the environmental impacts associated with the use can be mitigated and it is within the Forest's management guidelines.

**Mapping (geometronics).**—This program involves National Forest System lands, showing the terrain, developments, and the composition and extent of vegetation or other resources. Primary base maps for 7½-minute quadrangles are prepared and revised periodically in cooperation with the U.S. Geological Survey. Secondary base maps covering complete national forests are prepared by the Forest Service for administrative and forest visitor uses. Project maps and special purpose maps are produced for use in the design of developments such as roads, recreation areas, timber sale layouts, and logging plans.

## Land Line Location

The land line location program is concerned with locating, marking, posting and maintaining property lines between National Forest System lands and other property. Sometimes, where the costs of land location surveys exceed the purchase costs of in-holding tracts, the Forest Service can purchase such in-holdings from willing sellers using land line program funds. Some land surveys are made by the Bureau of Land Management on a reimbursable basis.

## Maintenance Of Facilities

The Forest Service has over 11,000 permanent buildings used for fire and administrative purposes, for service and general storage, and for associated utility



systems. These facilities are located primarily at ranger district and work center locations. Nearly half of these facilities were constructed before 1940 and more than four-fifths before 1965. Owing to the fact that the structural and functional life expectancy of these buildings range from 30 to 35 years, deferred maintenance and increased service demands have resulted in an extensive maintenance backlog. About 40% of the appropriated funds relate to health and safety items.

The Maintenance of Facilities portion of the National Forest System program is directed toward repairing, renovating and maintaining these facilities to meet growing needs for use.

### Forest Fire Protection

The Forest Fire Protection Program protects life, property, and natural resources on the 191 million acres of National Forest System lands. Additional acreage is protected on adjacent state and private lands, protected through fee or reciprocal protection agreements. Protection is provided to these lands under the Cooperative Funds Act of June 30, 1914,<sup>56</sup> when it is not economical or practical to provide separate fire protection organizations or when such cooperation is necessary to protect National Forest System resources.

The Forest Service's program is divided into two parts—fire presuppression and fuels management.

**Fire presuppression.**—Fire presuppression activities provide the Forest Service with the capability to prevent or take effective initial suppression action on wildfires. The Forest Service also helps other federal agencies and states through training programs, planning assistance, joint use equipment contracts, and inter-agency fire coordination centers.

Presuppression encompasses all activities from discovery to initiating action on fire. It includes activities such as fire planning, training fire fighting personnel, maintenance of fire attack forces and equipment, disposal of logging slash, construction of fuel breaks, equipment development and testing, fire detection, and initial attack on fire starts.

Presuppression also includes restriction on access in times of critical fire danger, and limitations on use of fires and logging or other equipment. Law enforcement activities for Forest Service personnel, distribution of educational literature on forest fires, and personal contacts with National Forest System users also aid in the prevention of fires.

Specialized tasks are performed using airplanes and helicopters. They are used to locate and map fires both ocularly and with infrared sensors, for transporting cargo and personnel, for directing fire operation, and for the application of fire retardant.

**Fuels management.**—Fire occurrence, fire behavior, damage from fire and fire suppression costs often can be significantly influenced by managing natural fuels. The fuels management program includes support and planning for fuels activities, inventory of fuel hazards, analysis of alternatives for treating these hazards, and treatments. Treatment includes yarding and stockpiling woody materials for increased utilization, hand or mechanically manipulating fuels to a less flammable and obstructing condition, and reducing fuel volume by removal or prescribed fire.

### Fighting Forest Fires

The fire fighting program is directed toward fighting wildfires on or threatening National Forest System lands, and to rehabilitating burned over National Forest System lands. It is also used to supplement presuppression activities when above-average forecasted or actual burning conditions exceed a nationally determined acceptable level of risk.

The suppression of wildfires burning on or threatening National Forest System lands is a major and hazardous program that varies in size from year to year. Fires are suppressed by ground and air attack. Ground attack includes hand crews, pumpers, and other mechanized equipment. Air attack includes smokejumpers, helicopters, air tankers and other specialized aircraft for detection, surveillance and transportation. Because of the variability in fire conditions and firefighting costs from year to year, suppression costs above the appropriated level are provided for by supplemental appropriations.

### Cooperative Law Enforcement

Law enforcement programs are directed at protecting natural resources, federal property, employees and visitors on the National Forest System lands. Some major law enforcement investigative activities include wildland arson, timber theft, cannabis detection and eradication, internal investigations, theft, and destruction of archeological resources.

The cooperative law enforcement program provides funding to local law enforcement agencies for protection of visitors and their property on National Forest System lands. Authority for such cooperation was included in the Cooperative Law Enforcement Act of 1971,<sup>57</sup> which provided for federal reimbursement of local governmental expenditures incurred in connection with the enforcement of state laws and local regulations on National Forest System lands.

Most funds made available in this program are expended for patrol activities, or services such as station-

ing law enforcement officers in problem areas. This funding is also used to reimburse state and local law enforcement agencies for extraordinary expenses associated with protecting the public and their property on the national forests. Often, the number of visitors to the National Forest System lands equal or greatly exceeds the resident population of the counties. Since this visitor use is seasonal and often occurs in geographically remote areas, this funding helps these small local law enforcement agencies provide protection for the public on National Forest System lands.

There is also a cooperative program for reimbursements to local law enforcement agencies for the detection, investigation, and eradication of cannabis on National Forest System lands. These agreements are executed separately from regular cooperative agreements. The major concern of these agreements is protecting National Forest System resources, operations, employees and forest visitors from danger associated with illegal cultivation, manufacture, or distribution of cannabis or other controlled substances on National Forest System lands. There is a risk to national forest visitors, contractors, and employees when they encounter those who are tending or guarding these lucrative crops. Reducing the use of the national forests for cannabis production is essential to maintain a safe environment for all users of the National Forest System.

The Drug Abuse Act of 1968<sup>58</sup> provides for the detection of cannabis being cultivated within the boundaries of the National Forest System and also provides for the apprehension and prosecution of persons involved in cultivation. Funding for this program is expended internally within the Forest Service and is not for disbursement to state and local law enforcement agencies.

### **Forest Road Maintenance**

At the beginning of FY 1989 the forest development road system on National Forest System lands contained about 353,900 miles of various standards and types of road. Approximately 17% of the system is maintained in a closed condition, approximately 52% of the system is maintained for use only by high clearance vehicles, with the remaining 31% of the system being maintained for use by standard passenger cars. The road maintenance program provides essential access for using and managing lands. Specific work activities include roadside brushing, surface grading, culvert cleaning, repairing bridges, replacing depleted surfacing materials, and replacing damaged or nonfunctioning traffic control devices. It also includes transportation system management activities such as traffic studies, regulating and controlling traffic, determining and resolving jurisdiction problems, managing construction and enforcing applicable regulations.

Federal appropriations provide for approximately 48% of the funding for this program. Purchasers of government timber are responsible for another 48%. Other commercial users, such as those in mining or hauling private timber, are responsible for the remaining 4%.

The Forest Service is responsible for all maintenance attributed to administrative and noncommercial use. Most traffic on the forest development road system is by the general public, primarily for recreation. The Forest Road Maintenance program funds all the maintenance for which the Forest Service is responsible.

Much required road maintenance work does not result from road use. This work includes cleaning culverts, clearing roadside brush, removing landslides, maintaining traffic control devices, and painting bridges. These maintenance costs are shared by the Forest Service and the commercial users when the roads are used for commercial hauling. The Forest Service assumes responsibility for all these costs when the roads are not in commercial use.

### **Forest Trail Maintenance**

The National Forest System contains about 105,000 miles of trails ranging from primitive pathways through wilderness areas to paved walkways. The purpose of the Forest Service trail program is to manage, operate and maintain this system to provide opportunities for recreational and administrative travel.

Trail maintenance includes clearing pathways of encroaching vegetation and fallen trees, and repairing or improving of trail signs, treadways, drainage facilities, and bridges. Trail maintenance is popular with volunteers and is often a share-cost program. The Forest Service provides equipment, food, supervision, training, and some transportation; volunteers give labor and organization.

In general forest areas, modern equipment and transportation are used to clear and maintain the trails. In contrast, primitive tools and techniques are used in wilderness areas to minimize the impact of human influence on these wildlands. In these areas, trail workers use hand saws or axes to clear fallen trees from the path and pack animals to carry equipment and food.

### **Timber Sales Administration and Management**

Timber harvesting is a major use on nearly 90 million acres of National Forest System lands—about half the total area of the national forests. Timber harvests, averaging more than 10 billion board feet annually, provide approximately one-fifth of the Nation's total production



of lumber and other wood products. The timber resources on these federal lands are thus of major importance to many rural communities supported by logging and milling operations, and to other industries and consumers of housing, paper products, and other wood-based materials.

The basic purpose of the timber management program on the National Forest System lands is to produce continuous flows of timber harvests in perpetuity, while protecting environmental values and other land uses.

The program is divided into four parts: sales preparation, harvest administration, timber resource inventory planning, and silvicultural examination.

**Sales preparation.**—The first step in harvesting timber from the national forests is sales preparation. The preparation of timber sales includes the location and marking of timber in stands considered ready for harvesting under approved multiple-use and timber management plans, together with the drafting of contract requirements for timber harvesting, road construction, and related activities. The advertisement of sales and awarding of sales to successful bidders follow. In the layout of timber sales and in planning for timber harvesting, professionals in landscape management and design, wildlife management, and other disciplines cooperate to ensure that logging operations will be conducted in ways that will maintain the ecological and environmental quality of the lands involved.

Authorization for sale of timber on National Forest System lands “at not less than appraised prices” was initially authorized in the Organic Administration Act of 1897.<sup>40</sup> The National Forest Management Act of 1976<sup>2</sup> added specific requirements for timber sale and harvesting programs, including guidelines for cutting methods and limitations on volumes of allowable harvests and bidding practices. Further authority for alternative methods of timber sales was included in the Timber Sales Bidding Act of 1978.<sup>59</sup>

Provisions for a “set aside” of certain timber sales for small business concerns, in a program jointly developed with the Small Business Administration, were included in the Small Business Act of 1958.<sup>60</sup> Joint studies also have been conducted with the Bureau of Land Management and the Bureau of Indian Affairs to coordinate federal timber sale procedures.

**Harvest administration.**—The Harvest Administration Program is directed at administering wood harvesting on National Forest System lands in accordance with timber sale contracts and permits in order to minimize adverse environmental impacts, maximize benefits, and protect the government from fraud, abuse and waste.

Timber sale contracts are administered to meet land management objectives, fulfill contractual obligations, and protect the public’s interests. Administration includes ensuring that purchasers understand objectives,

monitoring their activities for contract compliance, approving their work, measuring (scaling) their logs for payments, ensuring proper log accountability from stump to mill, ensuring that contract payments are adequate for the expected level of activity, negotiating and resolving disputes about contract performances, and enforcing laws applicable to the purchasers’ operations and contracts.

**Timber resource inventory planning.**—The Inventory Planning Program and the Silvicultural Examination Program described below develop information necessary for planning the orderly management of national forest timber resources. This information is used primarily to determine lands suitable for timber production, determine allowable sale quantities, establish timber-sales schedules, and identify opportunities for intensive forest management. The inventory data is also used in the management of wildlife, recreation, and other resources.

Timber resource inventories conducted in this program provide information needed for land classification, determining timber volumes, and monitoring growth rates. Other information is also gathered for forest land and resource management plans. These inventories describe the conditions and extent of the timber resource on each national forest, providing a measure to evaluate changes during the planning period.

Inventories also provide resource information for research publications and the National Assessment Program required by the Forest and Rangeland Renewable Resources Planning Act.<sup>1</sup> With the completion of a major part of the land management planning effort, about 16 million acres will be inventoried annually under this program. This schedule will help meet the requirements for a 10-year review cycle of National Forest System land and resource management planning.

This cycle of timber resource inventories is coordinated with the schedule for state forest inventories carried out under the Forest Research appropriation for forest inventory and analysis.

**Silvicultural examination.**—The Silvicultural Program provides periodic review and analysis of timber conditions and treatment needs to meet forest and resource management plan objectives. It also provides information for monitoring and certifying silvicultural treatments to ensure that timber resources are managed properly.

This program gathers timber stand data, compiles and stores these data in stand files, and prepares an analysis and written prescription for about 5 million acres of forest land annually to ensure proper treatment. This program and the timber inventory planning program provide information needed for planning the orderly management of national forest timber resources.



Timber stands are normally examined at 10-year intervals so that land managers can monitor changing stand conditions and treatment needs.

### **Reforestation and Stand Improvement**

The Reforestation and Stand Improvement Program is directed toward obtaining adequate stocking of forest lands and maintaining a level of timber productivity sufficient for sustained yield management of National Forest System lands. The program aims to increase the growth rate and product quality of timber growing on national forests to levels consistent with environmental quality, multiple resource use objectives, and social and economic benefits and costs.

The Reforestation and Stand Improvement Program is financed with appropriated funds, Reforestation Trust funds, and Knutson-Vandenberg funds (K-V) (table 3). The appropriated funds are used to reforest harvested areas; areas damaged by fire; insects, or disease, by unsuccessful plantations; and to release planted trees, competing vegetation, or overcrowding.

The appropriated funds pay for seedlings purchased from Forest Service and private nurseries. Contracts for site preparation, animal damage control, fertilization, tree planting, release, precommercial thinning, and a limited amount of tree pruning are also charged to these funds.

The Knutson-Vandenberg funds in the Trust Funds appropriation are used to purchase seedlings for reforesting timber sale areas. Seedlings to be planted on all other areas, such as areas burned by wildfires, are purchased with funds from the National Forest System appropriation.

The Forest Service is also authorized under the Act of March 3, 1925<sup>61</sup> to cooperate with owners of nonfederal lands situated within or near national forests and to accept deposits for reforestation or other work on such lands. These holdings are usually too small to warrant employment of professional foresters. Cooperation with the Forest Service in such instances benefits the Government by reducing possible fire hazard or other adverse impacts from improper land use.

The objective of the timber stand improvement part of the program is to increase timber growth or product quality by thinning, remove excess trees, remove competing vegetation, and fertilize stands at desirable levels.

The purposes of the nursery and tree improvement part of the program are to improve the genetic quality of seed planting stock used on National Forest System lands and to produce high quality planting stock in appropriate numbers and species for timely reforestation.

### **Recreation Use**

The National Forest System is the largest supplier of public outdoor recreation in the Nation, with recreation use amounting to more than 238 million visitor days in 1987. This represented more than two-fifths of all recreation use on federal lands.

The goal of recreation management on National Forest System lands is to provide outdoor recreation opportunities as a major component of the multiple use of the forest, range, and related resources on these federal lands. This objective is accomplished by providing a wide range of recreation uses and facilities, including wilderness, dispersed recreation areas, developed recreation areas, visitor information services, and management of visual resources.

Recreation uses on the national forests were specifically authorized in the Multiple Use Sustained Yield Act of 1960,<sup>41</sup> and on National Grasslands by the Bankhead-Jones Farm Tenant Act of 1937.<sup>42</sup> A long series of appropriation acts included provisions for an expanding program of development of recreation facilities and management of outdoor recreation on the national forests. The National Forest Management Act of 1976<sup>2</sup> also provided authorization and guidelines for inclusion of recreation in multiple-use management. The program has three major parts—recreation management, wilderness management, and cultural resource management.

**Recreation management.**—The purpose of recreation management is to provide and protect the natural resources and facilities that accommodate the public's need for outdoor recreation, emphasizing opportunities to know and experience nature. It is also directed at maintaining, repairing, and restoring existing facilities necessary to meet the demands for public outdoor recreation in natural settings. Private sector capital through concession permits, challenge cost-share projects, and other partnerships are used when appropriate.

**Wilderness management.**—Wilderness management is directed at protecting and preserving resources and values while providing for the uses permitted by law. Wilderness is managed for scenic, scientific, educational, conservation, historical, and recreation use. Although people enjoy visiting wildernesses and experiencing the primitive environment, these lands are not primarily recreational areas. About 5% of recreation use on the national forests occurs in designated wilderness areas.

The Forest Service manages 348 wilderness areas in 35 states with a total of 32.4 million acres. One acre in six of the National Forest System is now in the National Wilderness Preservation System.

**Cultural resource management.**—The purpose of the cultural resource program is to protect, manage and



interpret the cultural resources on National Forest System lands in accord with the requirements of the National Historic Preservation Act of 1980<sup>62</sup> the National Environmental Policy Act of 1969<sup>18</sup> and the Archaeological Resources Protection Act of 1969.<sup>63</sup> The program also includes field surveys of National Forest System lands to identify cultural resources properties, the preparation of nominations to the National Register of Historic Places, and the enforcement of laws protecting cultural resources.

The loss of cultural resources to vandalism, pot-hunting, illegal digging, and theft in many parts of the country is a great concern. The Forest Service has been investigating and prosecuting pot-hunting cases since the mid-1970s. Since passage of the Archaeological Resources Protection Act of 1979, Forest Service special agents have been directly involved with many convictions in several States.

### **Wildlife and Fish Habitat Management**

The National Forest System provides most of the habitat for many fish and wildlife species, such as cutthroat trout, moose, black bear, elk, bighorn sheep, and mountain goats. It is also key to the survival and recovery of many threatened or endangered species, such as the grizzly bear, woodland trout, and gray wolf. Habitats for 153 federally listed threatened or endangered species are managed on National Forest System lands.

Wildlife and Fish Habitat Management was initially authorized under general provisions of the Organic Administration Act of 1897<sup>40</sup> and in later appropriation acts. The Multiple-Use and Sustained Yield Act of 1960<sup>41</sup> and the National Forest Management Act of 1976<sup>2</sup> provided specific authorization for management of National Forest System lands for wildlife and fish along with other uses. The Endangered Species Act of 1973<sup>64</sup> has also required the identification of endangered and threatened species of animals and plants and the management of federal lands to ensure perpetuation of these species.

The goal of wildlife and fish management on National Forest System lands is to maintain healthy, self-sustaining populations of all existing native and desired non-native vertebrate species; and to improve the habitat productivity for those species highly desired by the public, such as deer, elk, wild turkey, trout, bass, and salmon.

This goal is primarily accomplished through capital investments, which include activities such as seeding, planting, prescribed burning, and aquatic habitat development. Many activities are conducted in cooperation with state wildlife and fish agencies and individuals,

conservation groups, and various local, state, and national agencies. Formal partnerships have been developed with many organizations.

The wildlife and fish management program is divided into five parts:

**Wildlife habitat.**—The Wildlife Habitat part of the program is directed at maintaining or improving habitat for wildlife species in high demand for consumptive or nonconsumptive purpose.

Emphasis is on improving and mitigating impacts from other management activities. Activities include: prescribed burning to improve spring and winter forage for bighorn sheep, elk, deer, and turkey; water developments for quail, chukars, and mourning doves; access management on existing roads to reduce habitat disturbance for elk, mountain goats, and black bear; placement of nesting structures for wood ducks; and streamside and wetland improvements which provide nesting and feeding areas for waterfowl, wading birds, and furbearers.

Wetland improvements, such as the construction of low-head dams to promote the development of marsh vegetation and the creation of potholes, provide nesting and resting areas for a variety of waterfowl and wetland associated species. Many of these projects are accomplished in partnerships with a variety of individuals, groups, and state and federal agencies. The wetlands improvements are a part of the North American Waterfowl Program.

**Inland fish habitat.**—The Inland Fish Habitat Program is concerned with maintaining or improving the capability of lakes and streams to sustain resident fish populations. Priority is given to projects that implement the fisheries programs of other federal and state agencies and that restore through enhancement the losses resulting from development activities.

Habitat improvements include: installing artificial spawning reefs and fish shelters to improve lake habitats, creating sheltered pools in streams to increase fish holding capacity, and placing structures in streams to provide fish spawning and rearing habitat.

**Anadromous fish habitat.**—The purpose of this program is to maintain or improve habitat capability to produce salmon and steelhead for commercial fishing, sport fishing, and subsistence uses.

Projects are conducted to maintain and increase the habitat capability for production of West Coast and Great Lakes salmon and steelhead, and Atlantic salmon in the East. Activities include removing fish barriers, placing stream habitat improvement structures, fertilizing lakes, and creating artificial spawning and rearing facilities.

**Endangered threatened, and sensitive species habitat.**—The goals of this program are to maintain or improve habitat for recovery of endangered and threat-

ened plants and animals and to sustain viable populations of sensitive plants and animals.

The Forest Service provides habitat protection and management for endangered, threatened, and sensitive species found on National Forest System lands. Recovery plans are the basis of habitat improvements which will provide for an increased level of species recovery.

**Administration and resource coordination.**—This part of the wildlife and fisheries programs is concerned with administration coordination and the provision of biological expertise in planning activities that affect habitat. Administration of the program includes activities such as cooperating with state and federal agencies and wildlife and fish interest groups, planning habitat goals in coordination with other resource activities, training and continuing education programs for biologists, habitat surveys to document current conditions and to plan habitat improvements, habitat monitoring, and developing wildlife and fisheries habitat planning models.

In the Threatened, Endangered, and Sensitive Species Program, administration activities include inventory, mapping, and technical support for species such as grizzly bear, spotted owl, red cockaded woodpecker, and Kirtland's warbler.

For resource coordination, wildlife and fisheries biologists work with other Forest Service resource managers to design projects or programs, such as vegetative management, timber sales, mineral developments, and livestock grazing. In most instances, resource coordination efforts of Forest Service biologists are designed to protect habitat or minimize costs of other resource management programs.

Intensive external coordination is carried on among Forest Service biologists, state and other federal agency personnel, and the foresters, biologists, and planners in various commercial industries which are located within, or adjacent to, National Forest System lands. The public is involved in these activities through their membership in various conservation groups or individual participation.

## Range Management

The broad goals of range management on National Forest System lands are to sustain resource values such as soil productivity and water quality; to protect watersheds, wildlife habitat, threatened and endangered flora and fauna, and ecological diversity; and to promote forage production for domestic livestock, wild horses and burros, and wildlife.

Range Management was authorized by general provisions in the Organic Administration Act of 1897,<sup>40</sup> later appropriation acts, in the Multiple-Use Sustained Yield

Act of 1960,<sup>41</sup> and in the National Forest Management Act of 1976.<sup>2</sup> The Bankhead-Jones Farm Tenant Act of 1937<sup>42</sup> provided authorization for management of livestock grazing on the national grasslands and land utilization project areas.

The range program is divided into four parts—vegetation management, forage and structural improvements, wild free-roaming horses and burros, and noxious weed control.

*Vegetation management* is directed at meeting the planned goals for range vegetation while achieving a proper balance between protection and sustained use. It is also directed at demonstrating range management practices for use on private lands and promoting cooperation in the most effective use of range vegetation on all ownerships.

*The Forage and Structural Improvement Program* is concerned with providing forage for livestock, wild horses, wild burros, and wildlife and the associated facilities such as fences and water developments.

*The Wild Free-roaming Horses and Burros Program* is concerned with the management, protection and control of these animals (about 1,900) on National Forest System lands.

*The Noxious Weed Program* is directed at the control of such weeds and the establishment of beneficial plant cover on National Forest System lands, including the reimbursement of local, county and state weed control authorities for such work as provided in the Carlson-Foley Act of 1968.<sup>65</sup>

## Soil, Water And Air Management

The goal of the Soil, Water and Air Management Program is to maintain and improve soil, water and air quality and to secure favorable conditions of streamflow.

The program includes:

- Providing information about soil and water capabilities and limitations for use in resource management and planning.
- Improving soil productivity and water quality to provide for favorable conditions of waterflow.
- Developing soil and water conservation practices for all resource management activities that affect soil and water resources.
- Monitoring soil, water, and air resources to determine whether goals for water and air quality and soil productivity are being met and to provide a basis for identifying more effective management practices.



- Maintaining existing soil and water improvements to ensure their continued effectiveness.
- Conducting soil and water resource inventories to meet identified management needs.
- Identifying and quantifying water requirements to carry out management responsibilities on the National Forest System, and securing and validating water rights to meet these requirements through state procedures.
- Prescribed fire planning.
- Preparing emergency rehabilitation plans for lands damaged by wildfires, floods, or other natural disasters.
- Preparing and implementing soil and water improvement plans for lands in declining watershed condition.
- Protecting the air resource through the review of preconstruction applications for private sector development.
- Providing weather data and meteorological expertise for Forest Service resource management.
- Cooperating with other agencies in soil, water and air resource activities and gathering weather information on, or directly affecting, the National Forest System. This work includes water supply and flood forecasting, surveys of air and water quality, management of public water supplies, and cooperation with the Bureau of Land Management in gathering and sharing weather information.

## General Administration

The General Administration Program, financed with National Forest System appropriated funds, consists of managerial and support activities that are not readily identified with specific programs when they are planned. These activities include those concerned with program support such as legislative affairs; program development and budget; resources program and assessment; personnel management; civil rights; computer sciences, communications, and information systems management; procurement and property management; equipment and supplies; management analysis and support; public information and involvement; and common services such as rents and utilities.

As part of engineering support, the Forest Service has a technology development and applications program. This program is akin to the development side of corporate research and development programs. As such, it complements activities carried out by the Forest Service research program. The purpose of this program is to develop or identify promising new technology and to help adopt it in all phases of land management.

## Construction

The Forest Service construction program provides for acquiring, restoring, constructing and improving buildings, utility systems, dams, recreation facilities, roads, bridges, trails, and other physical facilities. Land acquisition for administrative sites may be included when it is a part of the total project costs.

The construction program is authorized by general provisions of the Organic Act of 1897,<sup>40</sup> the Granger-Thye Act of 1950,<sup>12</sup> the National Forest Roads and Trails Act of 1964,<sup>66</sup> the National Trails System Act of 1968,<sup>67</sup> the Forest and Rangelands Renewable Resources Planning Act of 1974 as amended,<sup>1</sup> the National Forest Management Act of 1976,<sup>2</sup> the Forest and Rangeland Renewable Resources Research Act of 1978,<sup>9</sup> and other legislation.

The construction program is divided into three components—facilities, roads, and trails.

**Construction of facilities.**—The facilities program is concerned with constructing, replacing and improving building and related facilities to support forest research, state and private forestry, and National Forest System programs. It includes portable structures (trailers and modular units) that became an integral part of the site. It also includes such facilities as airports; heliports; water, waste, and electrical systems; and recreational facilities.

**Forest road construction.**—The road construction and reconstruction program is concerned with three types of forest roads—arterial roads, collector roads and local roads.

Forest arterial roads serve large land areas and usually connect with public highways or other arterial roads to form a network of primary travel routes. Location and standards for these roads are often determined by the need for travel efficiency rather than by specific resource needs. About 5% of the transportation system on the National Forest System lands are arterial roads.

Forest collector roads serve smaller land areas and usually connect to forest arterials or public highways. These roads collect traffic from forest local roads. Location and standards are determined by long-term resource needs and travel efficiency. About 20% of the transportation system are collector roads.

Forest local roads connect terminal facilities such as log landings and recreation sites, with forest collector roads, forest arterial roads, or public highways. Location and standards are determined by the specific resource needs that the roads serve. About 75% of the transportation system are local roads.

The Forest Road Program also finances multipurpose roads on or adjacent to the national forests. Actual construction or reconstruction of forest roads may also be financed under the Purchaser Credit Program and the Purchaser Election Program. These programs usually fund construction and reconstruction only of forest collector or forest local roads. Appropriated funds for the survey, design, and construction engineering costs are funded by the forest road program or, for salvage sales, by the salvage sale fund.

Under the Purchaser Credit Program timber sale contracts require the purchaser to construct roads needed to remove the timber purchased. There is no appropriation for purchaser credit roads. Instead, the amount of timber sales revenue paid by the timber purchaser and received by the U.S. Treasury is reduced by an amount equal to the cost of roads. Construction and reconstruction under the Purchaser Credit Program is accounted for outside of the Forest Service budget, but Congress sets a limit each fiscal year.

The construction of roads under the purchaser election program is described below in the section on Permanent Appropriations Programs.

**Trail construction.**—The priority objectives of the trail construction program are to improve trail user information and signs and to redevelop the trail system to better meet uses and needs. The redevelopment emphasizes reconstruction and relocation of trails that are substandard as a result of age, heavy use, location, or lack of maintenance. Reconstruction often includes replacing bridges, developing trailhead facilities to accommodate vehicles, providing drainage structures, and removing barriers that prevent use by disabled people.

## Land Acquisition

The primary purpose of the Land Acquisition Program is to acquire lands, waters, and other related interests for recreation, wilderness, wildlife habitat management, endangered species protection, and public outdoor recreation purposes. Some lands are acquired for administrative purposes and for watershed protection.

The acquisitions are made under the authorities in the Weeks Law of 1911,<sup>20</sup> the Wilderness Act of 1964,<sup>43</sup> the Land Acquisition Act of 1925,<sup>61</sup> the Wild and Scenic Rivers Act of 1968,<sup>69</sup> the National Trails System Act of

1968,<sup>67</sup> the Endangered Species Act of 1973,<sup>64</sup> the Eastern Wilderness Act of 1975,<sup>44</sup> and other special acts. The Land and Water Conservation Fund Act of 1964<sup>68</sup> provides funding for the acquisition of recreational lands and interests.

The acquisition program includes the management of land donations and interchanges. Donations of lands or interests therein are encouraged and accepted to consolidate the national forests, improve resource management, and to obtain lands needed for research or administrative purposes. Donations may be accepted under the Clarke-McNary Act of 1924,<sup>7</sup> The Land Acquisition Act of 1925<sup>61</sup> and other legislation.

Land interchanges entail the transfer of jurisdiction of federal lands or interest therein between federal agencies. Interchanges are made to improve landownership patterns, simplify management, reduce costs, and improve service to the public.

## Other Appropriations

Besides the appropriations for the programs for the National Forest System described above, there are several additional programs—acquisition of lands for national forests, special acts; acquisition of lands to complete land exchanges; miscellaneous trust funds; and range betterment funds—carried out with appropriated funds.

**Acquisition of lands for national forests, special acts.**—This program is directed at acquiring lands within critical watersheds needing soil stabilization and restoration of vegetation, to prevent serious erosion and resulting damage by floods. Funds may also be used for cash equalization in land exchanges involving acquisition of such lands. This type of acquisition is authorized by several special acts.<sup>70</sup>

**Acquisition of lands to complete land exchanges.**—The objective of this program is to acquire lands suitable for National Forest System purposes to replace National Forest System lands acquired by public school districts, public school authorities, or state or local governments. Such acquisition are authorized by the Sisk Act of 1967.<sup>71</sup>

**Miscellaneous trust funds.**—This program administers gifts and bequests for forests and rangelands. The available funds, \$90,000 in fiscal 1988, are used to sponsor a Heritage Chair scientist(s) to conduct research on areas such as wood utilization, forest insects and disease, or forest economics; and to finance related research symposia. Balances not needed for recurrent operations are invested in interest-bearing securities.

**Range Betterment Fund.**—The objective of this program is to arrest range deterioration and improve range forage conditions with resulting benefits to livestock



production, watershed protection, and wildlife. Range betterment activities involve installing both structural and nonstructural range improvements. These include seeding, fence construction, weed control, water development, and fish and wildlife habitat enhancement. The program is authorized by the Federal Land Policy and Management Act of 1976<sup>72</sup> and the Public Rangelands Improvement Act of 1978.<sup>73</sup>

## Permanent Appropriations Programs

All the National Forest system programs covered by the preceding material are funded through an annual appropriation act. There are also programs authorized by Congress on a continuing or permanent basis which are funded by receipts from various sources. These include brush disposal; timber roads, purchaser elections; timber salvage sales; Tongass Timber Supply Fund; operation and maintenance of Forest Service quarters; and two other small programs—licenses, and restoration of forest lands and improvements.

**Brush disposal.**—The objective of the brush disposal program is to dispose of brush and other debris resulting from cutting operations which may increase the fire hazard, impair reforestation, contribute to the buildup of insect populations, look unsightly, or limit recreational access. When disposal of brush and other debris from timber sale operations is necessary, national forest timber sale contracts require treatment or deposit of funds for treatment of debris. When economical and expedient, the work is done by the timber purchaser. The work can also be carried out by the Forest Service using deposits collected from the purchaser to cover costs of the work. Authorization for this program is contained in the Act of August 11, 1916<sup>74</sup> as amended by the Granger-Thye Act of 1950.<sup>12</sup>

**Timber roads, purchaser elections.**—The purpose of this program is to build timber sale roads on the national forests (except in Alaska) for small business purchasers who elect to have the roads built by the Forest Service. This program is authorized in the National Forest Management Act of 1976.<sup>2</sup>

**Timber salvage sales.**—The objective of this program is to salvage insect-infested, dead, damaged, or down timber, and to remove associated trees for stand improvement.

A separate permanent appropriation for timber salvage was established for this program as a result of the National Forest Management Act of 1976. Part of the receipts from timber salvage sales are deposited in this account and used to prepare and administer future salvage sales.

Separate appropriations of \$3 million each in fiscal years 1977 and 1979 were used as “seed money” to

accelerate the establishment of “timber salvage sales” as a self-sustaining permanent appropriation.

In fiscal year 1988, Congress appropriated an additional \$37 million and provided that the funds shall be merged with and made a part of this appropriation. This is to accommodate the salvage program generated by the severe fire damages of 1987.

**Tongass timber supply fund.**—In 1980 Congress directed the Forest Service, through the Alaska National Interest Lands Conservation Act,<sup>75</sup> to maintain the timber supply from the Tongass National Forest to dependent industry at a rate of 4.5 billion board feet per decade.

The Tongass Timber Supply Fund was created as a result of Congressional wishes to designate wilderness on the Tongass National Forest while maintaining an existing viable timber industry. The designated timber supply is sufficient to maintain the industry’s timber harvest level at a rate similar to the mid- to-late 1970s, the time immediately preceding the passage of the Alaska National Interest Lands Conservation Act.

Before fiscal year 1988, the budget for the Tongass National Forest consisted of funding annually appropriated to the Forest Service from the National Forest System and Construction Appropriations and through Permanent Appropriations and Trust Funds.

Most of the funding available to the Tongass National Forest was derived from receipts collected by the Secretaries of the Interior and Agriculture and provided through the Tongass Timber Supply Fund.

In fiscal year 1988, Congress directed that all funds for the Tongass National Forest be derived from the Tongass Timber Supply Fund. In fiscal year 1989, the Budget Reconciliation Act of 1987,<sup>76</sup> directed that the Tongass Timber Supply Fund be funded by an annual appropriation rather than a permanent appropriation.

**Operation and maintenance of Forest Service quarters.**—The purpose of this program is to operate and maintain Forest Service employee quarters.

The Continuing Appropriations Act of 1985, Interior and Related Agencies Appropriations<sup>77</sup> provided authority for the establishment of a permanent fund for deposit of Forest Service employee payroll deductions for quarters rental. Funds are used to operate and maintain employee quarters on the unit from which collected. These funds are in addition to the maintenance of facilities funds in the National Forest System annual appropriations.

**Other permanent funds.**—Besides programs described above there are two other small programs—the Smokey Bear and Woodsy Owl licenses programs and the Restoration of Forest Lands and Improvements programs—funded under permanent appropriations.

Under the licenses program, fees for the use of the Smokey Bear and Woodsy Owl characters by private enterprises are collected under regulations formulated

by the Secretary of Agriculture. They are available to fund the nationwide fire prevention campaign, programs to promote the wise use of the environment, and programs that foster maintenance and improvement of environmental quality.

The Restoration Program includes recoveries from cash bonds or forfeitures under surety bonds by permittees or timber purchasers who fail to complete performance or improvement, protection, or rehabilitation work required under the permit or timber sale contract.

The Recovered Funds are used to cover the cost to the Government of completing the work on National Forest System lands. Funds received as settlement of a claim are used for improvement, protection, or rehabilitation made necessary by the action which led to the cash settlement.

### Trust Funds Programs

Besides the programs described above, funded by annual and permanent appropriations, there are several National Forest System programs funded by trust funds. These are the Knutson-Vanderburg (K-V) programs, cooperative programs and the reforestation programs.

**Knutson-Vanderburg programs.**—The Knutson-Vanderburg Act of 1930, as amended,<sup>78</sup> provides that part of the receipts from timber sales may be used for needed reforestation, timber stand improvement, and to protect and improve all other resource values on timber sales areas. As shown in table 3 most of the Knutson-Vanderburg funds are used to reforest sales areas.

**Cooperative work, other.**—The Cooperative Funds Acts of 1914,<sup>56</sup> the Granger-Thye Act of 1950,<sup>12</sup> the National Forest Roads and Trails Act of 1964<sup>66</sup> and other acts authorize the use of deposits received from cooperators for the construction, reconstruction and maintenance of roads, trails and other improvements; for scaling services; fire protection and other resource purposes on National Forest System lands.

The Granger-Thye Act also authorizes the acceptance of deposits for administering and protecting nonfederal land within or near National Forest System land. The program funded with such monies include in large part management, reforestation, fire protection, and road maintenance.

The Forest and Rangeland Renewable Resource Research Act of 1978<sup>9</sup> authorizes the acceptance of deposits from state and other public agencies, industrial associations, and other private agencies to finance research projects of mutual interest and benefit.

**Reforestation trust fund.**—The Recreational Boating Safety and Facilities Improvement Act of 1980<sup>79</sup> established a trust fund for reforestation and timber stand improvement on National Forest System lands when

appropriated funds do not meet the total needs of fiscal year programs. The objective is to prevent the build-up of work back logs. The funds are held by the Secretary of the Treasury and provided to the Secretary of Agriculture based on the estimated needs to accomplish the treatment of the acreage in the reforestation and timber stand improvement programs.

### National Forest System Administration

The National Forest System programs described above are directed at the National level by a Deputy Chief for the National Forest System. This Deputy Chief and the supporting headquarters staff have multiple responsibilities. They are responsible for the formulation and administration of national programs for the National Forest System; coordination with other federal departments and agencies, states, and other organizations; and program review and general direction of the work carried out at the regional offices of the Forest Service, the national forests and other centers of National Forest System programs.

The major part of program activities is carried out through a decentralized field organization that includes nine regional offices located at:

Atlanta, GA (R-8)	Albuquerque, NM (R-3)
Denver, CO (R-2)	Juneau, AK (R-10)
Odgen, UT (R-4)	Portland, OR (R-6)
Milwaukee, WI (R-9)	Missoula, MT (R-1)
San Francisco, CA (R-5)	

On-the-ground management of resources is conducted through a system of 156 national forests, 19 grasslands, and 19 land utilization projects.

The management of National Forest System resources involves complex resource, economic, and social problems. To deal with these problems the Forest Service employs people trained in a wide range of fields such as forestry, range management, wildlife management, engineering, recreation, landscape architecture, economics, accounting and personnel management. Employment in fiscal year 1988 totaled 23,414 person years. Most of these people were directly involved in the management of the resources on the National Forests.

### Sharing of National Forest System Receipts with States and Local Governments

The National Forest System programs generate substantial receipts to the U.S. Treasury from timber sales and other land uses. In fiscal year 1988 estimated receipts totaled \$898 million. Additional receipts were



obtained from mineral leases on National Forest System lands under programs for which the Bureau of Land Management has administrative and fiscal responsibility.

The counties in which National Forest System lands are located share these receipts, for the most part under the Twenty-five Percent Fund Act of May 23, 1908,<sup>80</sup> and the Weeks Law of 1911.<sup>20</sup> These provide that 25% of all monies received from each national forest is to be paid to the state in which the national forest is situated, for the benefit of public schools and public roads of the county or counties in which the national forest is situated. The Bankhead-Jones Farm Tenant Act of 1937<sup>42</sup> also provided that 25% of the net revenue from the use of national grasslands and other Title III lands shall be paid to the county or counties in which the land was acquired, for use for schools and roads.

The National Forest Management Act of 1976<sup>2</sup> defined the term "monies received" from use of National Forest System lands to include all collections for sale areas betterment activities, and all amounts earned or allowed any purchaser of national forest timber and other forest products, as purchaser credits for the construction of roads.

Receipts from disposal of common varieties of minerals on National Forest System lands and from mineral leases on acquired lands are similarly shared with states and counties under the Common Varieties of Minerals Materials Act of July 31, 1947,<sup>53</sup> and under the Mineral Leasing Act for Acquired Lands of 1947.<sup>48</sup> For receipts from other mineral leases and related mineral disposals, for which the Bureau of Land Management in the Department of the Interior is responsible, such receipts are also shared with counties of origin. Payments from these receipts are made to the state and counties by the Bureau of Land Management.

Special payments to certain states are provided for in special Acts, including the Boundary Waters Canoe Area Act of 1978<sup>26</sup> for Minnesota, and the Act of June 20, 1910<sup>81</sup> for Arizona and New Mexico. Provisions for assuring minimum levels of federal payments to local governments in counties where public lands are located also were contained in the Payments in Lieu of Taxes Act of 1976.<sup>82</sup>

### Relationships with Other Forest Service Programs

Within the Forest Service, the National Forest System is closely coordinated with related programs of State and Private Forestry. All regional foresters and national forest supervisors are responsible for working with State and Private Forestry to implement the most efficient technology for harvesting. National Forest System is a prime cooperator in fire and pest protection and re-

gional timber supply programs which involves state and private interspersed or adjacent lands.

In addition every regional forester and national forest supervisor represents and presents the State and Private Forestry program to the cooperating states, local governments, and private forest owners. As such, the National Forest System is a major part of the means by which technical and financial assistance are delivered to other federal agencies, state and local governments, and private forest land owners.

### Relationships With Other Agencies

Besides close working relationships within the Forest Service in carrying out programs of research and cooperative forestry, as described in preceding sections, the Forest Service cooperates with many federal, state, and private organizations in the management of the National Forest System.

**Soil Conservation Service.**—The Forest Service works closely with the Soil Conservation Service on projects dealing with watershed protection and improvement. Watershed improvement work conducted on designated watersheds under the Flood Control Act of 1944<sup>83</sup> and the Watershed Protection and Flood Prevention Act of 1954<sup>16</sup> is closely coordinated with related activities of the Soil Conservation Service on adjoining private or nonfederal public lands. Soil surveys conducted by the Forest Service on National Forest System lands are similarly coordinated with the Soil Conservation Service which has federal leadership for soils. The Forest Service also cooperates in Soil Conservation Service snow surveys, a large part of which involves snow packs on national forest lands, and with conservation districts in planning and carrying out soil and water conservation programs and range management programs in districts that involve National Forest System lands.

Collection of data on water resources by the Forest Service is coordinated with related federal programs in the U.S. Department of the Interior.

**Animal and Plant Health Inspection Service.**—The Forest Service cooperates with the Animal and Plant Health Inspection Service and other federal, state, and county agencies in enforcing livestock quarantine and testing programs to prevent spread of contagious diseases of animals. Somewhat related programs for control of noxious farm weeds on National Forest System lands are largely handled through cooperation with State and county weed control organizations, as authorized in the Carlson-Foley Act of 1968<sup>85</sup> and the Federal Noxious Weed Control Act of 1974.<sup>84</sup>

**U.S. Bureau of Mines.**—The Forest Service works with the U.S. Bureau of Mines in a variety of ways. These

include: supplying mineral material production data; jointly conducting mining feasibility studies; integration of data supplied by the Bureau into land management planning; material assistance in acquisition of geologic field data; and use of material supplied by the Bureau to identify mineral industry events, trends, and issues.

**The Bureau of Land Management.**—The complex relationship between the Forest Service and the Bureau of Land Management in managing locatable and leasable mineral resources on National Forest System lands varies with the statutory authority involved. These authorities vary not only by the commodities involved but also from location to location; the specific management roles of the two agencies vary accordingly.

Regardless of the authorities involved, the bulk of the administration dealing with locatable and leasable mineral activities on National Forest System lands is carried out by the Forest Service. For example, the Forest Service jointly administers the general mining laws with the Bureau of Land Management on those portions of the National Forest System lands that were formerly public domain lands. The Forest Service's role involves evaluating and authorizing each specific industry proposal for locatable mineral exploration, development, production, and site reclamation. It also conducts mineral examinations to determine the validity of mining claims. The Bureau of Land Management keeps track of land status, mining claims and related mining filings, and issues patents for qualifying mining claims.

In the administration of grazing resources, where ranch operators use lands administered by both the National Forest System and Bureau of Land Management, and where National Forest System grazing lands are mingled with public domain and private lands, grazing management programs are coordinated through memoranda of agreements involving the Forest Service, the Bureau of Land Management, the Soil Conservation Service, and conservation districts. Such coordination involves such matters as seasonal use of related ranges, issuance of permits, and grazing practices.

Fire control on Bureau of Land Management lands that are mingled with or adjacent to national forests is often handled by the Forest Service under cooperative agreements. Cooperative fire training and control facilities in Boise, ID, were also jointly developed by the Bureau of Land Management, the Forest Service, and other agencies.

In Oregon, the Forest Service manages certain intermingled revested Oregon and California railroad grant lands under a special arrangement whereby receipts received by the Forest Service are transferred to the Department of the Interior for distribution to counties, under the Act of June 24, 1954.<sup>85</sup>

Cadastral surveys to establish land lines and boundaries for federal lands are made by the Bureau of Land Management for lands reserved from public domain, with funding from the Forest Service for work on National Forest System lands. The Bureau of Land Management also is responsible for maintaining land records for all federal public lands.

**The U.S. Geological Survey.**—This agency conducts a broad program of surveys, including the classification of lands as to their value for minerals and for reservoir and waterpower sites. Surveys of water resources conducted in cooperation with other agencies provide data on the quantity, quality, and use of the Nation's water resources. The Geological Survey also has major responsibility for a national program to prepare base maps showing topography, land development, and vegetation. Primary base maps for National Forest System lands are prepared and periodically revised in a coordinated program of the Geological Survey and the Forest Service.

**Office of Surface Mining Reclamation and Enforcement.**—This agency is responsible for developing, implementing, and enforcing surface mining and reclamation standards, and is responsible for reclaiming abandoned mined lands as authorized by the Surface Mining Control and Reclamation Act of 1977.

**National Park Service.**—Cooperation between the Forest Service and the National Park Service includes the designation and marking by the Park Service of historic, cultural, and other landmarks on lands administered by the Forest Service under the Historic Preservation Act of 1966,<sup>86</sup> which established the historic preservation program. Some national monuments that are located within national forest boundaries also are administered by the Park Service.

**Fish and Wildlife Service.**—The research program of the Fish and Wildlife Service provides information that aids in the management of National Forest System lands. This agency also is responsible for federal predator and animal damage control projects on National Forest System lands, although only after the Forest Service has given approval. The Fish and Wildlife Service administers the Endangered Species Act of 1973<sup>84</sup> under which all federal agencies must manage resources so as to protect endangered and threatened species. The Fish and Wildlife Service also administers grant programs with the states under the Pittman-Robinson Act of 1937<sup>87</sup> and the Dingell-Johnson Act of 1950.<sup>88</sup> Certain wildlife habitat improvement work done by state fish and game commissions on National Forest System lands is made possible by these federal grant programs.

**Bureau of Reclamation.**—Water development projects of the Bureau of Reclamation have varied impacts on management of adjacent National Forest System



lands, including administration of special use permits for powerlines or other facilities. In certain cases, the Bureau and the Forest Service also have developed agreements whereby the Forest Service is responsible for the planning and administration of recreation facilities developed in connection with reclamation projects.

**Federal Highway Administration.**—This agency in the Department of Transportation is responsible, in cooperation with the Forest Service and state highway agencies, for the planning and construction of forest highways. Such highways are main traffic arteries that connect or provide access to national forests, and are of major importance to states, counties, and local communities. In accordance with the Federal Aid Highway Act of 1973,<sup>89</sup> appropriations for forest highways are allotted and administered in conformity with regulations and plans jointly approved by the Secretaries of Transportation and Agriculture. Forest Service administrative expenses in connection with the planning and approval of construction projects and related measures to assure protection of National Forest System resources are covered by transfer of funds from the Department of Transportation.

**Council on Environmental Quality.**—The Environmental Policy Act of 1969<sup>46</sup> requires the preparation of Environmental Impact Statements for any "major action" proposed by federal agencies, including actions affecting the use, management, and protection of National Forest System resources. These statements are submitted to the Council on Environmental Quality after extensive review by other agencies and the public. This requirement entails a major program in the Forest Service in terms of manpower, time, and funding.

**Environmental Protection Agency.**—Several laws administered by this agency influence the management of National Forest System resources. Under the Federal Water Pollution Control Act of 1972<sup>32</sup> and later amendments in 1977, the Forest Service cooperates with the Environmental Protection Agency and state water control agencies in planning for "best management practices" and in meeting other requirements for protection of water quality. All federal agencies are required to comply with federal, state, and local requirements for the control and abatement of water pollution at federal installations. The Clean Air Act Amendments of 1977<sup>90</sup> require federal agencies to meet federal, state, and local requirements for control of air pollution in logging slash disposal and other fire management programs. Insect control programs on National Forest System lands also are planned and conducted according to Environmental Protection Agency standards and requirements for use of pesticides imposed under the Federal Insecticide, Fungicide, and Rodenticide Act of 1972 as amended.<sup>91</sup>

**Corps of Engineers.**—Cooperative arrangements with the Corps of Engineers in the Department of the

Army provide for Forest Service administration of recreation on certain lands in the National Forest System that are affected by Corps of Engineers reservoir construction projects and for the interchange of land for administrative purposes around Corps impoundment projects.

**Public Health Service.**—Developed recreation sites on National Forest System lands are subject to inspection by the Public Health Service in the Department of Health, Education and Welfare. Such facilities may be closed by the Service where pollution abatement facilities are inadequate.

**Small Business Administration.**—This agency cooperates with the Forest Service in a program of "set aside" sales of national forest timber under the Small Business Act of 1958<sup>60</sup> to assure that "small" businesses, defined as less than 500 employees, obtain a fair share of the available sales of national forest timber.

**Federal Power Commission.**—The Forest Service prepares stipulations which it recommends to the Federal Power Commission for inclusion in licenses issued by the Commission for water power developments. Those stipulations are designed to protect National Forest System resources that may be affected by power developments.

**General Service Administration.**—Many of the administrative tasks of the Forest Service are handled with or through the General Services Administration, including the construction and operation of many buildings used by the Forest Service, procurement of supplies, use and disposal of property, management of transportation and communications equipment and facilities, management of automatic data processing facilities, management of archives and records centers, and the publication of laws and administrative documents.

**State Fish and Game Departments.**—The management of fish and wildlife habitats on National Forest System lands is closely coordinated with programs of state fish and game departments which have the responsibility for management of wildlife and fish populations, including such measures as setting hunting and fishing seasons and bag limits, propagation of game and fish, and the licensing of hunters, trappers, and fishermen.

In habitat improvement work on National Forest System lands, the funding provided by direct federal appropriations through the Forest Service is often supplemented by State agencies using portions of state grants provided under the Pittman-Robinson Act of 1937<sup>87</sup> and the Dingell-Johnson Act of 1950.<sup>88</sup> State project work financed in this way covers a variety of wildlife habitat improvements, wildlife surveys, land acquisitions, and other wildlife management activities.

The Cooperative Wildlife Habitat Management Act of 1974<sup>92</sup> also contains provisions whereby states may

charge special fees for hunting and fishing on National Forest System lands. These fees are then made available for wildlife and fish habitat management projects on National Forest System lands under state-federal cooperative agreements. Forest Service personnel also cooperate with state, county, and other federal officials in the enforcement of laws and regulations for the protection of wildlife.

### Relationships With the General Public

The growing participation of many groups and individuals in National Forest System planning and administration of resource programs has become of far-reaching importance at both national and local levels. Under the National Environmental Policy Act of 1969,<sup>18</sup> large numbers of Environmental Impact Statements for "major" Forest Service actions are widely reviewed not only by other federal and state agencies but also by many private organizations and individuals.

The Forest and Rangeland Renewable Resources Planning Act of 1974<sup>1</sup> and the National Forest Management Act of 1976,<sup>2</sup> likewise require public involvement in the development of resource assessments, land management plans for each unit of the National Forest System, and the formulation of Forest Service programs. Relationships with the public in these and related Forest Service activities involve public hearings and many meetings and correspondence with individuals and organizations.

Similar public participation is maintained in special project work such as the Roadless Area Review and Evaluation (RARE II) and many specific development projects. Forest Service regional offices and national forests, and other Forest Service units concerned with research and with state and private forestry programs,

also work and consult with the varied interests that are concerned with Forest Service programs.

## HUMAN RESOURCE PROGRAMS

The Forest Service participates in cooperative manpower programs to provide human and natural resource benefits by administering and hosting programs in work, training, and education for the unemployed, underemployed, elderly, young, and others with special needs. The fiscal year 1988 appropriation for these programs are shown in table 4.

### Youth Conservation Corps

One of these programs, the Youth Conservation Corps, was established under the Youth Conservation Corps Act of 1970.<sup>93</sup> The Corps provides gainful summer employment and job training in conservation work for young men and women, plus a variety of educational experiences in learning to improve the productivity of forest, soil, water, and other natural resources. Youths participating in this program are between 15 and 18 years of age, and are recruited by random selection from all economic, social, ethnic, and racial backgrounds.

The conservation work-learn projects conducted under this program include such activities as the construction and maintenance of recreation facilities on National Forest System lands, range and wildlife habitat improvement work, timber stand improvement, trail construction and maintenance, visitor information services, and soil and water conservation projects. In fiscal year 1988, about 1,200 young people are expected to participate in a \$1.3 million program funded from benefiting Forest Service programs. Conservation work valued at about \$1.6 million will be implemented.

### Job Corps

Under an agreement with the U.S. Department of Labor and by authorizations in Title 4 of the Comprehensive Employment and Training Act of 1973,<sup>94</sup> the Forest Service operates 18 Job Corp Centers to provide basic education and job training to disadvantaged youths. The purpose of this program is to produce graduates who are able to find productive work, re-enter school or join the military. Enrollees receive room, board, clothing, skills training, education, and a monthly allowance in lieu of wages.

During program year 1986 (July 1, 1986 to June 30, 1987), 9,097 young men and women participated in the program funded at \$57.2 million. Besides acquiring job

Table 4.—Forest Service funds for human resource programs, fiscal year 1988.

Program	Funds (thousand dollars)
Youth Conservation Corps <sup>1</sup>	unfunded
Job Corps	60,200 <sup>2</sup>
Senior Community Service Employment Program	22,700 <sup>2</sup>
Volunteers	unfunded
Hosted Programs	unfunded
Total	82,900 <sup>2</sup>

<sup>1</sup>Congress directed that not less than \$1 million be expended from benefiting Forest Service program funds in fiscal year 1988. Actual Forest Service funding is expected to be \$1.3 million.

<sup>2</sup>Funds for program year July 1, 1987-June 30, 1988.



skills which will enhance the Nation's future productivity, these Job Corps participants completed work valued at \$18.3 million.

It is anticipated in program year 1987 (July 1, 1987 to June 30, 1988), about 9,242 young men and women will participate at a funding level of \$57.1 million. The value of accomplished work is estimated to be \$21 million.

### Senior Community Service Employment Program

The Forest Service cooperates with the Department of Labor in sponsoring a Senior Community Service Employment Program under the Older American Community Service Act of 1975.<sup>95</sup> This program has three fundamental purposes: community service, part-time employment and supplemental income, and training and transition of participants to the private sector labor market. The program employs economically disadvantaged persons age 55 and older and fosters a renewed sense of self-worth and community involvement among traditionally poor and hard-to-employ older people.

### Volunteers in the National Forests

The Volunteers in the National Forest Act of 1972<sup>96</sup> permits citizens to volunteer their time and talent to help the Forest Service in such work as providing information to visitors, environmental education, clearing trails, and assisting in research projects.

The program provides help in natural resource protection and management at nominal costs. The program offers people the opportunity to contribute their services to help manage the nation's natural resources.

The Touch America Program (TAP), a component of the volunteer program, includes special emphasis on participation by youth ages 14 to 17. TAP is a partnership of private sector organizations sponsoring teenage youths to do conservation work. During fiscal year 1987, 5,203 youths participated.

In fiscal year 1987, 57,298 volunteers served in the Forest Service, including TAP participants. The appraised value of their work was \$23.8 million. The Forest Service covers out of pocket costs of volunteers from regular project funds. It is anticipated that there will be a participation of 58,730 volunteers participating in the program in fiscal year 1988.

### Hosted Programs

The Forest Service also serves as a host agency by providing work opportunities for programs primarily administered by State and local governments. Hosted

programs include employment under the Job Training Partnership Act, College Work Study, Vocational Work Study and Work Incentive. In fiscal year 1987, 761 person-years of work were completed, valued at \$9.5 million. There were 6,568 participants in these programs. In fiscal year 1988, it is expected that 7,000 people will participate in hosted programs doing conservation work valued at about \$10 million.

### ENDNOTES

<sup>188</sup> Stat. 476 as amended; 16 U.S.C. 1601 (note), 1600-1614.

<sup>290</sup> Stat. 2949 as amended; 16 U.S.C. 1600 (note).

<sup>3</sup>U.S. Department of Agriculture, Forest Service. An Assessment of the Forest and Range Land Situation in the United States. For. Resour. Rep. 22. Washington, DC: U.S. Department of Agriculture, Forest Service. 352 p., 1981.

<sup>4</sup>U.S. Department of Agriculture, Forest Service. The Principal Laws Relating to Forest Service Activities. Ag. Handbook 453. Washington, DC: U.S. Department of Agriculture, Forest Service. 591 p., 1983.

<sup>5</sup>U.S. Department of Agriculture, Forest Service. [In press] Report of the Chief of the Forest Service Fiscal Year 1987. Washington, DC: USDA Forest Service.

<sup>6</sup>U.S. Department of Agriculture, Forest Service. [processed] 1989 Budget Explanatory Notes for Committee on Appropriations. U.S. Department of Agriculture, Forest Service.

<sup>743</sup> Stat. 653 as amended; 16 U.S.C. 499, 505, 568, 568a, 569, 570.

<sup>845</sup> Stat. 699 as amended; 16 U.S.C. 581, 581a, 581a-l, 581-b, 581-c.

<sup>992</sup> Stat. 353 as amended; 16 U.S.C. 1600 (note), 1641 (note), 1641-1647.

<sup>107</sup> U.S.C. 361a-i.

<sup>1176</sup> Stat. 806 as amended; 16 U.S.C. 582a, 582a-1-582a-7.

<sup>1264</sup> Stat. 82 as amended; 16 U.S.C. 581i-l.

<sup>1372</sup> Stat. 1793; 42 U.S.C. 1891-1893.

<sup>1491</sup> Stat. 913; 7 U.S.C. 1354, 2669.

<sup>1591</sup> Stat. 1407; 16 U.S.C. 2001-2009.

<sup>1668</sup> Stat. 666; 16 U.S.C. 100 (note), 1001-1008; 33 U.S.C. 701b (note).

<sup>1790</sup> Stat. 2743 as amended; 43 U.S.C. 1701 (note) et. seq.; 16 U.S.C. 478a, 1338a.

- <sup>18</sup>83 Stat. 852; 42 U.S.C. 4321 (note) 4321, 4331-4335, 4341-4347.
- <sup>19</sup>78 Stat. 329 as amended; 42 U.S.C. 1916 et. seq.
- <sup>20</sup>36 Stat. 961 as amended; 16 U.S.C. 480, et. seq.
- <sup>21</sup>38 Stat. 373 as amended; 7 U.S.C. 351-9.
- <sup>22</sup>50 Stat. 188.
- <sup>23</sup>64 Stat. 473 as amended; 16 U.S.C. 568c, 568d.
- <sup>24</sup>86 Stat. 657; 7 U.S.C. 2669.
- <sup>25</sup>92 Stat. 365; 16 U.S.C. 2101 (note), 2101-2110, 1606, 2111.
- <sup>26</sup>92 Stat. 1649; 15 U.S.C. 1132.
- <sup>27</sup>58 Stat. 887 as amended by 68 Stat. 666 and 76 Stat. 808; 33 U.S.C. 701b; 16 U.S.C. 1004.
- <sup>28</sup>49 Stat. 1148 as amended; 16 U.S.C. 590g et. seq.
- <sup>29</sup>52 Stat. 1215 as amended; 33 U.S.C. 701b-l.
- <sup>30</sup>76 Stat. 605; 16 U.S.C. 540a and 7 U.S.C. 351-9.
- <sup>31</sup>91 Stat. 1567; 33 U.S.C. 1288.
- <sup>32</sup>58 Stat. 736; 16 U.S.C. 580a.
- <sup>33</sup>86 Stat. 657 as amended; 7 U.S.C. 266-70.
- <sup>34</sup>90 Stat. 982; 7 U.S.C. 3004.
- <sup>35</sup>92 Stat. 349; 16 U.S.C. 1600 (note), 1670 (note), 1671-1676.
- <sup>36</sup>87 Stat. 221; 16 U.S.C. 1503, 1504, 1510.
- <sup>37</sup>99 Stat. 1354; 7 U.S.C. 1281.
- <sup>38</sup>26 Stat. 1103; 16 U.S.C. 471.
- <sup>39</sup>Hough, Franklin B. Report upon forestry. Gov. Print. Off., Washington, DC: vol. I, 650 p. 1878; vol. II, 618 p., 1880; vol III, 318 p; 1882.
- <sup>40</sup>30 Stat. 11 as amended; 16 U.S.C. 473-475, 477-482, 551.
- <sup>41</sup>74 Stat. 215; 16 U.S.C. 528 (note), 528-531.
- <sup>42</sup>50 Stat. 522 as amended; 7 U.S.C. 1010-1012; 16 U.S.C. 551.
- <sup>43</sup>78 Stat. 890; 16 U.S.C. 1121 (note), 1131-1136.
- <sup>44</sup>88 Stat. 2096; 16 U.S.C. 1132 (note).
- <sup>45</sup>92 Stat. 40; 16 U.S.C. 1132.
- <sup>46</sup>83 Stat. 852 as amended; 42 U.S.C. 4321, 4331-5, 4341-7y.
- <sup>47</sup>41 Stat. 437 as amended; 30 U.S.C. 181.
- <sup>48</sup>81 Stat. 913; 30 U.S.C. 351-359.
- <sup>49</sup>91 Stat. 445; 30 U.S.C. 1201, 1236, 1272, 1305.
- <sup>50</sup>84 Stat. 1566; 30 U.S.C. 1001 et. seq.
- <sup>51</sup>17 Stat. 91; 30 U.S.C. 22, 28, 28b.
- <sup>52</sup>69 Stat. 369 as amended; 30 U.S.C. 613-5.
- <sup>53</sup>61 Stat. 681 as amended; 30 U.S.C. 601-4, 611.
- <sup>54</sup>74 Stat. 205; 7 U.S.C. 2201 (note).
- <sup>55</sup>42 Stat. 465; 16 U.S.C. 485, 486.
- <sup>56</sup>38 Stat. 415 as amended; 16 U.S.C. 498.
- <sup>57</sup>85 Stat. 303; 16 U.S.C. 551a.
- <sup>58</sup>100 Stat. 3206; 21 U.S.C. 801.
- <sup>59</sup>92 Stat. 32 as amended; 16 U.S.C. 472a(e).
- <sup>60</sup>43 Stat. 384 as amended; 15 U.S.C. 631 et. seq.
- <sup>61</sup>43 Stat. 1132 as amended; 16 U.S.C. 555, 557, 572.
- <sup>62</sup>94 Stat. 2987; 16 U.S.C. 470 et. seq.
- <sup>63</sup>93 Stat. 721; 16 U.S.C. 470aa-ii.
- <sup>64</sup>87 Stat. 884 as amended; 16 U.S.C. 1531-1536, 1538-1540.
- <sup>65</sup>82 Stat. 1146; 43 U.S.C. 1241.
- <sup>66</sup>78 Stat. 1089 as amended; 16 U.S.C. 532-538.
- <sup>67</sup>82 Stat. 919 as amended; 16 U.S.C. 1241 (note), 1241-1249.
- <sup>68</sup>78 Stat. 897; 16 U.S.C. 460 (note) et. seq.
- <sup>69</sup>82 Stat. 906 as amended; 16 U.S.C. 1271 (note) 1271-1287.
- <sup>70</sup>54 Stat. 297 and 299; 58 Stat. 227.
- <sup>71</sup>81 Stat. 531 as amended; 16 U.S.C. 484a.
- <sup>72</sup>90 Stat. 2743 as amended; 43 U.S.C. 1701 (note), et. seq.
- <sup>73</sup>92 Stat. 1806; 43 U.S.C. 1752-53, et. seq.
- <sup>74</sup>39 Stat. 446 as amended; 16 U.S.C. 490.
- <sup>75</sup>94 Stat. 2371; 16 U.S.C. 3210.
- <sup>76</sup>100 Stat. 1330; 7 U.S.C. 1421.
- <sup>77</sup>98 Stat. 1874; 5 U.S.C. 5911 (note).
- <sup>78</sup>46 Stat. 527 as amended; 16 U.S.C. 576-576b.
- <sup>79</sup>94 Stat. 1983; codified as amended in scattered sections of 16 U.S.C.
- <sup>80</sup>35 Stat. 251 as amended; 16 U.S.C. 500; 16 U.S.C. 553; 31 U.S.C. 534.
- <sup>81</sup>61 Cong. ch. 310 p 573, 601.

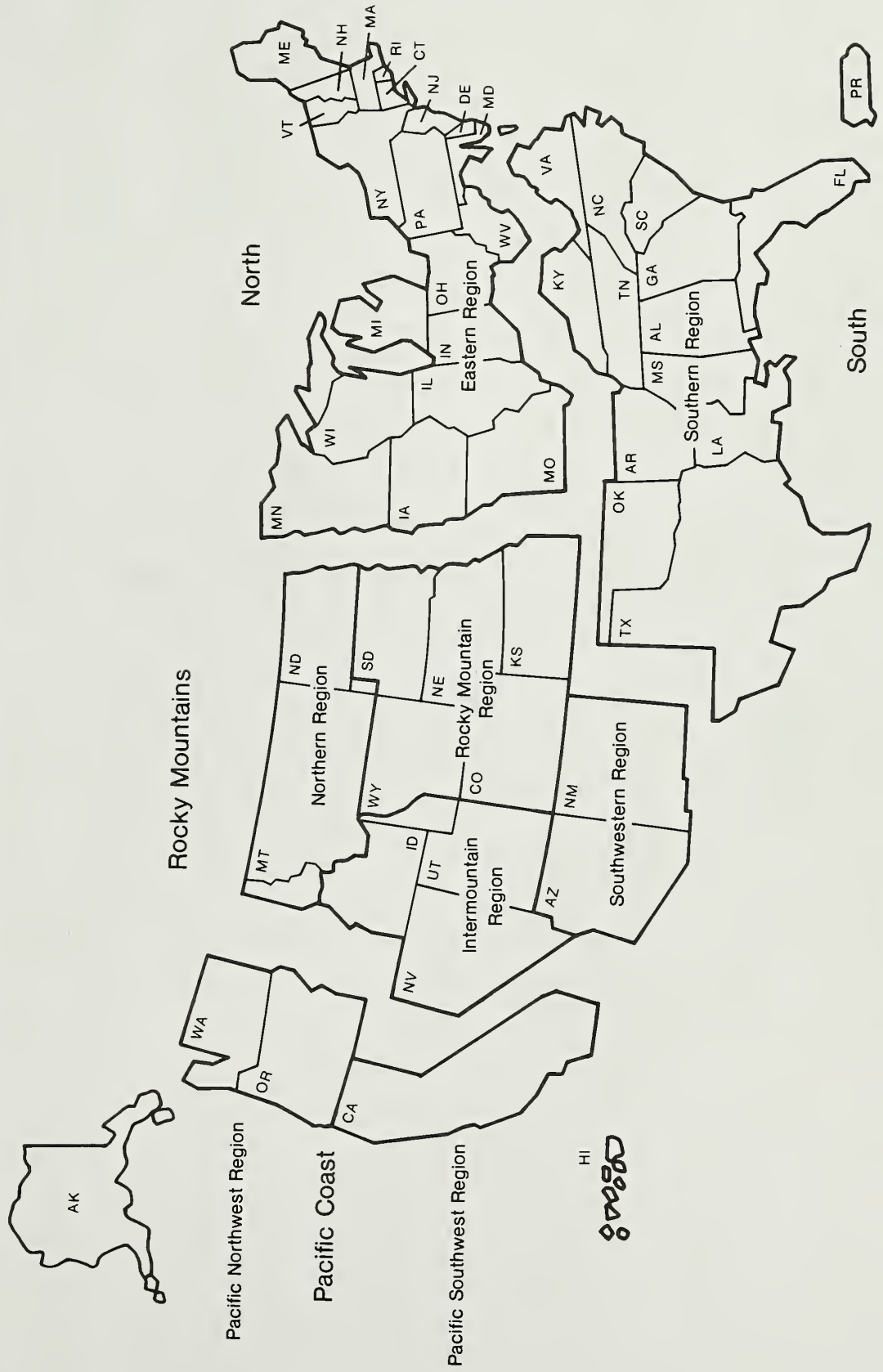


- <sup>82</sup>90 Stat. 2662; 31 U.S.C. 1601-1607.
- <sup>83</sup>58 Stat. 887 as amended; 33 U.S.C. 701-1
- <sup>84</sup>88 Stat. 2148; 7 U.S.C. 2801-2 (note).
- <sup>85</sup>68 Stat. 271; 43 U.S.C. 1181 f-g.
- <sup>86</sup>80 Stat. 915; 16 U.S.C. 470a, 470f, and 470j.
- <sup>87</sup>50 Stat. 917; 16 U.S.C. 669-669j.
- <sup>88</sup>68 Stat. 430; 16 U.S.C. 777.
- <sup>89</sup>87 Stat. 250; 23 U.S.C. 101 et. seq.
- <sup>90</sup>91 Stat. 685; 42 U.S.C. 7401 et. seq.
- <sup>91</sup>86 Stat. 973 as amended; 7 U.S.C. 136, 136b, 136i-m, 136p.
- <sup>92</sup>88 Stat. 1369; 16 U.S.C. 670a-o.
- <sup>93</sup>84 Stat. 794 as amended; 16 U.S.C. 1701-1706.
- <sup>94</sup>87 Stat. 839 as amended; 29 U.S.C. 801-992.
- <sup>95</sup>89 Stat. 720; 42 U.S.C. 3056.
- <sup>96</sup>86 Stat. 147; 16 U.S.C. 558a (note) 558a-558d, 558d.





# Forest Service Regions and Assessment Regions







NATIONAL AGRICULTURAL LIBRARY



1022257056

*an*

NATIONAL AGRICULTURAL LIBRARY



1022257056