Forest Service Programs, Authorities, and Relationships

Ervin G. Schuster and Michael A. Krebs

A Technical Document Supporting the 2000 USDA Forest Service RPA Assessment

U.S. Department of Agriculture Forest Service

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Abstract

The Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended, directs the Forest Service to prepare and update a renewable resources assessment that would include "a description of Forest Service programs and responsibilities …, their interrelationships, and the relationship of these programs and responsibilities to public and private activities." The first description was part of the RPA Assessment document in 1979. The second was published as an independent support document in 1989. This third description is organized around major Forest Service programs within the National Forest System, State and Private Forestry, and Research and Development. Programs and responsibilities within International Programs, Law Enforcement and Investigations, Capital Improvement and Maintenance, along with Senior, Youth, and Volunteer Programs, are also discussed. Each section discusses major program areas, legal authorizations, administrative and organizational considerations, and relationships within the Forest Service and with outside organizations. A listing of major legislative authorities is provided.

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Introduction

Nearly a century ago, President Theodore Roosevelt and America's first Chief Forester, Gifford Pinchot, founded the USDA Forest Service and fostered the first strategy for managing and protecting the nation's forests. A pattern of effective organization and management was set in motion under Pinchot and the Forest Service leaders who followed him, as the conservation of natural resources became a widely accepted concept and a national policy. Today, the tradition of land stewardship continues with renewed vigor as we enter a new century with its promise and challenges.

This document describes the programs and responsibilities of the USDA Forest Service, as called for in the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 as amended. The RPA directs the Secretary of Agriculture to periodically prepare 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 (NFS), their interrelationships, and the relationship of these programs and responsibilities to public and private activities."

Accordingly, this document has been prepared in support of the latest update of the RPA Assessment. The research, cooperative assistance, and land management programs conducted by the Forest Service affect almost all forests and rangelands, both public and private, in the United States, including timberlands, woodlands, brushlands, grasslands, alpine areas, and the associated waters. These land and water areas total some 1.6 billion acres, or about 70 percent of the total area of the United States.

The Forest Service provides leadership in management, protection, and use of the nation's forests, grasslands, and aquatic ecosystems. Through the National Forest System, the agency is responsible for managing more than 192 million acres of public lands in the United States. The State and Private Forestry organization within the Forest Service provides technical and cost-sharing assistance to help assure conservation and sound stewardship of the nation's vast state and private forest lands. Within State and Private Forestry, the Fire and Aviation Management program protects life, property, and natural resources from wildfire hazards on the 192 million acres of NFS lands. An additional 20 million acres of adjacent state and private lands are also protected through fee or reciprocal protection agreements. Through the Research and Development organization, the Forest Service provides world leadership in the development of scientific information to assist public and private landowners in management of their lands.

Mission and Objectives

The mission of the Forest Service is to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations. "Caring for the Land and Serving People" is more than a motto—it is the foundation for everything the Forest Service does. In delivering its mission, the Forest Service is guided by the agency's strategic plan.

The Forest Service Strategic Plan identifies long-term goals, outcomes, objectives, and performance measures for the work of the agency. Collectively, these provide purpose and context for future management actions and investments, as well as a set of milestones for evaluating progress. Separately, annual performance plans address specific management actions and investments needed to ensure progress toward goals and objectives of the Forest Service's Strategic Plan. Annual performance plans reflect local needs identified in land and resource management plans for the national forests and grasslands. Plans for research and assistance to tribal governments, states, and communities are also reflected in annual performance plans. Annual budget proposals seek funding needed to deliver the annual actions and investments identified.

The Forest Service is committed to provide the best possible stewardship, benefiting current and future generations of the American people. The realities of diverse interests, finite budgets, and environmental considerations influence the choices made in the management of forest and grassland resources. Delivering on this commitment requires understanding of the public's interests through direct discussions and collaboration; financial support through congressional appropriations, volunteers, partners, and user fees; development and use of scientific information; and broad support for the agency's long-term goals and objectives.

During the past decade, the United States has committed to sustainable resource management in response to an international consensus to link natural resource development and protection of the environment. The Forest Service is committed to managing the 192 million acres of the NFS in a sustainable manner. Forest Service responsibilities associated with the NFS, Research and Development, and State and Private Forestry programs hold opportunities to pursue and achieve the promise of sustainable resource management.

Management Framework

The Forest Service must comply with legislated authorities and responsibilities, particularly concerning the water, air, and soils that sustain life on Earth. Specifically, the Forest Service must work to sustain the health, diversity, and productivity of the nation's forests and grasslands. The agency is also required to conduct its business in the most effective and efficient manner possible, providing the best possible value for the American people.

Many acts of Congress define and direct Forest Service management actions. The Organic Act of 1897, Multiple Use and Sustained Yield Act of 1960, National Forest Management Act of 1976, Wilderness Act of 1964, and Endangered Species Act of 1973, together, provide a framework within which the agency's mission is defined. The National Environmental Policy Act of 1969 guides analysis of the impacts and effects of program actions that accomplish the mission. The Government Performance and Results Act of 1993 and the Chief Financial Officer's Act of 1990 direct the mission to be accomplished in a business-like manner.

As the lead Federal agency in natural resource conservation, the Forest Service provides leadership in the protection, management, and use of the nation's forest, rangeland, and aquatic ecosystems. The ecosystem approach to management integrates ecological, economic, and social factors to maintain and enhance environmental quality to meet current and future needs. Through implementation of land and resource management plans, the Forest Service ensures sustainable ecosystems by restoring and maintaining species diversity and ecological productivity that helps provide recreation, water, timber, minerals, fish, wildlife, wilderness, and aesthetic values for current and future generations of people.

Through technical and financial assistance, the Forest Service assists states and private landowners in practicing good stewardship, promoting rural economic development, and improving the natural environment of cities and communities. The agency continues to develop and use the best available scientific information to facilitate achievement of goals and objectives. Domestic and international activities are directed at developing values, products, and services in such a way as to maintain ecosystem health.

Management Situation

The management situation of the Forest Service is similar to that of many organizations today. Financial resources are finite and competition for them is strong. Operations are being transformed by new and emerging information technologies. Accountability (for monies spent and results achieved) is expected and closely monitored, from within and outside the agency. Results expected of the agency are as diverse as the public interests the agency serves.

The model for how the Forest Service manages its business has changed in response to the management situation and other factors. Consistent with requirements of the Government Performance and Results Act of 1993, the new model provides for considering long-term as well as near-term objectives in an adaptive system, while monitoring and evaluating financial performance and public perceptions, accomplishing operational objectives, and achieving long-term results. Full implementation of this model facilitates Forest Service accountability for actions taken and results realized.

The long-term goals and objectives of the Forest Service, outlined in the Strategic Plan, are intended to guide near-term agency actions. Those actions include decisions on programs and plans associated with the National Forest System, State and Private Forestry, Research and Development, and Business Operations, as well as agency budget proposals. The Strategic Plan identifies intended long-term outcomes and priorities. The importance of the Strategic Plan is directly akin to the importance of knowing where we want our journey to take us before we travel long distances. Intended outcomes guide every decision and direction adjustment throughout the journey. As the Strategic Plan guides other plans, actions, and investments, it also provides context and purpose that drive near-term choices essential to achieve intended long-term outcomes.

The Strategic Plan is a keystone. By itself, it means little. However, in association with other components of the Forest Service management system, the Strategic Plan plays an essential role just as a keystone in an arch provides integrity to the structure of the arch. The Strategic Plan outlines the purpose and context for everything the agency does, providing guidance for near-term actions and monitoring how they affect progress toward long-term outcomes.

The Forest Service has both a responsibility and an opportunity to be a leader in ensuring that the nation maintains a natural resource conservation posture that will meet the requirements of our people in perpetuity. In carrying out its responsibilities, the Forest Service engages in a wide array of activities that this document has grouped into four program areas:

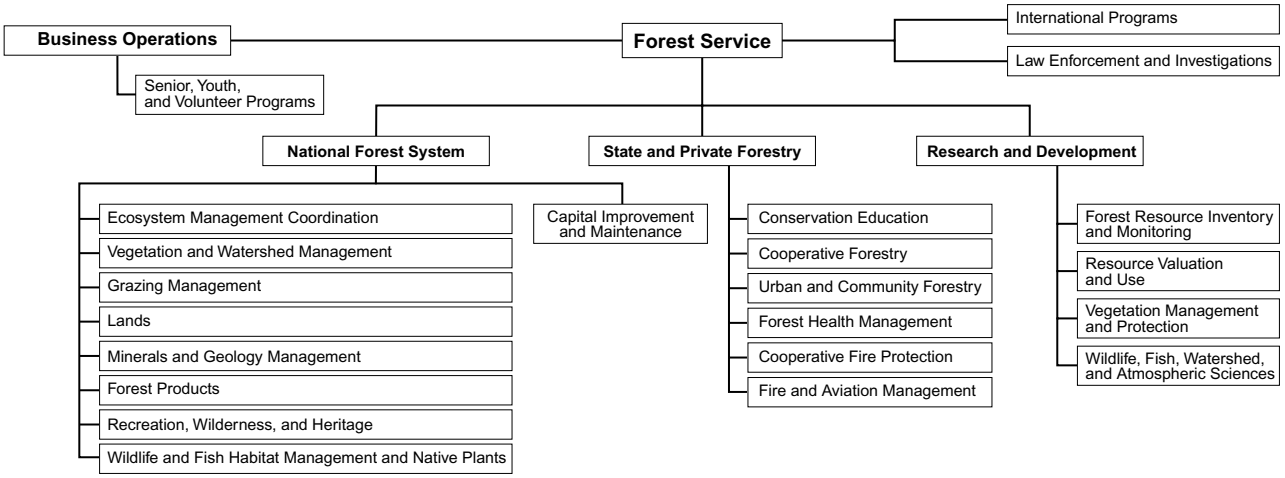
- **National Forest System.** This entails direct administration of 192 million acres of national forests,

national grasslands, and land utilization projects, and the management of their resources for the use by people.

- **State and Private Forestry.** Nationwide cooperative forestry programs are conducted with state forestry agencies to protect and improve nearly a billion acres of forests, rangelands, and associated water resources in private and non-Federal public ownerships. State and Private Forestry also has responsibility for fire management programs.
- **Research and Development.** Comprehensive research programs are aimed at solving management problems concerning all types and ownerships of forests, rangelands, and associated waters, as well as the industrial, environmental, and other uses of these natural resources.
- **Other programs.** Other programs described in this document include those aimed at developing employment, education, and training opportunities for people with special needs, providing international cooperation and assistance, and enforcing laws that protect public and employee safety and natural resources and other property.

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. Similarly, state, industrial, and conservation organizations also play an important role in forest land management, in forest and range research, and in environmental protection programs on private forests and rangelands. Cooperative relationships between the Forest Service and other resource organizations are 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 concerned people.

Forest Service programs and responsibilities change over time and descriptions vary with purpose and audience. The agency administers many programs of varying importance, far too many to describe in this document. Major program areas are organized within the administrative structure of the Forest Service. Some programs are administered through the principal areas of the Forest Service, such as the Fire and Aviation Management programs that are administered through State and Private Forestry. Other programs are administered directly from the Office of the Chief, such as International Programs. We begin by describing programs and responsibilities within the National Forest System. Additional details concerning Forest Service programs, administrative regulations, and other pertinent information may be found in Federal laws concerning the Forest Service and its activities, in the Code of Federal Regulations, in the Forest Service Manual and Handbooks, and in other materials referred to within this document.



Major program areas within the Forest Service.

National Forest System

The National Forest System has its roots in the last quarter of the 19th century. After the Civil War, forests were being cut rapidly. While some cutover lands were used for crops and pasture, other lands remained idle. Because of poor land management practices and frequency of uncontrolled fires, floods and erosion were becoming serious problems over large areas. Timber supplies vital to a growing population were being depleted in some regions. In the late 1800s a series of studies, articles, and other material described deterioration of the nation's forests and grasslands. New organizations, such as the American Forestry Association, formed and began to build support for action. Influential members of the Federal government and other concerned citizens actively promoted the idea of "forest reservations" to protect part of the remaining forested public lands. Grasslands in the public domain also received attention and a call for action.

Today, the National Forest System includes over 192 million acres of publicly accessible national forests and grasslands, about 15 percent of the total forest and rangelands in the United States. These lands are located in 43 states, Puerto Rico, and the Virgin Islands. They include 155 national forests containing about 188 million acres, and 20 national grasslands containing about 4 million acres. The remaining acreage is in purchase units, land utilization projects, research sites, and other areas. The National Forest System provides a unique national legacy of clean water, abundant timber, fish, wildlife, forage and mineral resources, and a wide spectrum of outdoor recreation opportunities. It is indeed a national treasure to be enjoyed and sustained for all generations.

Authorization

Origins of the National Forest System date to the Creative Act of 1891, which authorized setting aside public lands as forest reserves. Six years later in the Organic Administration Act of 1897, Congress provided further direction and management authority for forest reserves. That law provided for establishment of forest reserves, later called national forests, "to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States…." The Organic Act also provided for an organization, initially the General Land Office of the Department of Interior, to manage the reserves. The Department was vested with broad authority "to regulate their occupancy and use and to preserve the forests thereon from destruction." In 1905, Congress transferred management of the forest reserves to the Department of Agriculture and its Bureau of Forestry. The Forest Service was established on July 1, 1905, replacing the Bureau of Forestry name, and in 1907, forest reserves were renamed national forests.

The Weeks Act of 1911 authorized the Secretary of Agriculture to purchase forest lands within watersheds of navigable streams, "as in his judgment may be necessary to the regulation of the flow of navigable streams or for the production of timber." This Act led to creation of national forests in the eastern United States. By 1980, purchases and donations based on the Weeks Act had added over 22 million acres to the National Forest System.

In the Multiple-Use and Sustained-Yield Act of 1960 (MUSY), Congress affirmed the Forest Service's authority to manage national forests "for outdoor recreation, range, timber, watershed, and wildlife and fish purposes," and did so without limiting the agency's broad discretion in determining the appropriate resource emphasis or levels of use of the lands of each national forest.

The year 1960 also saw addition of national grasslands to the National Forest System. Origin of the national grasslands dates to concerns over widespread soil erosion in the Great Plains "dustbowl" area during the 1930s. Under authority of the National Industrial Recovery Act of 1933 and the Emergency Relief Appropriations Act of 1935, the Federal government began purchasing these submarginal lands for purposes of controlling erosion, producing more forage, and ensuring economic stability for rural residents. Purchased lands were called Land Utilization (L-U) projects. The Bankhead-Jones Farm Tenant Act of 1937 gave custody of the L-U lands to the Secretary of Agriculture. In 1954, the Forest Service was given management responsibility for the L-U lands. In 1960, a Secretary of Agriculture administrative order designated the remaining L-U lands (the majority had already been transferred to states and colleges) as national grasslands. The order also stated that national grasslands were to be administered as part of the National Forest System.

During the 1960s and 1970s, the general public became increasingly concerned about the condition of the environment throughout the United States. Congress responded by enacting several laws directed toward protecting or improving the natural environment, conserving natural resources to meet the needs of the American people in perpetuity, and providing for greater public involvement in agency decisionmaking. These laws

included several pieces of legislation affecting the National Forest System, most notably the National Environmental Policy Act and the Endangered Species Act, and later the National Forest Management Act.

Congress enacted the National Environmental Policy Act of 1969 (NEPA) "to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man, [and] enrich the understanding of the ecological systems and natural resources important to the Nation." Under NEPA, all Forest Service proposals for major Federal actions significantly affecting the quality of the human environment must include detailed statements of environmental effects and proposal alternatives. Environmental effects include ecological effects "such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems." NEPA also requires the Forest Service to "initiate and utilize ecological information in the planning and development of resource-oriented projects."

The Endangered Species Act of 1973 (ESA) also bounds the otherwise broad discretion the Forest Service has over land and resource management. One of the purposes of ESA is "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved ….." It requires Federal agencies to carry out programs for conservation of threatened and endangered species so that they no longer need protection under ESA, and to ensure agency actions are not likely to jeopardize continued existence of such species or result in destruction or adverse modification of designated critical habitat. ESA requires Federal agencies such as the Forest Service to "utilize their authorities in furtherance of the purposes of this [Act] by carrying out programs for the conservation of endangered species and threatened species" in consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

The National Forest Management Act of 1976 (NFMA) requires the Forest Service to manage National Forest System lands according to land and resource management plans that provide for multiple-use and sustained yield in accordance with the Multiple-Use and Sustained-Yield Act. In developing and maintaining these plans, NFMA calls for "integrated consideration of physical, biological, economic and other sciences." Federal courts have recognized that NFMA and related statutes represent a congressional delegation of broad authority, allowing the Forest Service to address issues of sustainability using an integrated ecological and socio-economic framework. NFMA also requires the Secretary to promulgate regulations "that set out the process for the development and revision of the land management plans" for units of the National Forest System, and specifies certain procedures, guidelines, and goals that should be discussed in the regulations.

In addition to the legislation discussed above, the U.S. Congress enacted numerous pieces of legislation authorizing, governing, and controlling management of the National Forest System. Some pertain to resource management activities, others to administrative activities. In response to these mandates, the National Forest System provides a wide variety of program areas concerning ecosystem management coordination, forest products, wildlife and fish habitat management, and more.

Ecosystem Management Coordination

The Ecosystem Management Coordination (EMC) program is assigned overall responsibility for developing and guiding land and resource management planning for national forests and grasslands. In carrying out its responsibilities, the staff group oversees agency-wide implementation of NEPA and NFMA. These two important Federal laws and their implementing regulations guide agency actions in developing inventories, assessing natural resource conditions, making natural resource decisions, and monitoring results. In addition, specific procedures and requirements for coordination with other agencies, tribal governments, industry, interest groups, and the public are established in EMC. Activities are partitioned into two major areas: (1) inventory and monitoring and (2) planning and decisionmaking.

Inventory and monitoring

Inventory and monitoring activities include major information collection, storage, and analysis processes used to understand land and resources of the National Forest System and to keep track of on-the-ground results of natural resource stewardship decisions. Inventory and monitoring activities are conducted utilizing the most effective scientific and statistical methods. EMC's Inventory and Monitoring Institute in Fort Collins, Colorado, provides managers with technical, scientific, and practical advice, counsel, and solutions to inventory and monitoring requirements. The Institute facilitates exchange of information and advice from scientists in other agencies, academia, and private industry and among Forest Service employees. Similarly, inventory and monitoring approaches and technology are evaluated and perfected in cooperation with the San Dimas Technology and Development Center.

Inventories—Inventories are designed to provide sound, integrated information about the land and waters of each national forest and grassland. Besides providing basic information, integrated natural resource inventories provide information necessary for monitoring results of management activities. Inventories include physical, biological, and human dimensions and are supported by specific data standards and protocols. Inventories are often used to develop assessments or characterizations of ecosystems at a various scales. Many Forest Service programs depend on natural resource assessments to guide agency activities. For example, clean water action plans rely on aquatic ecological inventories and watershed assessments in the identification of potential project sites. Assessments provide information for a broad range of resource management activities, including land and resource management plan revisions and amendments.

Natural Resource Information System—Management, storage, and use of resource data are a significant agency investment. Developing and managing standards for inventory, storage, and interpretation of resource information decrease agency costs and enable sharing of resource information with agency partners and the public. The Natural Resource Information System (NRIS) implements national standard protocols for data and delivers consistent methods for storage and retrieval of data to field specialists. NRIS eliminates duplication of efforts, fosters information sharing, and equips the Forest Service for updating information needs. NRIS has six "database" modules and one "tools" module. NRIS Database modules include: FSVeg (historical and current timber stand examination data); Terra (terrestrial ecological inventories of soils, geology, climate, and potential vegetation); Air (air quality and visibility monitoring); Water (aquatic inventory data, water uses and rights, aquatic biota, and restoration needs); Human Dimensions (social and economic information from U.S. census data and other indices of social and economic conditions adjacent to National Forest System lands, recreation use patterns, and heritage and cultural resources); and Fauna (wildlife and rare plant data collected by Forest Service biologists and other agencies and organizations). The Tools module provides software to combine, analyze, and present information from database modules at multiple scales. NRIS modules are installed and implemented as information needs arise. All inventory and mapping procedures comply with Federal requirements and are coordinated with the Environmental Protection Agency and a host of other Federal agencies and partners.

Monitoring—Individual national forests and grasslands prepare an Annual Monitoring and Evaluation Report that documents monitoring results, provides information on effectiveness of management activities, and offers suggestions for cost-effective improvements. Forest Service regions prepare an annual "State of the Regional Evaluation Report," which documents program direction and emphasis. The report is a basis for evaluation of regional programs.

Planning and decisionmaking

The National Forest Management Act requires each unit of the National Forest System to have a land and resource management plan (plan) that may be continuously amended, as appropriate, but is formally revised at least every 15 years. The plans establish a framework to integrate the many natural resource management programs of the Forest Service and conform to laws and regulations governing National Forest System management. These laws include MUSYA, NFMA, NEPA, the Clean Air and Clean Water Acts, the Endangered Species Act, and other environmental and land use statutes.

Plans are strategic in nature. They provide guidance and direction applicable to future site-specific projects and activities, but subsequent decisionmaking is necessary before an irretrievable or irreversible commitment of resources can occur. Plans also may restrict some activities or establish other requirements applicable to particular areas. A plan does not grant, withhold, or modify any contract, permit, or other legal instrument, and it creates no legal rights. At the national level, the Forest Service Strategic Plan required under the Government Performance and Results Act of 1993 establishes goals, outcomes, measures, and strategies that apply to management of the National Forest System, as well as to other Forest Service mission areas.

Sustainable and effective management of national forests and grasslands relies on scientifically credible information, collaboration with a broad spectrum of people, and effective decisionmaking by responsible officials. The Forest Service planning framework and the skillful implementation of planning and NEPA procedures facilitate identification and responsive resolution of emerging problems. Planning, done at the most appropriate scale, enables the Forest Service to make sound decisions guiding management of national forests and grasslands into the future.

Vegetation and Watershed Management

Maintenance and improvement of watershed conditions to protect ecological values, maintain ecological sustainability, and produce renewable resource

outputs at sustainable levels is central to successful implementation of the Vegetation and Watershed Management program. The Vegetation and Watershed Management program focuses on restoration and maintenance of watershed conditions (including soil, water, air, and forest and rangeland vegetation), by reducing risks associated with wildfires, noxious weeds, impaired air quality, drought, floods, past land use practices, wild horse and burro use, and insect infestation and disease.

A watershed approach provides an understanding of landscape capability, offering management information that can lead to maintenance of high quality water, sustained use of resources, healthy forests and rangelands, suitable habitat for fish and wildlife, and protection of threatened and endangered species. Watershed management is fundamental to ensuring stable ecosystems. A watershed management approach requires that existing conditions of watersheds be maintained and watersheds in degraded condition be restored. Watersheds are first delineated and assessments then conducted to define existing and potential conditions. This information is incorporated into land and resource management plans and management programs for maintenance and improvement of watershed conditions.

Vegetation management is critical for maintaining and improving watershed conditions for wildlife habitat; reducing fuels that, if left untreated, increase fire risk and are of particular concern in urban-wildland interface areas; achieving desired forest land objectives that enhance ecosystem structure, function, and condition; preparing sites for regeneration; improving water quality; and improving forest stands and grasslands areas. The Vegetation and Watershed Management program has six main components: (1) maintaining and improving watershed conditions; (2) improving rangeland vegetation; (3) improving forest land vegetation; (4) managing noxious weeds; (5) managing air quality; and (6) environmental compliance and protection.

Watershed conditions management

In addition to providing for resource use, national forests and grasslands are the single largest source of water in the Continental United States. They contain over 9 million acres of wetlands and riparian areas. These lands include the headwaters of 15 percent of the nation's water supply, provide a domestic water source for over 60 million people, and support multiple uses of the national forests and grasslands. Valued in the billions of dollars, water furnishes additional benefits, such as preserving species viability, providing water-based recreation, reducing treatment costs to municipal water suppliers, and creating jobs and tax revenues. Water use is expected to increase by over 150 percent in the next 50 years. This is especially important in the arid West.

The Watershed Conditions Management program ensures watersheds and associated natural resources are managed within their capability so they can continue to provide stable ecosystems and sustain production of goods and services. This program helps supply soil, water and air quality, and weather information needed to sustain healthy ecosystems. It assures compliance with appropriate laws and standards; protects and maintains watersheds that are currently in good condition; implements treatments to improve or restore watershed conditions to a fully productive level; protects airsheds in National Forest System wilderness areas; and sustains and monitors project level treatments implemented in previous years.

The Watershed Conditions Management program facilitates and coordinates a wide range of activities to maintain and improve conditions in priority watersheds. This is done in partnership with other Federal, state, tribal, and local governments and nongovernmental entities. Maintenance and improvement activities include preventing erosion and loss of topsoil, revegetating flood-prone areas, improving fisheries habitat, reclaiming abandoned mine lands, rehabilitating burned areas, decommissioning unnecessary roads, and improving air quality. Because Forest Service policy and the direction of many public agencies have shifted to a regional

scale or watershed focus, the Forest Service actively participates in collaborative efforts using a watershed approach with the public, state and local governments, Tribes, other Federal agencies, and the private sector.

The Watershed Conditions Management program supports a number of key initiatives, including: (1) the Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management and (2) the Interdepartmental Abandoned Mine Lands Hazardous Substance and Watershed Cleanup Initiatives. Increased emphasis on watershed restoration and enhancement agreements and the agency's challenge cost-share partnership program encourage direct public involvement in managing natural resources across land ownership boundaries. Fore example, watershed restoration work improved a municipal water source and cold water fisheries by coordinating the planting of riparian habitat, installing wildlife and grazing exclosures, installing erosion control structures and windbreaks, thinning to improve forest health, and increasing road maintenance on both private and Federal lands. Similarly in western Oregon, the Forest Service, three private landowners, a local school district, and a local community watershed festival worked together to improve Coho salmon habitat by fencing meadows, reducing erosion, and monitoring water quality.

The Watershed Conditions Management program focuses on five areas: soil resource management, watershed improvement, hydrology and water quality, water rights and uses, and riparian and wetlands.

Soil resource management—This program area is designed to ensure that soil quality is maintained at or above levels that occur in undisturbed soils, so as to sustain forest, grassland, and watershed health and productivity. Soil quality refers to a soil's inherent or "natural" capacity. Natural capacity of soil is influenced by the amount of annual erosion, the ability of the soil to conduct air and water, and the amount of organic matter cycling through the upper soil horizons. Soil is the foundation of ecological processes and sustainability. Alterations in soil qualities can drastically change terrestrial and aquatic plant communities and their associated fauna. Therefore, maintaining soil quality is fundamental to protecting hydrologic function, water quality, and watershed productivity. Soil resource management is accomplished through integrated inventory, monitoring, development of field guides and interpretive models, standards and guidelines for management activities, and identification of improvement actions needed for implementing land and resource management plans.

Watershed improvement—For a variety of reasons, many watersheds are not in a healthy condition and thus are producing goods and services below their potential. Field estimates show that about one-third of National Forest System watersheds are in good condition, with about two-thirds at risk or needing improvement. As treatments take effect over several years, watershed health and function are improved. Focusing work in priority watersheds in partnership with other state, Federal, tribal, and nongovernmental partners is simply good business. Watershed improvement treatments are designed to improve or restore watershed conditions and maintain treatments implemented in previous years. They work within a watershed and ecosystem context to speed restoration of entire watershed systems rather than treating isolated symptoms. The watershed improvement program surveys watersheds to identify problem areas and maintains an inventory of these needs. Treatment prescriptions are designed to improve these areas with highest priority given to watersheds that threaten downstream life and property, impair key riparian areas and wetlands, or injure threatened or endangered species and habitats. Treatment measures include reshaping gullied land and revegetating denuded and flood-prone areas, closing and modifying roads to reduce erosion and runoff, preventing loss of topsoil, fertilizing and/or ameliorating compacted soils, restoring riparian vegetation to shade waters, and filtering out sediments and other harmful materials. Some measures treat hazardous material sites and abandoned mines to prevent release of toxic materials and ensure Federal facilities comply with Federal law and regulation, including the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, the Clean Water Act of 1977, and amendments to the Safe Drinking Water Act of 1977.

Hydrology and water quality—These activities focus on using a watershed approach and adaptive management to ensure favorable conditions of water flow from national forests and grasslands, provide protection of water quality, improve watershed conditions, and ensure compliance with the Clean Water Act of 1977. Hydrology and water quality activities promote favorable conditions of water flow from the national forests; provide protection of water quality consistent with the purposes of the national forests; ensure compliance with the Clean Water Act; and improve watershed conditions and water quality degraded by past land management activities. The objective of these activities is to protect and maintain those watersheds currently functioning in a sustainable condition and to improve and restore those watersheds determined to be functioning at risk or in a malfunctioning condition. This is accomplished through (1) assessing hydrologic conditions, (2) developing management standards and guidelines, (3) identifying

ways to protect or improve stream channel integrity and/or the stability and productivity of uplands, (4) monitoring the implementation and effectiveness of practices and programs, and (5) prioritizing this work through land and resource management plans.

Water rights and uses—These activities provide the protection necessary to ensure sustained use of resources from, and on, National Forest System lands. Water rights and use activities contribute to maintaining multiple uses of National Forest System lands, ensuring long-term sustainability of natural resources. The Forest Service identifies and quantifies the amount of water needed for resource management, files for rights to this water under state law, and protects these rights in water-right adjudications and administrative proceedings conducted by the states. In managing requests for water diversion, the Forest Services is responsible to include terms and conditions that will minimize damage to scenic and aesthetic values, fish and wildlife habitat, other resources, and the environment.

Riparian and wetlands—While the Forest Service manages about 192 million acres of forests and grasslands, only about 5 percent of these areas are riparian areas or wetlands. Although limited in size, these areas integrate and reflect the consequences of activities occurring on contributing watersheds. Riparian areas and wetlands have many special capabilities, functions, and values: (1) they are commonly the most productive areas in the watershed; (2) they store and slowly release floodwaters; (3) they provide habitat for a wide range of plant and animal species; (4) they filter sediment and chemical runoff to protect water quality; and (5) they shade and cool streams to help fish and insects thrive. Livestock grazing, transportation facilities, timber harvesting, intense recreation, and mining for gold, silver, and gravels have heavily affected riparian areas and wetlands. Only about half of these areas currently meet standards and guidelines of land and resource management plans. Restoration of riparian areas and wetlands is very important, and many programs work toward that end. Nearly half the work in the watershed improvement program takes place in riparian areas and wetlands. Many range management activities also work to improve these areas. Much wildlife habitat improvement and all fisheries habitat improvement occur in riparian areas and wetlands. A portion of recreation management is designed to limit impacts to streambanks and lakeshores. Modification of road location and maintenance are decreasing impacts on these areas. The Forest Service works closely with the Environmental Protection Agency's Wetlands Division and the U.S. Army Corps of Engineers in managing wetlands. It also has a strong partnership with the Bureau of Land Management, fielding a jointly staffed National Riparian Service Team.

Rangeland vegetation management

Rangeland management activities are concerned with healthy, diverse, and resilient rangeland ecosystems. They also include protection and improvement activities within riparian systems. Approximately 93 million acres (almost half) of National Forest System lands are classified as rangelands. Through their restoration and protection it is possible to maintain robust riparian and upland systems, a variety of ecological conditions, and associated biodiversity. Significant portions of the nonrangelands are also managed for rangeland values. In total, this represents a majority of National Forest System lands. Health management activities on these rangelands include managing for conditions prescribed in land and resource management plans and refined in project decisions. Rangeland vegetation management requires inventory, analysis, planning, project implementation and management, and monitoring. Inventories for a given project area gather essential information on current resource conditions. Analysis of inventory data provides an assessment of existing conditions compared to potential for the site. Planning determines objectives for the site and how to best achieve them. Finally, monitoring measures the success of management practices and identifies needed adjustments to management strategies.

Improving rangeland vegetation is essential to maintaining healthy, resilient, and productive rangeland ecosystems, including the protecting and improving riparian systems. Management practices include activities that physically manipulate rangelands and existing vegetation (e.g., grass stand improvements, prescribed burning, and the installation of structural and nonstructural rangeland improvements). These practices serve to maintain and enhance rangelands to meet desired conditions; provide continuing rangeland products and sustainable habitat for livestock and wildlife; maintain and improve rangeland forage conditions; and contribute to multiple ecological objectives such as improving soil stability and water quality, and protecting watersheds.

Rangeland improvement includes maintaining or enhancing existing understory and grassland vegetation through better livestock management and use of livestock grazing as tool for vegetation management. Conducting baseline inventories and analyses of rangeland conditions and understanding how livestock and wildlife use these lands is essential to proper management of rangeland resources. Monitoring use and improvements on rangeland, and managing associated

data has also become a significant and time-consuming function. These data are used to develop management plans for rangelands that are approved through NEPA decision documents.

The National Forest System is home to large numbers of wild horses and burros. Wild horse and burro management is provided through territory management plans that prescribe desired herd population levels. These levels are determined by habitat requirements and available forage within the territories. Livestock grazing permits, wildlife, and other rangelands uses are considered in setting desired population levels. Managers inventory and monitor resource conditions in wild horse and burro territories, as with other rangelands. With close cooperation of the USDI Bureau of Land Management, authorized personnel remove excess animals, which become available for adoption.

The Rangeland Vegetation Management program also improves rangeland vegetation by managing wild horse and burro populations. Structural or non-structural improvements made to or placed on rangelands are designed to improve watershed conditions, to enhance water quality, to protect soils from erosion, and to improve the forage base and general habitat for wildlife and livestock. The effectiveness of these projects is assessed through intensive monitoring programs established in land and resource management plans, project NEPA-based decisions, biological opinions, and court mandates. Monitoring represents a significant portion of the on-the-ground work performed to improve rangeland vegetation.

Forestland vegetation management

The Forestland Vegetation Management program responds to Forest Service strategic plan goals and objectives regarding ecosystem health, multiple-use benefits, and scientific and technical assistance. This program includes activities that protect and restore forests on National Forest System lands. Thus, this program provides for maintenance, enhancement, and/or restoration of National Forest System forest ecosystems to desired conditions. Vegetative resources are managed to improve wildlife habitat, reduce woody fuels (to diminish fire risk), recover value after natural disasters (while preparing sites for regeneration), and combat insect infestations and disease to improve forest health. Perpetuating forest land health also requires maintenance of productive soils and high water quality, and prevention and control of noxious weed invasion and spread.

Vegetative treatments and timber sales are useful management tools for implementing land and resource management plan objectives and restoring, maintaining, and improving forest ecosystems. Ecosystem conservation projects include timber sales designed for stewardship purposes, which enhance forest ecosystem integrity. Such sales are an effective management approach to reduce fuel accumulations, enhance wildlife habitat, and reduce impacts of pests and disease. Silvicultural prescriptions for these vegetative treatments attempt to approximate locally common natural disturbances, improve forest health and productivity, maintain soil productivity, and improve wildlife habitat.

Reforestation and stand improvements are directed toward obtaining adequate stocking on forest lands and maintaining a level of timber productivity sufficient for sustained yield management of National Forest System lands. They aim to increase growth rate and product quality of timber growing on national forests to levels consistent with environmental quality, multiple use objectives, and social and economic benefits and costs. The Forestland Vegetation Management program is financed with appropriated funds, Reforestation Trust funds, and Knutson-Vandenberg funds. Appropriated funds are used to reforest harvested areas, areas damaged by fire, insects, or disease, and unsuccessful plantations. These funds are also used to release planted trees from competing vegetation or overcrowding. 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 financed by appropriated funds. Knutson-Vandenberg funds and Reforestation Trust funds are used to purchase seedlings for reforesting timber sale areas. Seedlings planted on all other areas, such as areas burned by wildfires, are purchased with funds from the National Forest System appropriation.

Reforestation Trust Fund—Reforestation is accomplished through planting, seeding, and site preparation to encourage natural regeneration. These activities are essential to maintaining healthy and resilient forest ecosystems, promoting ecosystem conservation, and maintaining timber productivity. Prompt reforestation guarantees that forest vegetation is regenerated after timber harvest or disturbances, to meet land and resource management plan objectives. It is highly desirable to annually reforest an amount of land equal to the annual amount of new lands in need of reforestation; this protects those lands and restores their productive capacity. Reforestation is financed through appropriated funds and the Reforestation Trust Fund. The Fund was established by the Recreational Boating Safety and Facilities Improvement Act of 1980 to reduce the

backlog of reforestation and timber stand improvement needs on the National Forest System

Timber stand improvement—The objective of the timber stand improvement is to increase timber growth or product quality by thinning, removing excess trees, removing competing vegetation, and fertilizing stands at desirable levels. Improvements include release treatments, precommercial thinning, pruning, and weeding, all of which promote forest health and tree vigor, and ensure a sustained supply of wood products from national forests. Release treatments remove competing vegetation to promote high levels of growth and vigor in the remaining stand. Precommercial thinning regulates stand density, reduces standing fuels, modifies species composition, and alters stand structure to meet numerous resource management objectives. Pruning removes fuel ladders and helps improve timber product quality by increasing the amount of clear, sound wood. Fertilization maintains or improves soil productivity and promotes sustained tree growth and vigor. Because most timber stand improvements treatments are important for maintaining sustainable levels of timber production, they are primarily applied to lands classified as suitable for timber production.

Forest health—Forest health programs are concerned with restoring and maintaining desired forest land vegetation conditions by reducing risks associated with wildfires, insect infestations, and disease. In addition, programs provide continued management of vegetation growing on the national forests. Management of forestland vegetation is critical for improving wildlife habitat; reducing fuels; achieving desired forestland objectives that enhance forest structure, function, and condition; preparing sites for regeneration; and improving forest stands. One way the Forest Service meets these vegetation management needs is through timber sales. Other methods include reforestation and timber sale improvements accomplished through service contracts or by Forest Service employees. Many of these activities can also provide wood for American consumers, jobs and income to local communities, and other forest products in demand.

Nursery and tree improvement—The purpose of the nursery and tree improvement program is to improve the genetic quality of seed planting stock used on National Forest System lands by producing high quality planting stock in appropriate numbers and species for timely reforestation. The Forest Service operates six nurseries for seedlings and seed extraction, which is supplemented by contracts with state and private nurseries. Genetic resource improvements make valuable contributions to forest health by (1) identifying and conserving important genetic traits that control resistance to major pests; (2) providing baseline genetic information for forest management activities using genetic test plantations and laboratory studies; (3) producing adequate quantities of improved seed to meet demand; and (4) incorporating genetic principles into silvicultural treatment prescriptions and forest and land management planning efforts. This program not only improves the genetic quality of reforestation stock, but is also used to ascertain the biological diversity of forest tree and native plant species. Seed collection zones and/or breeding zones have been established to ensure use of locally adapted seed. Intensive tree improvement programs (using tree selection, seed orchards, progeny testing, and selective breeding techniques) are maintained for targeted species, resulting in growth and yield improvements of 5 to 10 percent.

Noxious weeds

Noxious weed are widespread in the United States and affect many resources both on and off of Federal lands. Wilderness, wildlife, forage, visual quality, reforestation, recreation opportunities, and lands values are all affected. The 1990 Farm Bill amended the Federal Noxious Weed Act of 1974. The amendment requires Federal agencies to establish integrated management systems and to complete and implement cooperative agreements with state agencies to control noxious weeds. In response, the Forest Service has cooperated with the U.S. Department of Agriculture in developing departmental and agency strategies for noxious weed management and has substantially strengthened noxious weeds management direction to field units. Priority is given to treatment of noxious weeds on National Forest System lands in conjunction with similar efforts by weed control districts on adjacent lands.

Air quality

These activities focus on protecting sensitive areas from effects of air pollution and providing mitigation measures for management activities. The Clean Air Act of 1955 specifically charges the Forest Service with preventing adverse effects of air pollution in 88 wilderness areas. Therefore, the Air Quality program operates a national monitoring network for air quality related values, which include visibility, aerosol sampling, lake and stream chemistry, deposition, vegetation damage plots, and meteorological conditions. This information provides the basis for agency responses to hundreds of applications annually for private sector development, particularly in energy related industries. The agency

makes recommendations to State air regulators where further mitigation is needed to prevent adverse effects of air pollution in wilderness. Forest Service air resource managers represent the agency on regional, multistate planning groups and the Environmental Protection Agency to address regional haze and other air pollution effects across the country. In addition, Forest Service air resource managers provide expert recommendations on mitigation measures to reduce air pollution from agency actions. This involves working with fire and aviation managers on implementing smoke management programs to prevent air pollution problems. It also includes analysis of effects of oil and gas leasing, mining, road dust, and vehicular traffic (as in ski areas).

Climate and weather—This support function focuses on weather and climate data collection and distribution of this information internally to the wildland fire management program and cooperators, including the National Weather Service and state agencies. The program provides for spot weather forecasts, flash flood warnings, drought preparedness and mitigation, and agricultural commodities projections. Data, products, and expertise used for ecosystem management, watershed management, and fire management, especially fire suppression and presuppression activities, originate from the agency's national Weather Information Management System. The weather program also manages the training of personnel and the weather station operation and maintenance, data acquisition, storage, and distribution of more than 600 remote, automated weather stations located on national forests and grasslands.

Emergency burned area rehabilitation—After wildfires, Burned Area Emergency Rehabilitation (BAER) activities help minimize unacceptable threats to life and property and/or levels of erosion, loss of soil productivity, deterioration of water quality and downstream damage, changes to ecosystem structure and function, and degradation of critical cultural and natural resources. The level of BAER operations varies widely from year to year, depending on the severity and location of wildfires. This support function utilizes emergency funding authority, collaborating with the wildland fire management program in emergency watershed restoration planning and subsequent activities to revegetate burned watersheds, curtail damaging runoff, and stabilize soils and ecosystems damaged by wildfire.

Environmental compliance and protection

These activities focus on cleanup of hazardous substances and wastes at Forest Service managed facilities and may include some abandoned mine sites. Environmental Compliance and Protection activities focus on an increased awareness of the importance of environmental legal requirements and the part they play in maintaining national forests and grasslands. Formerly called the "Hazardous Materials Management" program, Environmental Compliance and Protection activities cover water and waste water facilities, compliance auditing, environmental emergencies, cleanup of hazardous substances and wastes at facilities and abandoned or inactive mines, including restoration of natural resources at these sites. These activities protect and enhance the environment with functional, safe, and environmentally sound systems and facilities through a comprehensive self-evaluation and environmental management system for achieving, maintaining, and monitoring compliance with environmental laws and regulations.

Mine land restoration activities include reclaiming abandoned mines that are causing environmental damages or posing health risks. This program plans, designs, implements, monitors, operates, and maintains rehabilitation measures at abandoned mines that threaten noncompliance with state water quality standards, release of hazardous materials, and safety hazards such as open shafts. Restoration activities support the Interdepartmental Abandoned Mine Lands Hazardous Substance and Watershed Cleanup Initiatives. This initiative aims to coordinate efforts of Federal land managers and private landowners to efficiently and comprehensively address priority watersheds within states, rather than treating individual sites scattered throughout the country. The initiative focuses on mines where owners or responsible parties cannot be identified, located, or are unable to pay cleanup costs. This program covers both coal and hard rock mines. Activities also involve restoration of active mines and coordination of an interagency team that focuses on all aspects of ecosystem restoration, including research, development, and technology transfer.

Grazing Management

Grazing management is one of many uses of rangelands, a use that also includes production of forage for wildlife and livestock. The Grazing Management program emphasizes (1) inspecting management activities on active allotments, (2) restoring ecosystems and watersheds affected by past livestock grazing, (3) maintaining ecosystems and watersheds in a healthy condition, (4) creating NEPA-based allotment management plans, (5) monitoring the implementation of allotment plans, and (6) providing expertise for sustainable rangeland management. Livestock grazing is also used as a tool to

implement the objectives of land and resource management plans through specific projects.

Livestock grazing is managed under permit, where the number of animals, type and class of animals, and season of use are delineated on the term grazing permit. Taken together, this information provides the permittee and the Forest Service with a measure of the amount of forage that is under permit. Forage under permit is measured in terms of amount of vegetative material a 1,000-pound cow or its equivalent can consume in one month. This number is characterized as a standard animal unit month or AUM. The AUM concept also applies to other types of animals, such as horses, burros, bison, and sheep. The Forest Service produces over 8 million AUMs annually.

Substantial analysis and decisionmaking precedes issuance of grazing permits. The Forest Service plans for rangeland health and ecosystem conservation on grazing allotments through a process compliant with environmental laws as provided in the Rescissions Act of 1995. The Rescissions Act instructs the Forest Service to establish and implement a time schedule such that analyses and decisions as required by the National Environmental Policy Act of 1969 are completed for all allotments within the National Forest System. In response to this Act, a schedule of analyses and decisions was developed for the 15-year period starting in 1996 and ending in 2010. Analyses and decisions have been made on about one-third of the nearly 7,000 grazing allotments needing environmental analyses and decisions. Following decisions on livestock grazing allotments, an allotment management plan (AMP) is written to implement the decision through management practices. Term grazing permits are issued pursuant to the AMP, complete with explicit annual operating instructions to the permittee. Adherence to these instructions is monitored on a regular basis to assure compliance with the terms and conditions of the permit, AMP, land and resource management plan requirements, environmental laws, and court mandates.

Grazing permits are managed to assure that allotments are administered to "standard." This is accomplished by annually verifying that grazing activities are compatible with standards and guidelines found in land and resource management plans, allotment management plans, annual operating instructions, grazing permits or agreements, and other relevant documents (e.g., biological opinions and evaluations pursuant to the Endangered Species Act). A grazing allotment is deemed "administered to standard" when agency personnel document that activities are consistent with those standards and guidelines.

Lands

The Lands program deals with the rights of real property, which include the right to own, use, sell, exchange, and lease land. The role of the Lands program is to utilize these realty activities to enhance the National Forest System by assisting individual national forests and grasslands in meeting their land and resource

management plan objectives. The Lands program consists of two major classes of activities: land acquisition and land ownership management.

Land acquisition

During establishment and reservation of the National Forest System beginning in the 1890s, national forest boundaries were sometimes uneven and incorporated blocks of non-Federal land. The resulting ownership pattern, involving 40 million acres of non-Federal land within national forest boundaries, created management problems, inefficiencies, and increased costs for both the Federal and non-Federal landowners. In some cases, private inholdings contain highly valuable natural resource lands, particularly water sources and streams. Such inholdings often create opportunities to improve management through consolidation of land ownership for both the Forest Service and the non-Federal parties involved.

The land acquisition program focuses on enhancing and protecting the National Forest System for future generations. Through this program, the Forest Service acquires lands or interest in lands, as additions to the National Forest System for outdoor recreation, conservation of wildlife and threatened and endangered species habitat, protection of significant cultural resources, acquisition of wetland and riparian areas, and protection of rare ecological areas that promote biological diversity. Many of the acquired lands are located in congressionally designated areas such as wilderness, national recreation areas, wild and scenic rivers, and national scenic trails. Acquisitions also improve forest management through consolidating boundaries and providing public access to existing national forest and grasslands.

Acquisitions are made under authorities in the Weeks Act of 1911, the Wilderness Act of 1964, the Department of Agriculture Organic Act of 1956, the Wild and Scenic Rivers Act of 1968, the National Trails System Act of 1968, the Endangered Species Act of 1973, the Eastern Wilderness Act of 1975, and other special acts. The Land and Water Conservation Fund Act of 1964 (L&WCF) provides funding for acquisition of recreational lands and interests. Lands and interest in lands are acquired in a variety of ways.

Land purchase—This activity involves the acquisition of lands or interest in lands through direct purchase. Land purchase funds are used for the actual payment of the market value of the acquired lands. They are also used for making cash payments to equalize values in land exchanges when the lands being acquired through exchange would qualify for purchase using L&WCF dollars.

Donations—The acquisition program also includes the processing land donations. The Forest Service encourages and accepts donations of land or interests therein to consolidate national forests, improve resource management, and obtain lands needed for research or administrative purposes. A number of acts authorize the Forest Service to accept donations of land or interest in land. The Acceptance of Gifts Act of 1978 is the most commonly used authority to accept gifts of land.

Land exchanges—Many times voluntary land exchanges are the only tool that allows the Forest Service to obtain specific lands and values from a private owner who is only willing to offer the land if property is obtained in return. The land exchange program involves equal-value exchange of land between the National Forest System and other ownerships under authority of the General Exchange Act of 1922, the Weeks Act of 1911, and several special acts. The land exchange program complements the land acquisition program and focuses on reducing costs of protection and administration, and resolving 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" land ownership patterns resulting from earlier land grants. Exchanges are a means of solving problems caused by fragmented ownership. Many exchanges help communities by exchanging isolated tracts of non-Federal land for Federal land adjacent to expanding communities. Exchanges must be based on equal land values and need to demonstrate an overall public benefit considering factors such as fish and wildlife habitats, cultural resources, watersheds, wilderness and aesthetic values, enhancement of recreation opportunities, public access, and logical and efficient management.

Interchanges—Land interchanges entail the transfer of jurisdiction of Federal lands or interest therein between Federal agencies. The Forest Service has ongoing authority for such interchanges only with the U.S. Department of Defense, under the Interchange with Department of Defense Act of 1956. Specific legislation is required to authorize interchanges with other Federal entities. Interchanges are made to improve land ownership patterns, simplify management, reduce costs, and improve service to the public.

Land Sales—The agency has limited authority to sell or convey Federal lands. These authorities are applicable as means of resolving innocent encroachments and to make lands available to local governmental entities for

community or school purposes. These conveyances can be processed under the Small Tracts Act of 1983, the Townsite Act of 1958, and the Education Land Grant Act of 2000.

Rights-of-way acquisition—The Forest Service estimates that over 17 million acres, approximately 9 percent of all National Forest System lands, have inadequate public access. Securing needed public access would involve the acquisition of approximately 28,000 road and trail rights-of-way, covering approximately 7,500 miles. The Forest Service maintains an ongoing program to acquire public access to existing National Forest System lands. On average 320 rights-of-way cases are secured annually. The Forest Service resolves access cases by acquiring easements for roads and trails, consolidating ownership through land exchanges and purchases, and working with local public road authorities to validate existing outstanding access rights. When negotiations fail, the Forest Service may request the use of eminent domain (i.e., the power to take private property for public use) as a "last resort" to acquire a needed right-of-way.

Land ownership management

The 192 million acres of national forests and grasslands over which the Forest Service has responsibility is equal to over 12 percent of the contiguous United States. Protecting these lands through legally defensible land status and boundaries is a fundamental responsibility or ownership. Land ownership management includes a number of major activities that are important to National Forest System stewardship responsibilities: special uses; land ownership adjustment and boundary management; land ownership status; claims, encroachments, and trespass resolution; hydropower relicensing; and mapping.

Special uses—More than a dozen Federal statutes provide the Forest Service with authority to authorize various uses and occupancies of National Forest System lands in a manner that adequately protects the health and productivity of the land. Special uses include all uses and occupancies of National Forest System lands, except those associated with grazing, minerals, and timber. Special uses are authorized by issuance of permits, leases, and easements, and most users are charged a fee based on the fair market value of the use. More than 46,000 "lands" special use authorizations exist throughout the National Forest System, authorizing more than 100 different types of use or occupancy. Easements, permits, and leases encumber approximately 9 million acres of National Forest System land and generate annual land use rental fees. Uses and authorizations include those associated with the statutory right to use and occupy National Forest System lands, such as the right of access to non-Federal lands or interests, and the right to occupy National Forest System lands within certain water development facilities. Other special uses include public and private roads and highways, major communication uses, utility transmission lines (power lines, oil and gas pipelines), hydroelectric projects, and recreation residences. Many of these uses are essential to supplying goods and services to individuals and major markets, particularly in the western United States. Managing special uses involves applications, environmental analysis of applications, inspecting for compliance, and dealing with backlogs of new applications and expired authorizations.

Boundary management—Proper location and marking of national forest boundaries is fundamental to proper land stewardship. Boundary management for National Forest System lands involves locating and identifying the land or interest in land on the ground. It is prerequisite to any land and resource management activity occurring on National Forest System lands, and is especially critical to any activity occurring near or adjacent to the boundary lines of the Federal estate. The boundary management activity also provides needed technical support to the land status, title claims, and encroachment activities. Boundary management is done through: (1) perpetuating the public land survey system on National Forest System lands, (2) resurveying and marking boundary lines, (3) reestablishing lost or obliterated corners, (4) maintaining boundary lines, and (5) collecting spatial information in support of geospatial activities.

Land ownership status—Of the 192 million acres of National Forest System lands, 29 million acres have been acquired and the remaining 163 million were reserved from the public domain as provided by the Organic Administration Act of 1897. Ensuring the legal status of National Forest System lands is essential; effective land stewardship and management begins with protecting and maintaining the legal title. The land ownership status activity provides the foundation for other land conservation and special use activities, as well as clear ownership records and planning for acquisition of lands. Actively maintaining the land ownership records involves updating spatial and case files to note changes in ownership, along with posting boundary modifications, encumbrances, and use restrictions. Additionally, land ownership status activities monitor land use for compliance with reservations, outstanding rights, mineral withdrawals, other conditions of title, and laws that direct or affect land management. The program also

deals with resolution of land title claims and planning for land ownership adjustments.

Claims, encroachments, and trespass—The objectives of this program are to maintain land title records and defend National Forest System lands from encroachments and title claims. Dispute resolution involves defending against title claims and Indian treaty claims, removing encroachments, or conveying land titles. There are over 55,000 known or potential title claim cases resulting from overlapping ownership between Forest Service and private lands; less than one percent of these cases are resolved each year. With development of geographic information system (GIS) capabilities, there exists significant potential for "electronic encroachment." Electronic encroachment occurs because inaccurate or unreliable electronic land ownership records corrupt land ownership patterns in GIS applications. The Forest Service is implementing the "automated land project" to resolve and eliminate GIS-based electronic encroachments.

Hydropower—Hydroelectric power generation is a very specialized area of the overall special use program. The Forest Service has authority to place restrictions on licenses issued by the Federal Energy Regulatory Commission (FERC) to adequately protect National Forest System lands and resources from potential changes in the management and use of an area. The Forest Service works cooperatively with FERC in developing these restrictions when reviewing new proposals for development and relicensing existing projects. The Forest Service completes a detailed review of the proposal, including proposal alternatives and environmental impacts. Authorizations are not granted until the review process is completed and the Forest Service is satisfied the proposal is within the management guidelines and environmental impacts can be mitigated.

Mapping—The Geospatial Technical Center produces primary base series maps. These maps are essential in generating derivative products such as forest plan maps, wilderness maps, recreation maps, and habitat maps used by National Forest System staff. The mapping program involves National Forest System lands, showing the terrain, developments, and composition and extent of vegetation or other resources. Primary base maps for 7-½ minute quadrangles are prepared and revised periodically in cooperation with the USDI Geological Survey. The Forest Service prepares secondary base maps covering complete national forests for administrative and forest visitor uses. Project maps and special purpose maps are produced for use in designing developments such as roads, recreation areas, timber sale layouts, and logging plans.

Minerals and Geology Management

The Minerals and Geology Management program seeks to manage the vast and diverse mineral resources within the National Forest System in a manner that contributes to the multiple use management of mineral resources, sustainable ecosystems, and healthy watersheds. Commitment to sustainable development principles necessitates integration of environmental, economic, and social policies and development strategies. Mineral and energy resources are integral components of economic systems, provide essential input to virtually every economic sector, and act as the driving force for some local and regional economies. The program emphasizes inspecting and monitoring active operations; restoring ecosystems and watersheds affected by past mining; providing expertise for sustainable forest management, watershed health, and public safety; contributing toward community and economic resiliency; and managing significant geologic resources. Programs emphasize minerals management and geology management.

Minerals 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 and have substantial potential for oil, gas, geothermal, uranium, phosphate, lead, gold, silver, sand and gravel, and many other minerals. The two largest coal mines in the United States are located on National Forest System lands, and much of the nation's phosphate, lead, and platinum-palladium production also comes from these lands. The value of energy and minerals from National Forest System lands exceeds $2 billion per year, and annual revenues to the Federal government exceed $146 million depending on commodity prices. These revenues are derived from annual lease rentals, royalties on production, bonus bids for competitive leases, and mineral sales. Revenues are in turn distributed to the states and counties, the Reclamation Fund, and the General Treasury.

The Minerals program manages approximately 6 million acres leased for oil and gas, coal, and geothermal energy; approximately 150,000 mining claims; about 3,000 bonded operations; and over 9,000 sales contracts and permits to produce mineral materials. In addition, over 1,000 new operations requiring NEPA analyses and documentation are processed each year, and about 20,000 operations are monitored and inspected to protect the environment.

The Forest Service's Minerals program develops procedures and requirements for mineral activities in

coordination with other resource values, other agencies, and the public. The program also involves authorization and administration of ancillary projects, such as roads and pipelines that are part of mineral development projects. 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.

All environmentally disturbing activities related to mineral and energy resources require developing reclamation plans, preparing and updating reclamation bonds, monitoring operations, and ensuring reclamation activities are implemented according to operating plans. Federal mineral and energy resources are categorized as leasable, locatable, and salable.

Leasable minerals—Under the Mineral Leasing Act of 1920, the Secretary of the Interior, through the Bureau of Land Management, issues permits or leases for prospecting and developing leasable minerals on National Forest System lands that were reserved from the public domain or acquired by certain land exchanges. These minerals include coal, oil, oil shale, natural gas, phosphate, sodium, asphalt, bitumen and bituminous rock, potassium, and sulphur. The Mineral Leasing Act for Acquired Lands of 1947 grants similar authority on acquired lands in the National Forest System. Regulation of surface coal mining operations and rehabilitation of mined areas are provided for in the Surface Mining Control and Reclamation Act of 1977. The Geothermal Steam Act of 1970 requires that geothermal leases on National Forest System lands be subject to conditions and approval by the Secretary of Agriculture to protect lands for the purposes for which they were withdrawn or acquired. The leasable minerals program involves: (1) processing lease applications and forwarding recommendations to the Bureau of Land Management; (2) determining terms and conditions to be included in plans of operation; (3) ensuring that activities comply with applicable laws and regulations; (4) ensuring coordination with surface resources and other land uses; (5) monitoring activities for compliance with an approved plan of operation, prospecting permit, and exploration license requirements; and (6) issuing and administering special use permits associated with leasable minerals.

Locatable minerals—Most National Forest System public domain lands are open to "location" of mining claims under the Mining Law of 1872. Mining claims may be located by citizens for all minerals that are not subject to disposal under leasing laws or the Mineral Materials Act of 1947. Locatable minerals include gold, silver, copper, lead, and zinc. Locatable mineral operations, such as exploration or production, are subject to Forest Service regulations requiring 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. Adequate reclamation bonding shall be ensured, as well as periodic reviews to make sure bonding levels can adequately cover the complete cost of reclamation. The Locatable Minerals program involves: (1) ensuring compliance with the Mining Law of 1872; (2) ensuring coordination with surface resources

and other land uses; (3) processing plans of operation; (4) monitoring mining activities for compliance with approved plans; (5) examining the validity of mining claims; and (6) evaluating the reasonableness of surface uses and proposed plans of operation through surface use determinations, when necessary.

Salable minerals—The Secretary of Agriculture has 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 stems from the Mineral Materials Act of 1947, the Transfer Act of 1960, 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 salable minerals program involves: (1) complying with laws and regulations; (2) administering sale and free-use disposals; (3) reporting production and value of materials; (4) inventorying the mineral materials resource; (5) conducting appraisals; (6) developing and implementing mineral material management plans and site development plans; (7) ensuring coordination with surface resources and other land uses; and (8) monitoring operations, including reclamation applicable to all disturbing activities.

Geology 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.

Resource geology—The Geology program: (1) provides geologic support personnel to gather, interpret, and present information about geologic conditions and mineral resources for resource evaluation and land management planning; (2) gathers, interprets, and reports geologic factors that affect the design, construction, and maintenance of Forest Service facilities; and (3) gathers and interprets geologic information needed to develop and protect such resources as ground water, underground spaces, minerals, and fossils.

Abandoned mine lands—The Abandoned Mine Lands (AML) program is directed at reclamation of abandoned mines that are causing damage to the environment and/or posing risks to public health and safety. There are thousands of such mines on National Forest System lands. Because many AML sites involve a combination of Federal, state, and private lands, multiple parties must work together on prioritizing, funding, and cleaning up these mines. As a result, the Forest Service has partnered with Federal, state, and private parties on cleanup of numerous AML sites and has supported watershed-wide AML cleanup efforts that address all significant AML problems within a watershed, regardless of ownership. The Forest Service is also working with other Federal agencies and private parties to develop consistent programs, policies, and procedures for dealing with AML sites.

Paleontology—Paleontological resources are physical evidence of past life on earth and include vertebrate, invertebrate, and plant fossils. Of national significance, these resources need to be preserved for the inspiration and benefit of the people of the United States. The objective of the Paleontological Resources program is to protect and manage paleontological (fossil) resources because they are unique and part of natural resource heritage. Paleontological resources have multiple use values: (1) as a legacy for present and future generations; (2) for scientific knowledge, education, and interpretation; and (3) for recreational opportunities and their aesthetic qualities. Unless otherwise prohibited through law, regulation, order, land-use plan, or a physical closure, a special-use permit is not required for casual collecting of invertebrate and plant fossils for personal use. Collecting vertebrate fossils and significant invertebrate and plant fossils for scientific or educational purposes requires a special-use permit. Collecting any type of fossil specimen, in whole or in part, for commercial use is prohibited.

Forest Products

National Forest System lands are managed to provide a sustainable level of forest goods and services to meet public needs. The Forest Products program provides for timber production for public use while maintaining a system of administration for timber sale and stewardship contracts and permits. The Forest Products program attempts to (1) promote ecosystem health and conservation using a collaborative approach to sustain the nation's forests, rangelands, and watersheds and (2) provide a variety of uses, values, products, and services for present and future generations by managing within the capability of sustainable ecosystems.

Timber sales and stewardship contracts are important tools for accomplishing several vegetation management objectives on National Forest System lands. They can improve wildlife habitat; reduce fuels that pose unacceptable fire risk; recover timber value following natural disasters while preparing those sites for regeneration;

combat insect infestations and disease to improve forest health; and improve tree growth to produce desirable timber products in the future. Special forest product sales (discussed later) are included in this program component. The Forest Products program also provides employment opportunities for sustaining local communities and produces a host of special forest products desired by the public.

The project process

Forest product projects cannot occur on short notice. They require an orderly process that can take up to eight years to complete required planning, including complying with the National Environmental Policy Act and other laws; providing access through road construction or reconstruction; coordinating with the management of other resources; preparing on-the-ground aspects of the projects; preparing contracts; advertising and awarding projects; and administering contracts.

Where the purpose of a project is primarily to produce desired forest products, all activities for planning, preparing, and administering the sale, including coordination with other resources, are treated as a Forest Products program responsibility. However, where the purpose of a project is primarily related to another land management objective (e.g., wildlife or fire), project planning (to where a decision results from environmental analysis) is treated as the responsibility of the program proposing the work. In all cases, forest road engineering support is a responsibility of the Roads Capital Improvement and Maintenance program. Main project activities include the: (1) silvicultural examination, (2) project preparation, (3) harvest administration, and (4) postsale treatments.

Silvicultural examination—Silvicultural examinations provide periodic review and analysis of forest stand conditions and prescribe stand treatments to meet land and resource management plan objectives. Examinations also supply information for monitoring and certifying silvicultural treatments to ensure timber resources are managed properly. This program gathers stand-level data, compiles and stores these data in stand files, and annually prepares an analysis and written prescription for about 5 million acres of forest land to ensure proper treatment. The Silvicultural Examination program provides information needed for planning the management of national forest timber resources. Forest stands are normally examined at 10-year intervals so that land managers can monitor changing stand conditions and treatment needs.

Project preparation—The process of implementing a vegetative treatment begins with identifying a need to do the work, ensuring the goals and objectives provided in the land and resource management plan can be accomplished in a cost-effective manner. From on-the-ground reconnaissance and other data, the Forest Service develops a position statement, which assesses the technical and economic feasibility of proceeding with a proposed project. A project area is tentatively identified and environmental analysis is started.

Project area design and planning occurs one to three years before the project is implemented. Intensive field investigation and collaboration with interested groups and individuals provide information used to formulate and analyze project alternatives. The agency collects and evaluates detailed information on stand conditions, silvicultural prescriptions, logging systems applications, transportation needs and road conditions, other resource conditions in the surrounding area, and planned treatments. Economic analyses showing economic results and tradeoffs are completed and rights-of-way easements are obtained. The responsible official determines the extent of environmental analysis and documentation required, conducts appropriate public involvement, coordinates with other agencies and organizations, and selects the preferred alternative.

The final project package is prepared two to three months before the timber sale or stewardship project is advertised. The contract, timber appraisal, advertisement or request for proposals, bid form, prospectus, and sale area or project map are completed. The bidding phase includes conducting an auction (sealed or oral bid) when determined appropriate, accepting bids, and determining the apparent successful bidder. The award phase includes reviewing bidder qualifications, obtaining equal employment opportunity clearance, completing a road option investigation and feasibility review (if applicable), identifying the qualified sale purchaser prior to award, signing the contract, and posting the sale information to the timber sale accounting system.

Some timber offerings are not sold. The Forest Service monitors unsold timber sales offered to determine if changes in project design or process are required to reduce the number of no-bid timber sales. No-bid timber sales are usually reoffered, and may be reworked to improve salability.

Important legislation affects project preparation. For example, the Organic Administration Act of 1897 initially authorized the sale of timber "at not less than appraised prices." The National Forest Management Act of 1976 added specific bidding requirements, guidelines for cutting methods, and limitations on allowable harvest volumes. Further authority for alternative methods of timber sales was included in the Timber Sales Bidding Act of 1978. 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.

Harvest administration—Harvest operations are monitored to make sure operations proceed and environmental impacts are avoided or minimized, both in accordance with the timber sale contract and permit specifications. Harvest administration also protects the government from theft, waste, fraud, and abuse. Administrative tasks include: (1) ensuring purchasers understand contract objectives and provisions; (2) approving purchaser activities and monitoring them for compliance with sale objectives and contract provisions; (3) enforcing environmental protection laws applicable to the contracts and purchaser's operations; (4) ensuring advance contract payments are adequate for the expected level of activity; (5) assuring all trees cut and removed from the sale area have been designated for removal; (6) measuring harvest volumes to determine purchaser payments; (7) monitoring and enforcing domestic manufacturing requirements for timber under the Forest Resource Conservation and Shortage Relief Act of 1990; (8) negotiating and resolving disputes concerning contract performance; and (9) preventing theft through investigation and cooperation with law enforcement personnel. Debarment (disqualification) and suspension of prospective timber purchasers are administrative actions taken to protect the public interest and ensure that the Forest Service solicits and considers bids for timber sales only from, and awards contracts only to, responsible businesses and individuals.

Postsale treatment—Postsale treatments include: (1) brush disposal, which is accomplished from 1 to 3 years following timber harvest using separate brush-disposal funds collected under the timber sale contract; (2) stand regeneration, which occurs 1 to 5 years after timber harvest and may include site preparation for natural regeneration or planting using nursery-grown tree stock; (3) stand improvements, such as thinning, weeding release, and pruning, which are generally applied from 1 to 10 years following timber harvest to improve the vigor and growth of the remaining stand; and (4) other sale area resource improvement activities approved in the governing environmental analysis. Stand regeneration, timber stand improvement, and other resource improvement activities are customarily accomplished within the timber sale area using Knutson-Vandenberg Fund deposits made from timber sale receipts, or, in other locations, using appropriated funds.

Timber salvage sales

The timber salvage sale program is designed for stand improvement, providing timely salvage of insect infested, dead, damaged, or down timber and associated trees. It is an essential part of the timber sales management program. The National Forest Management Act of 1976 established a permanent appropriation for timber salvage. All or a portion of receipts from timber salvage sales can be deposited in this account to finance future costs for salvage sale design, engineering and supervision of needed roads, sale preparation, and harvest administration. Some salvage sales are set aside for preferential award to business firms with 25 or fewer employees. The salvage sale program currently accounts for approximately half of timber sale volume.

Special forest products

In addition to sales of logs for sawtimber, a variety of special forest products (SFP) are sold each year, including posts, poles, fuel wood, cedar bolts for shingles, Christmas trees, mushrooms, beargrass, pinyon nuts, and ferns. There is a continuing public demand for these products, with over 100,000 permits issued for products valued at several million dollars. Gathering and use of SFP provide a variety of benefits to individuals and communities. Species used for SFP number in the hundreds and many have been collected and used for thousands of years. Commercial trade in products harvested from the wild has contributed to the economy of this country throughout its history. SFP support a variety of cottage industries in rural communities throughout the country. In the Pacific Northwest, ferns, tree boughs, and other plants have contributed to the commercial floral and Christmas greens industries for over 60 years. Sugar maple products in the Northeast are sold worldwide. SFP also provide critical cultural and subsistence benefits for many groups and individuals. Their nonmarket contributions to livelihoods include food, medicine, and decoratives for personal use and gift giving.

Stewardship pilots

The Forest Service launched the Stewardship Pilots initiative in 1996. Objectives encompass: (1) finding ways to implement needed vegetation treatments more effectively and efficiently; (2) demonstrating the role of vegetation management in proper resource stewardship; and (3) showing the role of ecosystem restoration and maintenance activities in helping to sustain rural communities. In FY 1999, the Omnibus Appropriations Act for Interior and Related Agencies provided authority to undertake up to 28 stewardship contracting pilot projects and obtained new business authorities and procedures that could be tested in connection with these projects. These new authorities included: (1) exchanging goods (such as timber that may be removed from a designated area) for services performed by a contractor (such as precommercial thinning or watershed, wildlife habitat, and recreation improvements), (2) awarding contracts on a "best value" basis (e.g., where a proposal would provide the best overall value in terms of total services received even though it may not have the lowest total bid price), (3) retaining and reinvesting receipts, and (4) increasing flexibility for using "designation by description" (e.g., where timber harvest goals are described in terms of type of tree (size, species, condition, etc.) to be cut or left, rather than marking individual trees for harvest). While all the stewardship pilots entail some timber harvesting, they are not traditional timber sales. Instead, they typically are multifaceted projects that encompass a broad range of resource management activities. More recent legislation clarified the intent of the original legislation and expanded the agency's stewardship pilot authority to encompass up to 28 more projects. The agency will continue working on the original pilot projects and begin to implement the new ones. All stewardship pilot projects are monitored and evaluated by representatives from the Forest Service, universities, forest industry, and the environmental community.

Recreation, Wilderness, and Heritage

Americans cherish the national forests and grasslands for the values they provide: clean water, clean air, natural scenic beauty, spiritual renewal, important natural resources, protection of rare species, majestic forests, wilderness, a connection with their history, and opportunities for unparalleled outdoor adventure. Recreation visitors desire a great deal from the Forest Service in terms of settings, experiences, facilities, and services, and they will expect even more in the future. Recreation is the fastest growing use on the national forests and grasslands.

As one of the multiple benefits, national forests and grasslands contribute a significant amount to the nation's economic well-being, a large share of it associated with outdoor recreation. Resource-based travel and tourism provide a window through which an increasingly urban society can enjoy and appreciate the natural world. The Forest Service has opportunity to open that window even wider to reflect changing demographic trends and visitor preferences.

To address increasing demands for recreation, the Forest Service developed the Recreation Agenda, which clarifies the role of national forests in meeting America's recreational needs while protecting the long-term integrity of natural and cultural resources. The Agenda is a framework for defining principles, processes, and priorities for the long-term, enabling decisionmakers to assure accountability of resources. The Agenda reflects the concerns and interests of public and private stakeholders, and concentrates on five key areas:

- Improve the settings for outdoor recreation;
- Improve visitor satisfaction with our facilities and services;
- Improve educational opportunities for the public about thevalues of conservation, land stewardship, and responsible recreation;
- Strengthen our relationships with private entities and volunteer based and nonprofit organizations; and
- Establish professionally managed partnerships and intergovernmental cooperative efforts.

Recreation

Recreation management provides and protects 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 demands for public outdoor recreation in natural settings. Private sector investments through concession permits, challenge cost-share projects, and other partnerships are used when appropriate. The Recreation program component includes administration and management of tourism and travel, partnerships, interpretive services, special uses management, congressionally designated areas, wild and scenic rivers, scenic byways, and scenery management.

Tourism and travel—Tourism is a valued activity on national forests and supplies access to National Forest System lands for a diverse mix of visitors. Tourism and recreation provide economic contributions equal to, if not greater than, traditional public land uses especially in gateway communities. Tourism differs from general recreation by offering visitors opportunities to participate in tours or other organized events rather than orchestrate their own visits. These tours are a valuable source of income to gateway communities. Travel and tourism services utilize existing networks of visitor information centers and state welcome centers. Services have been enhanced through the interagency National Recreation Reservation Service, which provides camping and cabin rentals for global users via a call center and Internet

booking service. The Forest Service also cooperates with state tourism offices and tourism professionals to develop existing and potential customers.

Partnerships—Delivering quality recreation products and services is based on effective capacity building. Capacity building means managing the recreation resource, utilizing all available tools and revenue streams to get the job done. Creating and nurturing partnerships is the cornerstone of the capacity building concept. Partners come from the private sector, community-based groups, nonprofit and other nongovernment organizations, individual volunteers, and other governmental agencies. Declining budgets were the genesis for interest in partnerships; however, as the workforce became proficient navigating in the partnership community, the real benefits became evident. Partnerships are the foundation for productive, sustained relationships that build knowledgeable, supportive constituencies and allow for joint collaboration to reach common goals. These relationships also enhance the variety and quality of services provided to the recreating public. As the agency's business paradigm moves away from dependence on appropriated funds, partnerships will play an increasingly stronger role in collaborative stewardship of the recreation resource.

Interpretive services—Interpretive Service programs provide the public with knowledge and understanding of conservation issues on public lands. Every year, about 10 million visitors use Interpretive Service programs when visiting national forests. Interpretive services play a key role in communicating with visitors, communities, and a variety of constituent groups. An overall objective of providing interpretive services is to enhance the public's participation in the decisionmaking process regarding natural and cultural resources on public lands. Interpretive service programs manage 57 major visitor centers, over 1,000 information centers, and tens of thousands of interpretive sites on National Forest System lands. A growing number of interpretive programs and facilities are now managed as interagency partnerships with Federal, state, and local organizations, including businesses. Continuing change in population demographics, scientific information, and patterns of recreational use require interpretive services to constantly upgrade its services and products. By using communication methods based in psychology and social sciences, interpretive programs forge emotional and intellectual connections between the visitor and natural heritage resources.

Special uses management—Management of recreation special uses is a major delivery system for outdoor recreation. The primary objectives of effective special uses management are to authorize uses that comply with forest plans, which serve the interest of the American people while providing protection of the natural resources, assuring compatibility with other uses, and ensuring fair market value is collected for the uses that occur on National Forest System lands. There are more than 24,000 recreation special use authorizations covering over 35 different types of activities that result in millions of dollars in annual fees to the United States. These concession operations and facilities include ski areas, lodges and resorts, and outfitter-guides, as well as many organization camps providing outdoor recreation experiences for millions of Americans. In many cases, these uses are essential to the supply of goods and services, not only to individuals, but to major market regions, particularly in the West.

In cooperation with the 135 ski area operators, national forests provide about 60 percent of downhill skiing opportunities in the United States to millions of people each year. And outfitting and guiding is a major tourism oriented industry, with big game hunting, white water river rafting, and guided trips making up the major portion of these permitted activities. Outfitter-guide operations account for over 5,000 permits of the more than 8,000 commercial concession operations.

Congressionally designated areas—The Forest Service manages about 60 legislatively established areas (national recreation areas, national scenic areas, and national monuments) totaling more than 9 million acres. These are areas set aside within the National Forest System and managed according to specific guidance established by Congress. Designated areas include such national treasures as the Winding Stair National Recreation Area in Oklahoma and Arkansas, the Sawtooth National Recreation Area in Idaho, the Mount Rogers National Recreation Area in Virginia, and Land Between the Lakes in Kentucky and Tennessee. These areas are critical to regional and local tourism programs and provide a wide array of outdoor recreational opportunities.

Wild and scenic rivers—The Wild and Scenic Rivers Act of 1968 established a process for identifying and protecting free flowing rivers. The system now includes 160 rivers and 11,294 miles of waterways, of which the Forest Service manages 97 rivers and 3,956 miles. The Forest Service's goals are to identify, protect, designate, and manage significant free flowing rivers in the national forests according to standards and guidelines identified in forest plans. Some rivers are jointly managed with one or more Federal or state agencies.

Scenic byways—The National Forest System contains 136 nationally designated scenic byways in 35 states totaling nearly 9,126 miles. These byways offer

recreational motorists a showcase of outstanding scenic beauty, interpretive and educational facilities, and scenic vista points. Vistas include the Edge of the Wilderness Scenic Byway on the Chippewa National Forest in Minnesota, the San Juan Skyway on the San Juan National Forest in Colorado, and the Santiam-McKenzie Pass Scenic Byway in Washington. Scenic byways offer great opportunities to tie national forests to local communities. Sightseeing is the fifth fastest growing recreation activity in the United States and has the third largest number of participants. Rural economies benefit from scenic byways by providing gateway tourism services to the visitors drawn to these attractions.

Scenery management—Beautiful landscapes constitute one of the primary reasons people choose to recreate on or live near National Forest System lands. However, the dynamic nature of forest and grassland ecosystems and the multiple use activities that occur within them have the potential to negatively or positively affect the scenery. Forest vegetation management requires conjunctive scenery management planning to sustain the scenic values over time. Also, vegetation management can be used in scenery management to reveal scenic vistas or to maintain or emphasize other aesthetic aspects of forest landscapes, which create attractive settings for recreation and tourism. In addition, many uses permitted on National Forest System lands, such as roads and highways, electrical transmission lines, and telecommunications sites require careful site location and mitigation measures to retain the scenic quality of the landscape. Even smaller scale activities, such as wildlife and fisheries habitat improvements, can adversely affect scenic quality if they are not well planned, located, and designed. Scenery management activities are necessary to maintain the wildland character, which forms the foundation of recreation and tourism attractions on National Forest System lands. The goal of scenery management is to create long-term, ecologically sustainable, scenic landscapes.

Wilderness

The Wilderness Act of 1964 established a National Wilderness Preservation System. The Forest Service is responsible for approximately one-third of the National Wilderness Preservation System, nearly 35 million acres, and administers almost two-thirds of the designated wilderness in the lower 48 states.

The Wilderness System provides a clean environment, habitat for fish and wildlife, scenic beauty, solitude, and economic benefits to gateway communities through tourism and recreation. Wilderness also offers unique opportunities to learn about relatively pristine ecological systems and the benefits people derive from being in these places. Wilderness provides for the health of all ecosystems, as a gene pool for rare and endangered plant and animal species, as a protection of geological resource value, as a unique repository for cultural resource values, and as a unique and irreplaceable "living laboratory" for medical and scientific research. And very importantly, wilderness includes the headwaters of rivers and water systems that many cities and rural communities depend upon. Wilderness contributes to local and regional economic development through livestock grazing, mining, irrigation (where previously designated), and tourism.

There is a strong heritage for wilderness in the Forest Service. The actions of Bob Marshall, Aldo Leopold, Arthur Carhart, and other conservation leaders echo through the agency and challenge its future. Forest Service regulations and policies dating to the 1920s predated the Wilderness Act by four decades. Today's wilderness managers face a very different world of options. The Forest Service, in cooperation with its partners, is forging new solutions to today's wilderness management issues.

Management of and planning for the National Wilderness Preservation System has brought an increased recognition of the challenges, issues, and concerns involving stewardship of these valuable wildlands. Wilderness administrative challenges include: (1) managing wilderness provisions for grazing, mining, and mineral exploration; (2) resolving fish stocking and wildlife management issues; (3) ensuring adequate access to wilderness users and private land owners; (4) determining disposition of human-made improvements and structures; (5) addressing research needs; (6) addressing potential impacts from adjacent development; (7) maintaining air quality standards; (8) expanding the role of fire as a natural process; (9) providing opportunities for solitude as directed by Congress; and (10) developing a strategy to deal with resource protection in wilderness.

An interagency approach to addressing wilderness issues and opportunities is chartered in "Wilderness Stewardship - A Strategic Plan." The Forest Service has taken the lead in establishing the interagency Arthur Carhart National Wilderness Training Center to "foster interagency excellence in wilderness stewardship by cultivating knowledgeable, skilled and capable wilderness managers and by improving public understanding of wilderness philosophy, values and processes."

The Forest Service's wilderness agenda "Thinking Like a Mountain" is the agency's approach to ensure an

enduring wilderness resource for present and future generations. The agenda is organized around six major areas: (1) education, training, and outreach; (2) wilderness inventory and monitoring; (3) information management; (4) priority resource issues; (5) program management and coordination; and (6) leadership.

Heritage resources

The Forest Service's heritage program responds to the National Historic Preservation Act of 1966, which directs Federal agencies to administer Federally owned or controlled prehistoric or historic resources in a spirit of stewardship. Stewardship involves survey, evaluation, and protection of the resource. As a result, the Forest Service is responsible for managing over 300,000 largely unstudied, heritage resources on the 192 million acres of National Forest System lands – more than one-fourth of all cultural resources identified nationwide. The heritage program also administers and implements policy derived from a variety of other Federal and local laws, regulations, standards, and guidelines. Because of these legal obligations, the heritage program plays a vital role in the mission, programs, and public service outputs of the Forest Service.

Professionals work to identify, conserve, and protect resources as diverse as historic buildings and structures, archaeological sites, rock art objects, and associated records and collections. The heritage program routinely:

- Assesses the value and evaluates the relative significance of heritage sites that have been identified;
- Assists over 400 Indian Tribes with sites of traditional uses and values;
- Inventories the National Forest System landscape for undiscovered resources because less than 10 percent of the lands have been examined;
- Oversees more than 3,000 properties in the National Register of Historic Places;
- Provides compliance input into about 10,000 Forest Service actions or projects annually regarding the potential impacts to significant heritage resources;
- Conducts public service efforts to foster involvement, partnerships, and education in heritage resources;
- Contributes to scientific understanding of the past through the analysis of archeological materials and features; and
- Provides environmental data from the past that contribute to ecological restoration and current issues like wildland fire and climate change.

Heritage resources hold clues to past ecosystems, add richness and depth to our landscapes, provide links to living traditions, and help transform a beautiful walk in

Indigenous petroglyph from the southwestern United States.

the woods into an unforgettable encounter with history. Because of the intrigue of archaeology and the past, the heritage program has a ready and willing public constituency. As society grows more urban and complex, people look for unique and authentic opportunities to experience the natural and cultural heritage of special places. 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 and Native Plants

National Forest Systems lands contain globally significant biological resources. More than 3,000 vertebrate and invertebrate species and more than 10,000 plant species occur on national forests and grasslands. Wildlife, fish, and native plants programs focus on providing healthy habitats for these species to maintain the diversity, viability, and productivity of plant and animal communities, thus providing for their survival, use, and enjoyment by current and future generations. This entails protecting and, where necessary, restoring the ecological integrity of biological communities and ecosystems.

This program enhances opportunities for consumptive, commercial, subsistence, and other beneficial uses of botanical, fish, and wildlife resources. These uses include hunting, fishing, and trapping. It also provides increased opportunities for nonconsumptive uses such as wildlife and wildflower viewing and photography, nature appreciation, and outdoor education related to the fish, wildlife, and botanical resources.

The National Forest System supplies important habitat for many plant, fish, and wildlife species. It is also key to the survival and recovery of many threatened or endangered species, including several orchid species, the grizzly bear, cutthroat trout, gray wolf, lynx, and red-cockaded woodpecker. National Forest System lands are globally significant in contributing to biological diversity, providing habitats for more than 400 Federally-listed threatened or endangered plant and animal species plus approximately 2,900 sensitive plant and animal species for which viability is a concern.

The goal of wildlife, fish, and botanical resources management on National Forest System lands is to maintain and restore ecological conditions so that lands can (1) support healthy, self-sustaining populations of all existing native and desired nonnative animal and plant species; and (2) provide appropriate habitat productivity for those species highly desired by the public, including deer, elk, wild turkey, trout, bass, and salmon. This goal is primarily accomplished through three mechanisms: (1) land use allocations, management standards and guidelines, monitoring requirements, and other decisions adopted in land and resource management plans; (2) design, implement, and monitor multiple-use management activities that involve and affect the habitat of plant and animal species; and (3) capital investments such as seeding, planting, prescribed burning, and aquatic habitat development. Many activities are conducted in cooperation with state wildlife and fish agencies, individuals, conservation groups, tribal governments, and other local, state, and national organizations. Formal partnerships have been developed with many organizations. The Wildlife and Fish Habitat Management and Native Plants program contains several components including: fisheries and aquatic biology; wildlife habitat management; threatened, endangered, and sensitive species; and botanical resources.

Fisheries and aquatic biology

Aquatic biodiversity on national forests and grasslands is globally significant because a large percentage of America's fish, freshwater mussels, crayfish, and aquatic insects live on national forest lands. National forests and grasslands contain over 200,000 miles of fishable streams, including over half the nation's premier trout and salmon habitat, and more than 2 million acres of lakes, ponds, and reservoirs. Ecological restoration, enhancement, protection, and monitoring of habitats that harbor inland, anadromous, catadromous, and marine fishes, and other aquatic life, are dominant features of the Aquatic Biology program.

An unmistakable product of healthy watersheds is the type and magnitude of fisheries they support. Pacific, Great Lakes, and Atlantic salmon spawned and reared in national forest waters contribute significantly to many local economies. Upwards of 200 million pounds of fish are harvested for commercial purposes each year, and an additional million pounds are harvested in traditional subsistence fisheries. Also, recreational anglers annually spend more than 46 million days fishing for inland and anadromous fish annually on national forests, which further contributes a total economic output of several billion dollars for tourism-related and associated retail expenditures in local economies. In support of public

Grizzly bears (*Ursus arctos horribilis*).

service, the Fisheries Program sponsors hundreds of "kids fishing days" and other aquatic education events.

Inland fish habitat—The Inland Fish Habitat program manages National Forest System *inland* watersheds to maintain the ecological sustainability of lakes and streams. This contributes to the viability of aquatic animal populations, including those important to recreational fishing. Riparian habitat is managed to support ecological processes that benefit inland fish habitat. Where needed, instream habitat improvements for aquatic structure include: installing artificial spawning reefs and fish shelters, creating sheltered pools in streams to increase fish holding capacity, and placing structures in streams to provide spawning and rearing habitat.

Anadromous fish habitat—This program operates anadromous watersheds in the National Forest System for the ecological sustainability of streams and connected lakes. This benefits the viability of aquatic animal populations, including salmon and steelhead populations important to commercial, sport, and subsistence fisheries. Riparian habitat is managed to support ecological processes that serve anadromous fish habitat. Projects associated with this program foster habitat capability for West Coast and Great Lakes salmon and steelhead, and Atlantic salmon in the East. Activities include removing fish barriers; providing fish passage at roads, diversions, or dams; installing stream habitat improvement structures; fertilizing lakes; and creating artificial spawning and rearing facilities.

Wildlife habitat management

National forests and grasslands support robust wildlife populations and contain over three-fourths of the elk, bighorn sheep, and mountain goat habitat in the lower 48 states. National forests and grasslands also contain 28 million acres of wild turkey habitat and over 5 million acres of wetlands, including nationally and internationally important habitat for waterfowl. Over 250 species of neotropical migratory songbirds utilize national forest and grassland habitats.

The Wildlife Habitat Management program has three main objectives: (1) protect, restore, and improve habitats to maintain healthy populations of all terrestrial wildlife (excluding threatened, endangered, and sensitive species, which are covered under another a separate program area); (2) improve habitats and provide opportunities for consumptive and commercial uses, including hunting and trapping; and (3) increase wildlife viewing

and appreciation opportunities. Habitat improvement activities comprise: prescribed burning to improve 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 to provide nesting and feeding areas for waterfowl, wading birds, and fur bearers. Enhanced user opportunities include: developing viewing areas and interpretive facilities; improving and acquiring hunter access; and supporting wildlife interpretive programs advocating conservation of natural resources, wildlife, and habitat.

"Get Wild" is the umbrella program for almost a dozen national-emphasis areas focused on partnerships; habitat restoration, improvement, and protection; along with public use and enjoyment. Hunters spend about 28 million days hunting on National Forest System lands. Nature viewing is a popular outdoor activity, and implementation of Nature Watch, a program to enhance viewing and photography opportunities, contributes more than 50 million annual user days on national forests and grasslands.

Habitat restoration, public education, and other projects that support the wildlife habitat management program are largely dependent on cost-share partnership programs. Partnerships (with organizations such as Rocky Mountain Elk Foundation, Ducks Unlimited, and National Wild Turkey Federation) are the key to success of the Get Wild program.

Threatened, endangered, and sensitive species

Over 400 listed threatened and endangered species use and depend on in national forest and grassland habitats, and the Forest Service has designated almost 3,000 additional species as "sensitive" because of concerns for their viability. The status and trends of such species are widely recognized as primary indicators of ecosystem health. Supplying appropriate ecological conditions for these species is crucial to meeting the agency's mission and its legal requirements to provide for plant and animal community diversity, species viability, and species conservation and recovery. Ecological conditions for "species at risk" and other focal species are managed to achieve recovery and conservation objectives. The most effective activities to accomplish these objectives include: (1) analysis of species management needs and adoption of appropriate land allocations, standards and guidelines, and other direction in land and resource management plans; (2) design of various multiple use management actions so that they contribute to species conservation, or minimize adverse impacts to habitat; (3) protection, restoration, and enhancement of habitat; and (4) monitoring and evaluation to determine the effectiveness of management direction. A wide variety of management activities are important to the recovery and conservation of threatened, endangered, and sensitive species on National Forest System lands. Habitat protection, prescribed burning, thinning, overstory removal, and other treatments are commonly needed and used.

Botanical resources

Botanical resources refer to native plants of all kinds. They include some sensitive and rare plants, some special purpose plants treated as special forest products, as well as many rangeland plant communities. In addition to the vital role they play in contributing to soil productivity and providing key habitat components for many animal species, native plants on National Forest System lands contribute significantly to biological diversity and are prized for their medicinal, genetic, aesthetic, and commercial value. Management of botanical resources entails a variety of habitat protection and restoration activities, including those taken to conserve threatened, endangered, and sensitive species of plants. Many of these activities are designed and implemented in partnership with other Federal and state agencies and nongovernmental organizations. "Celebrating Wildflowers" is a conservation education program that promotes the importance of conserving and managing native plants and their habitats while emphasizing the aesthetic, recreational, biological, medicinal, and economic values of wildflowers. Treatment of invasive and noxious weed species also is a crucial management activity on National Forest System lands and is increasingly recognized as essential for restoring and maintaining overall land health.

Partnerships with state agencies, nonprofit conservation and other organizations, and individuals, particularly through the challenge cost-share program, are essential to the cost-effective management of botanical resources, as well as enhancing the public's use and enjoyment of these resources on national forests and grasslands.

Administration and Organization

At the national level, a Deputy Chief for the National Forest System directs National Forest System programs. Responsibilities of this Deputy Chief and supporting headquarters staff comprise: 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:

Missoula, MT	Region 1	Northern Region
Lakewood, CO	Region 2	Rocky Mountain Region
Albuquerque, NM	Region 3	Southwestern Region
Ogden, UT	Region 4	Intermountain Region
Vallejo, CA	Region 5	Pacific Southwest Region
Portland, OR	Region 6	Pacific Northwest Region
Atlanta, GA	Region 8	Southern Region
Milwaukee, WI	Region 9	Eastern Region
Juneau, AK	Region 10	Alaska Region

On-the-ground resource management is conducted through a system of 155 national forests and 20 national grasslands, which contain more than 600 ranger districts. Management of National Forest System resources involves complex resource, economic, and social problems. Coping with these problems requires the Forest Service to employ people trained in a wide variety of fields such as forestry, range management, wildlife management, engineering, recreation, landscape architecture, social sciences, accounting, and personnel management.

Relationships

As one of the largest land management organizations in the world, the National Forest System has an extensive complex of national and international relationships.

Other Forest Service programs

Within the Forest Service, the National Forest System is closely coordinated with related programs in 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 vegetation management technology. National Forest System is a prime cooperator in fire protection, pest protection, and regional timber supply programs that involve state and private lands interspersed or adjacent to national forest lands. In addition, every regional forester and national forest supervisor represents and presents the State and Private Forestry program to cooperating states, local governments, Tribes, and private forest owners. As such, the National Forest System is a major means of delivering technical and financial assistance to state forestry agencies and/or other Federal agencies; state, tribal, and local governments; and private forest landowners.

All branches of the Forest Service participate in Research and Development to help solve natural resource problems. National Forest System and research personnel cooperate in studies on experimental forests on National Forest System and private lands. National Forest System staffs, in close collaboration with research scientists, promptly apply research findings (publications and other products).

Other USDA agencies

Natural Resources Conservation Service—The Forest Service works closely with the Natural Resources Conservation Service (formerly the Soil Conservation Service) on watershed protection and improvement projects. Watershed improvement work conducted on designated watersheds, under the Flood Control Act of 1944 and the Watershed Protection and Flood Prevention Act of 1954, is closely coordinated with related activities of the Natural Resources Conservation Service on adjoining private or non-Federal public lands. Soil surveys performed by the Forest Service on National Forest System lands are similarly coordinated with the Natural Resources Conservation Service, which has general Federal leadership for soil inventory and mapping. The Forest Service also cooperates in Natural Resources Conservation Service snow surveys, a large part of which involves snowpack on National Forest System lands. Finally, the agency works with conservation districts in planning and carrying out soil and water conservation programs and range management programs in conservation districts that involve National Forest System lands.

Animal and Plant Health Inspection Service—The Forest Service cooperates with the Animal and Plant Health Inspection Service (APHIS) and other Federal, state, and county agencies in enforcing livestock quarantine and testing programs to prevent spread of contagious animal diseases. Related programs to control undesirable plants on National Forest System lands are largely handled through collaboration with state and county weed control organizations, as authorized in the Carlson-Foley Act of 1968, Federal Noxious Weed Control Act of 1974, and Plant Protection Act of 2000. The Forest Service works together with APHIS in early detection and eradication of new invasive plant species. APHIS also is responsible for Federal predator and

animal damage control projects on National Forest System lands, after the Forest Service has given approval.

Bureau of Land Management

The USDI Bureau of Land Management and units of the National Forest System have extensive relationships, involving minerals, grazing, fire, and more. 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 commodity involved but also from location to location; the specific management roles of the two agencies vary accordingly. Regardless of the authorities involved, the Forest Service carries out the bulk of administrative work dealing with locatable and leasable mineral activities on National Forest System lands. For example, the Forest Service jointly administers general mining laws with the Bureau of Land Management on portions of the National Forest System lands that were formerly public domain lands. The Forest Service evaluates and authorizes each 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 it issues patents for qualifying mining claims.

Where ranch operators use lands administered by both the National Forest System and Bureau of Land Management, and where National Forest System grazing lands mingle with public domain and private lands, the Forest Service, Bureau of Land Management, USDA Natural Resources Conservation Service and conservation districts coordinate grazing programs through memoranda of agreement. Such coordination involves seasonal use of ranges, issuance of permits, grazing practices, and related matters.

Under cooperative agreements, the Forest Service often handles fire control on Bureau of Land Management lands that are mingled with or lie adjacent to National Forest System lands. The Bureau of Land Management, Forest Service, and other agencies also jointly operate cooperative fire training and control facilities at the National Interagency Fire Center in Boise, ID.

The Bureau of Land Management conducts cadastral surveys to establish land lines and boundaries for Federal lands reserved from the public domain. It receives funding from the Forest Service for such work done on National Forest System lands. The Bureau of Land Management also is responsible for maintaining land records of all Federal public lands.

In Oregon, the Bureau of Land Management and the Forest Service manage intermingled section of the revested Oregon and California railroad grant lands, known as O&C lands. Under a special arrangement provided under the Oregon-California Railroad Land Grant Act of 1954, receipts received by the Forest Service are transferred to the Department of the Interior for distribution to counties.

Other Federal agencies

Geological Survey—The USDI Geological Survey conducts a broad program of surveys, including classification of lands in terms of their value for minerals and for reservoir and waterpower sites. The Geological Survey has also taken over services provided by the former U.S. Bureau of Mines. These include: supplying minerals production data, providing technical assistance in acquisition of geologic field data, and providing information on mineral industry events, trends, and issues. Water resource surveys conducted in cooperation with the Forest Service and other agencies provide data on quantity, quality, and use of the nation's water resources. The Geological Survey also has major responsibility for a national program that prepares base maps showing topography, land development, and vegetation. Primary base maps for National Forest System lands are created and periodically revised in a coordinated program of the Geological Survey and the Forest Service.

Office of Surface Mining Reclamation and Enforcement—The USDI Office of Surface Mining Reclamation and Enforcement is responsible for developing, implementing, and enforcing surface coal mining and reclamation standards. It is also charged with reclaiming abandoned mined lands, as authorized by the Surface Mining Control and Reclamation Act of 1977. The Forest Service cooperates with the Office of Surface Mining Reclamation and Enforcement and with other government agencies and private interests in conducting such reclamation on National Forest System lands.

National Park Service—Cooperation between the Forest Service and the USDI National Park Service includes Park Service designation and marking of historic, cultural, and other landmarks on lands administered by the Forest Service under the National Historic Preservation Act of 1966, which established the Historic Preservation program. The Forest Service also works cooperatively with the National Park Service in protecting and managing natural and cultural resources that cross boundaries between National Forest System and

National Park System lands. Examples include recovery and conservation of threatened and endangered species, fire control, wilderness management, and protecting air quality,

Fish and Wildlife Service—The USDI Fish and Wildlife Service's research program provides information that aids in managing National Forest System lands. The Fish and Wildlife Service administers the Endangered Species Act of 1973 under which all Federal agencies must manage resources 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 and the Dingell-Johnson Act of 1950. 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 USDI Bureau of Reclamation variously impact management of adjacent National Forest System lands, including administration of special use permits for power lines or other facilities. In certain cases, the Bureau and the Forest Service have developed agreements whereby the Forest Service is responsible for planning and administration of recreation facilities developed in connection with reclamation projects.

Federal Highway Administration—The Department of Transportation's Federal Highway Administration is responsible, in cooperation with the Forest Service and state highway agencies, for planning and constructing forest highways. Such highways are main traffic arteries that either connect or provide access to national forests and are highly important to states, counties, and local communities. In accordance with the Federal Aid Highway Act of 1973, appropriations for forest highways are allotted and administered in conformity with regulations and plans jointly approved by the Secretaries of Transportation and Agriculture.

Council on Environmental Quality—Council on Environmental Quality (CEQ) coordinates Federal environmental efforts and works closely with agencies and other White House offices in developing environmental policies and initiatives. The National Environmental Policy Act of 1969 (NEPA) requires preparation of an environmental impact statement for any "major action" (an action that may have a significant affect on the environment) proposed by Federal agencies, including such actions affecting use, management, and protection of National Forest System resources. CEQ oversees Federal agency implementation of the environmental analysis process under NEPA and acts as a referee when agencies disagree over the adequacy of such analyses or public disclosure of environmental effects of proposed actions.

Environmental Protection Agency—Several laws administered by the Environmental Protection Agency (EPA) influence management of National Forest System resources. Under the Clean Water Act, as amended in 1987, the Forest Service is responsible for preventing water pollution from ongoing activities and repairing existing problems, consistent with requirements issued by states. The objective in both cases is to meet state water quality standards. Prevention is accomplished through the implementation and monitoring of "best management practices" (BMPs). Application of BMPs is required to be in compliance with state standards established pursuant to the Clean Water Act. In the case of existing water quality problems, states list water bodies determined to be "impaired" and establish a total maximum daily load (TMDL) standard for each water body. States are responsible for establishing TMDL standards and EPA provides oversight. Where state-listed, impaired waters occur on National Forest System lands, the Forest Service develops a watershed restoration plan that complies with state guidelines, priorities, and schedules. Under the Clean Air Act amendments of 1977 and 1990, Federal agencies are required, to the same extent as any nongovernmental entity, to meet Federal, state, and local requirements for control of air pollutants that may result from agency activities. An example is smoke resulting from burning hazardous fuels on National Forest System lands. Under the 1977 amendments to the Clean Air Act, the Forest Service role in protecting these areas from regional haze was further specified, as part of regional planning organizations that include relationships with EPA, other Federal land management agencies, states, and Tribes. Insect control programs on National Forest System lands also are planned and conducted according to EPA standards and requirements for use of pesticides under the Federal Environmental Pesticide Control Act of 1972. Under the Federal regulations (see 40 CFR (Code of Federal Regulations) 1500-1508.28) issued by CEQ for implementing the National Environmental Policy Act of 1969, all Federal agencies file environmental impact statement (EISs), both draft and final, with the EPA at the same time they are made available to the public. EPA publishes a notice in the Federal Register each week of the EISs filed during the previous week and delivers a copy of each EIS to CEQ. Also, EPA has review responsibility for EISs under the Clean Water Act of 1977.

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. The agencies likewise cooperate on the interchange of land for administrative purposes around Corps water 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 and Human Services. The Service may close such facilities where pollution abatement facilities are inadequate.

Small Business Administration—This Department of Commerce agency cooperates with the Forest Service in a program of "set aside" sales of national forest timber, under the Small Business Act of 1958, to assure that "small" businesses, defined as less than 500 employees, obtain a fair share of available sales of national forest timber. In addition to the Timber Sale Small Business "Set-Aside" program, the Forest Service supports the Small Business Administration's Procurement "8(a)" program. At least 5 percent of the total dollar value of Forest Service commercial acquisitions are set aside for small, minority-owned businesses. Also, the Forest Service sets aside all of the balance of its commercial acquisitions for small businesses, unless it is determined that no small business is capable of filling the requirement.

Federal Energy Regulatory Commission—The Forest Service prepares terms and conditions that it files with the Department of Energy's Federal Energy Regulatory Commission for inclusion in licenses issued by the Commission for hydropower projects. Those terms and conditions are designed to protect National Forest resources that may be affected by hydropower projects.

General Service Administration—Many administrative tasks of the Forest Service are handled with or through the General Services Administration. Tasks include 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 publication of laws and administrative documents.

State natural resource agencies

Planning for and managing national forests and grasslands is coordinated with state natural resource agencies having management or regulatory responsibilities concerning forest and grassland resources within a given state. For example, management of fish and wildlife habitats on National Forest System land and water is closely coordinated with programs of state fish and wildlife departments, which have the responsibility for management of wildlife and fish populations, including such measures as setting hunting and fishing seasons and bag limits, propagating wildlife and fish, and licensing of hunters, trappers, and anglers. In addition to state fish and wildlife agencies, the Forest Service has strong ties and working relations with state forestry organizations, water and air quality agencies, along with fire management and control units.

In habitat improvement work on National Forest System lands, funding supplied by direct Federal appropriations through the Forest Service is often supplemented by state agencies using grants provided under the Pittman-Robinson Act of 1937 and the Dingell-Johnson Act of 1950. 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 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 protection of wildlife.

Local governments

National Forest System programs generate receipts of a billion dollars per year from timber sales, recreation fees, and other land uses. A portion of these receipts is returned to the U.S. Treasury, and a portion is shared with local governments, such as counties, parishes, and boroughs.

Under the Twenty-five Percent Fund Act of 1908, the Weeks Act of 1911, and the Bankhead-Jones Farm Tenant Act of 1937, 25 percent of monies received from sale of products from National Forest System lands are paid to the state(s) containing those lands. These payments benefit public schools and public roads of the county or counties in which the national forests or grasslands are located. The term "monies received" includes collections for sale areas betterment activities, road construction credits earned or allowed any purchaser of national forest timber, and timber salvage sale deposits. Special payments to certain states are provided for in special acts, including the Boundary Waters Canoe Area Act of 1978 for Minnesota and the Arizona and New Mexico Enabling Act of 1910. More recently, the Secure Rural Schools and Community Self-Determination Act of 2000 provided local governments the choice of revenue sharing based on actual annual receipts or average of the receipts for the highest three years during the period 1986-1999. These several Revenue-Sharing programs are coordinated under the Payments in Lieu of Taxes

Act of 1976, which assures a minimum level of Federal payments to local governments in counties containing public lands.

Additional receipts are obtained from mineral leases on National Forest System lands under programs for which the Bureau of Land Management has administrative and fiscal responsibility. 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 Mineral Materials Act of 1947, and under the Mineral Leasing Act for Acquired Lands of 1947. Receipts from other mineral leases and related mineral disposals, for which the U.S. Bureau of Land Management is responsible, are also shared with counties of origin. The Bureau of Land Management makes payments from these receipts to the state and its counties.

General public

Growing participation of many groups and individuals in National Forest System planning and administration has far-reaching importance, at both national and local levels. Under the National Environmental Policy Act of 1969, large numbers of Environmental Impact Statements covering proposed 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 (as amended by the National Forest Management Act of 1976) likewise requires public involvement in developing land and resource management plans for National Forest System units. Relationships with the public in these and related Forest Service activities involve public hearings and many meetings and correspondence with individuals and organizations.

State and Private Forestry

State and Private Forestry (S&PF) programs of the USDA Forest Service provide Federal leadership in technical and financial assistance to landowners and resource managers to help sustain the nation's forests and protect communities and the environment from wildland fires. S&PF programs help bring forestry to all landowners, whether nonindustrial private, tribal, state, or Federal, in efficient, nonregulatory ways. Through coordinated efforts in management, protection, conservation education, and resource use, S&PF programs help facilitate sound stewardship across ownerships on a landscape scale, while maintaining flexibility for individual forest landowners to pursue their objectives. Two-thirds of all forested lands are privately owned, making S&PF programs relevant to many private landowners who need technical and financial assistance. Through a partnership of technical advice and focused financial assistance, Federal resources are dramatically leveraged to produce a variety of forest-based goods and services, including recreation, wildlife and fish, biological diversity, timber, and other products. On average, for every $1 of Federal investment, $10 is added from non-Federal sources to provide both economic and quality-of-life returns. Additionally, through its fire and aviation management programs, S&PF provides international leadership in all aspects of wildland fire management.

The quality and quantity of the nation's water, as well as stable and fertile soils, depend on the quality and condition of forest cover. This cover is also the key to the nation's forest-dependent wildlife populations and diversity in plant and animal communities. Watershed health, restoration, and management transcends ownership boundaries, directly affecting the costs of meeting society's need for water, while providing outdoor-based jobs, aesthetics, recreation, a sense of well being, and satisfaction to both city and country dwellers.

Across the landscape, over 70 percent of the nation's forests are in non-Federal ownership and represent 80 percent of potential wood fiber production and associated wages, taxes, and economic vitality. Similarly, these forest ownerships provide critical watershed conditions, soils, fish and wildlife habitat, and the aesthetic quality so valued on the nation's landscape. Because non-Federal forests represent most of the nation's forests, it is especially important to keep these lands healthy, productive, and sustainable. With increasing fragmentation and development pressure, the unique Federal role in reinforcing the value and functions of these lands, from remote wilderness to urban green space, has never been more critical.

Insects and diseases affect trees, forests, and forested ecosystems across rural and urban land boundaries. Monitoring, evaluation, and control of major forest pests require coordinated actions between Federal and state agencies to protect forest health. The Forest Health Management program provides technical and financial assistance and cooperative partnerships with states, private landowners, and other Federal agencies for insect and disease control. This program also has responsibility for forest insect and disease protection on all Federal lands.

Wildland Fire Protection programs are conducted with the highest regard for public and firefighter safety.

Within S&PF, the Fire and Aviation Management program provides direct, on-the-ground activities, while the Cooperative Fire Protection program does so through cooperative arrangements. Cooperation among Federal and state agencies and volunteer fire departments in wildland fire protection has proven effective and valuable in protecting lives, property, and other natural resources. Coordinated initial response to wildland fires prevents over 90 percent of wildland fires from growing to major proportions. As part of the National Fire Plan, S&PF works with states, local communities, and other Federal agencies to (1) reduce wildland fire hazards to communities and (2) ensure wildland fire management planning and firefighter personnel, and associated resources are prepared for extreme fire conditions. Assistance to state forestry agencies and rural volunteer fire departments, through funding wildland firefighters training and loaning equipment, is provided through the Cooperative Fire Protection program. In addition, as part of the National Fire Plan, assistance through the Economic Action Program helps communities identify, develop, and expand economic opportunities related to historically underutilized tree species and wood removed during hazardous fuel reduction treatments. Information, demonstration, applications development, and training are made available to participating communities. Support is also provided for community-led planning and prevention to reduce fire risk.

In both rural and urban communities, natural resources ranging from individual trees to parks and expansive urban greenways are a key element in quality of life for nearly 80 percent of the nation's population. Sound stewardship of urban and community forests provides numerous social benefits, including improving property values and aesthetics, promoting neighborhood and community pride, reinforcing social and cultural values, moderating climate and cost-of-living expenses, and mitigating urban sprawl. The Urban and Community Forestry program relates to these settings.

The nation's need for wood and other forest resources depends on adequate stewardship of non-Federal forest lands. Over half of the nation's supply of roundwood comes from nonindustrial private lands. Well-managed and protected forests provide cost-effective benefits to society and assure sustainable inputs for rural, resource-dependent communities. This is the domain of the Cooperative Forestry program. The Forest Service is uniquely positioned to link people and forests in order to strengthen the economic health of communities over the long term. Nearly 70 percent of rural counties are highly dependent on natural resource based earnings and over 75 percent of them are experiencing population growth and related changes. S&PF technical and financial assistance helps bring communities, groups, and businesses together to create diversified economic activity built on forest resources. Community-based partnerships, flexibility, and capacity building are emphasized. Economic action programs help communities become more economically self-sufficient by creating jobs, improving competitiveness through value-added manufacturing, and stimulating more diverse markets for natural resources. Both technical and financial assistance to help improve stewardship of the nation's urban and rural forests, and assistance to communities, are provided through the Cooperative Forestry program.

S&PF is also a leader in conservation education. The Conservation Education program helps people of all ages understand and appreciate natural and heritage resources, and how to conserve those resources for future generations. The program is funded through various other Forest Service programs, including those in S&PF.

Authorization

As early as 1898, Gifford Pinchot proposed a Federal program to help forest owners manage timberlands. 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, assistance offered to private timberland owners and operators was very limited. The Weeks Act of 1911 authorized cooperation with the states in forest fire control on private and state lands. The Smith-Lever Act of 1914 provided for a cooperative system of assistance, including the U.S. Department of Agriculture, state land grant colleges and universities, and county extension services, to extend research results to farmers and other rural people. The Clarke-McNary Act of 1924 provided further authorization for cooperative fire control and authorized Federal funding on a matching basis with states to aid farmers by providing information on management and utilization of forest resources. Clarke-McNary also prompted appointment of the first full-time professional foresters providing assistance to private timberland owners.

Cooperative forestry programs began during the Great Depression. The Norris-Doxey Cooperative Farm Forestry Act of 1937 provided for extension education, as well as Federal funding and direct technical assistance to farm woodland owners. During World War II, the Forest Service also established a forest utilization

and information service at research experiment stations to improve sawmill operations, locate timber for special needs, and otherwise help the war effort. The Cooperative Forest Management Act of 1950 greatly strengthened technical forestry assistance programs conducted by state forestry organizations and the Forest Service. This Act broadened those programs to include all private landowners, forest operators, wood processors, and public agencies, with respect to multiple-use management of forest lands, utilization of forest products, and urban forestry.

Rural development has long been a key program in State and Private Forestry. Title IV of the Rural Development Act of 1972 authorized a Cooperative Rural Community Fire Protection program to help rural towns and communities of less than 10,000 population acquire needed firefighting equipment and train firefighting personnel. The Cooperative Forestry Assistance Act of 1978 consolidated and expanded authority for Federal assistance on non-Federal forest lands. It authorized the Secretary of Agriculture to cooperate with State Foresters or equivalent state officials in providing this assistance.

Agricultural legislation has authorized much rural development work. The National Farm Bill of 1990 expanded authorities for Federal assistance on non-Federal forestlands, and to rural communities, through the Forest Stewardship Act of 1990 and the National Forest-Dependent Rural Communities Economic Diversification Act of 1990. The Forest Stewardship Act of 1990 amended the Cooperative Forestry Assistance Act of 1978, authorized expanded assistance to landowners, encouraged conservation of environmentally important forests at risk to conversion to nonforest uses, established the Semiarid Agroforestry Center, and expanded Tree Planting programs. The National Forest-Dependent Rural Communities Economic Diversification Act of 1990 authorized assistance to rural communities that are located near national forests, are economically dependent on forest resources, or are likely to be economically disadvantaged by land management practices. The Act aims to help communities diversify their economic base and improve the economic, social, and environmental well-being of rural America. Finally, the National Farm Bill of 1996 further amended the Cooperative Forestry Assistance Act of 1978, expanding authorities for conservation of environmentally sensitive forests at risk to conversion to nonforest uses and extending the Forestry Incentives program.

Authorization for wildland fire management activities dates back to the creation of national forests. The Organic Administration Act of 1897 authorized protecting national forests against destruction by fire. The Wilderness Act of 1964 provided for fire control within designated wilderness. The National Forest Management Act of 1976 required guidelines for land management plans to ensure protection of forest resources, including management prescriptions that minimize serious or long-lasting effects from wildfire. The Clean Air Act of 1955 provided for protection and enhancement of the nation's air resources and applies to application and management of prescribed fire. The Forest Service is also authorized to undertake wildfire protection activities on other Federal, state, and private lands. The Economy Act of 1932 provided for procurement of materials, supplies, equipment, work, or services from other Federal agencies. The Granger-Thye Act of 1950 authorized expenditure of Forest Service funds to erect buildings, lookout towers, and other structures on land owned by states. The Reciprocal Fire Protection Act of 1955 authorized reciprocal agreements with Federal, state, and other wildland fire protection organizations. The Wildfire Suppression Assistance Act of 1989 authorized the Forest Service to enter into agreements with fire organizations of foreign countries for assistance in wildfire protection.

State and Private Forestry sponsors a wide variety of programs. Some primarily serve non-Federal, state, and local clients, including the Conservation Education, Cooperative Fire Protection, Cooperative Forestry, and Urban and Community Forestry programs. The Forest Health Management program focuses on both Federal and non-Federal land, while the Fire and Aviation Management program focuses mostly on National Forest System lands.

Conservation Education

The Conservation Education program connects people to land, providing them tools needed to take informed actions related to sustaining natural and cultural resources. It helps people of all ages understand and appreciate natural and cultural resources and how to conserve those resources for future generations. For the Forest Service to meet its mission of "caring for the land and serving people," the public must have knowledge to understand natural resource issues and skills to participate meaningfully in debates surrounding them.

Conservation education helps people develop critical thinking skills and obtain knowledge needed to understand the complexities of ecological issues. In addition to encouraging them to take personal responsibility for their relationship with the environment, conservation education encourages people to participate with the

Theme art for Conservation Education program.

Forest Service and other natural resource management agencies in sustaining natural and cultural resources. The ultimate measure of successful conservation education is an informed and engaged citizenry able to participate effectively in actions and decisions needed to sustain natural and cultural resource values for present and future generations.

The Conservation Education program has three unique niches that complement the strengths of other Forest Service partners:

Science-based Information and Conservation Education Research—Forest Service Research and Development provides a tremendous resource for conservation education materials. Research results can be translated into easily understood terms and concepts, contributing to scientifically credible educational materials and activities that represent the current state of natural resource knowledge.

Experiential Learning—The National Forest System provides outstanding opportunities for place-based learning, providing the equivalent of 191 million acres of outdoor classrooms across the country, including experiential learning through visitor centers, such as the Mount St. Helens Visitor Center in Washington, and Conservation Education Centers, such as the Cradle of Forestry in North Carolina.

Delivery Network—State and Private Forestry has an extensive partner network, including State Foresters, to deliver conservation education across the country. In addition, the National Forest System has over 30,000 employees, who together with the S&PF network, make up an integrated national delivery network for conservation education.

Conservation education is, by its very nature, a cooperative endeavor, and the Forest Service works with many partners—Federal, state, nonprofit, and private—whose strengths complement those of the agency. State Foresters, for example, are a major part of the Conservation Education delivery system. Other important partners include: other Federal natural resource agencies, the National Association of Conservation Districts, Project Learning Tree, Project Wet, Project Wild, Boy Scouts, and Girl Scouts.

The Conservation Education program focuses broadly on developing and delivering education, centered around natural resources and processes. The Program accomplishes this through five activities: (1) developing and providing educational material, (2) delivering conservation education, (3) supporting education research, (4) providing natural resource and conservation education training, and (5) building and using partnerships. Conservation Eduation programs are organized around resource-specific programs and conservation education centers.

Resource-specific programs

There are numerous national, resource-specific conservation education programs sponsored and funded through other Forest Service program areas that operate independently but in partnership with the Conservation Education program. Defining characteristics of these programs include: national in scope, resource-specific, long-term, and sponsored by a specific Forest Service program. All resource-specific programs leverage funds with outside partners and, in the case of Smokey Bear and Woodsy Owl, derive some funding from licensing royalties. Examples of these programs are:

Nature Watch—Sponsored and supported by the Wildlife, Fish, and Rare Plants program, Nature Watch puts people in touch with plants, fish, and birds in their National Forests through viewing sites, interpretive walks, festivals, and other activities.

Urban Tree House—Urban Tree House is a cooperative, community-based, environmental research and education program, characterized by a structure placed in a community greenspace to help urban youth and adults learn about natural resources and environmental concepts.

Smokey Bear—One of the Forest Service's oldest conservation education programs, Smokey's message is "Only You Can Prevent Forest Fires."

Passport in Time (PIT)—PIT is a volunteer program, allowing the public to share in the thrill of discovery through archaeological and historic research.

Woodsy Owl—Woodsy is a national environmental icon, making him an excellent vehicle for delivering conservation education messages.

Conservation education centers

Located throughout the country are many Forest Service visitor and education centers whose primary purpose is delivery of conservation education. Grey Towers National Historic Landmark and The Cradle of Forestry are prime examples of these centers.

Grey Towers National Historic Landmark—Grey Towers, primary home of Gifford Pinchot, first Chief of the Forest Service, was donated to the Forest Service in 1963. It serves a dual purpose by (1) embracing a philosophy of preservation through use while (2) providing an estate open for public tours and conservation education programs. In conjunction with the Pinchot Institute for Conservation, a nonprofit natural resource policy research and education organization, Grey Towers serves as an active conference center for conservation and natural resource issues.

Cradle of Forestry National Historic Site—The Cradle of Forestry was set aside by Congress to commemorate the beginning of forestry conservation in the United States. It consists of a Forestry Discovery Center, an interactive exhibit hall, two interpretive trails, and the recently dedicated Carl Schenck Education wing, which provides the opportunity for more formal conservation education activities.

Cooperative Forestry

There are nearly 500 million acres of non-Federal forest land in the United States, comprising about 20 percent of the nation's land mass, and two-thirds of the nation's forests. Over 50 percent of the nation's forests are privately owned. Management practices on these lands affect everyone's social, economic, and natural environment. Cooperative Forestry programs provide technical and financial assistance to help rural and urban citizens (including private landowners) care for forests and sustain the communities where they live, work, and play. Through partnerships with state forestry organizations and many others, Federal funding is leveraged to help produce a variety of forest-based goods and services to meet domestic and international needs

Programs within Cooperative Forestry focus on working in partnership with non-Federal owners to promote management, protection, and better use of forest-based goods and services. Major program areas include Forest Stewardship, Forest Legacy, Forest Land Enhancement, Economic Action programs, and Pacific Northwest Assistance.

Forest stewardship

The Forest Stewardship program supports the sustainable management of America's non-Federal forests for the benefit of society, by enabling the nearly 10 million nonindustrial private forest (NIPF) landowners, who own 48 percent of the nation's forests, to better manage, protect, and use their natural resources. In cooperation with state resource management agencies, the Forest Service (1) helps forest owners pursue sustainable forest management through planning and implementation of riparian restoration, wildlife habitat enhancement, forest stand improvement, and other aspects of forest management; and (2) improves supplies of high quality, genetically improved tree seed and planting stock for reforestation. Activities address gaps in landowner information and understanding and generate cumulative benefits to society. Technical assistance to non-Federal landowners, development of multiresource stewardship plans for non-Federal lands, and provision of high quality tree planting stock to states and private landowners are all programs within the Forest Stewardship program. All Forest Stewardship program components (stewardship plans, technical assistance, and regeneration

nurseries and genetic resources) are coordinated with and/or delivered through the state forestry agencies.

Stewardship plans—This program helps private forest landowners develop plans for sustainable management of their forests. The program promotes management, protection, and better use of over 50 percent of America's forests; responds to increasing demand for goods and services from these lands; and targets actions for critical riparian areas. Given that NIPF forests provide over 60 percent of the domestic timber supply and only 10 percent of those ownerships are covered by a forest management plan, there is an urgent need to furnish additional technical assistance to assure their sustained use.

Technical assistance—This program helps non-Federal landowners on a voluntary, nonregulatory basis through supplying technical information and assistance, especially in development of multiresource forest stewardship plans. The plans establish the basis for future management, protection, and better use practices. Forestry professionals provide site-specific, on-the-ground technical assistance to NIPF landowners. They help landowners prepare forest stewardship plans that assure benefits to the landowner while protecting forest resources such as soil and water quality, nonwood products, wildlife habitat, recreational opportunities, and downstream water quality. Plans are prepared by state forestry personnel or private forestry consultants, in conjunction with owners, to protect and sustain private forest resources while contributing to long-term national goals. A recent survey of landowners participating in the program indicates that over 80 percent are implementing their multiresource management plans. Both technical and financial assistance have been significant factors in their ability to do this. Landowner investments can be supplemented by various conservation cost-sharing programs, such as the Environmental Quality Incentives Program, the Forestry Incentives Program, the Conservation Reserve Program, and other incentive programs that may be available.

Regeneration nurseries and genetic resources—This program supports over 85 state forest nurseries that produce about 30 percent of the total forest seedling supply in the United States. State nurseries are the primary source of native species tree seedlings for reforesting NIPF lands and enhancing ecosystem integrity. This program also provides information, technology, and training on forest nursery management, tree improvement, tree planting methodology, seedling culture, and equipment development to state, private, and Federal nurseries. The Forest Service also operates a tree seed bank that provides seed to national and international scientists for research purposes and makes quality assessments on seed used in the United States.

Forest legacy

With increasing forest fragmentation and development pressure, the Forest Legacy program plays a unique role in maintaining the value and functions of lands across ownerships from remote wilderness to urban green space. The need for this program has never been greater. The average annual rate of land converted to development was over 3 million acres from 1992 to 1997. This is more than twice the rate of the previous decade. Additionally, the number of private forest landowners has increased from 7.8 million to more than 9.9 million since 1978. This pattern of development encroaches on large tracts of forest, coastal areas, and municipal watersheds. The Forest Legacy program works with state government and local entities to safeguard priority areas.

This program helps protect private forest lands from being converted to nonforest uses by emphasizing mitigation of both forest fragmentation and loss of forested landscapes. Its goal is effective protection and conservation of environmentally important forest areas through conservation easements and other mechanisms. The Forest Legacy program relies on the concept of "willing seller and willing buyer" and is completely nonregulatory in its approach. The use of eminent domain is not authorized for this program.

Landowner participation in the program is entirely voluntary, and the selection process is guided by the states. Only private forest lands within designated Forest Legacy Areas, identified through a state's Assessment of Need (AON) plan, are eligible. AONs must be completed by participating states and territories. The AON analyzes the need for the Forest Legacy program and describes how the program will work in a state. A state joins the Forest Legacy program upon approval of its AON by the Secretary of Agriculture, thereby recognizing the national importance of forested areas needing protection.

With passage of the 1996 Farm Bill, the Forest Legacy program was expanded to allow a state grant option. Under this option, Forest Legacy acquisitions can vest title to the land in the state or a unit of state or local government. Most states take advantage of this state grant option. On average, each Federal dollar leverages an equal amount in non-Federal contributions to the program through donated lands or interests in lands, bargain sales, or additional in-kind contributions from states and partners including the cost of monitoring perpetual conservation easements.

Forest land enhancement

Through the Forest Land Enhancement Program (FLEP), state forestry agencies can provide a wide array of services to ensure the nation's NIPF and related resources continue providing forest products and safeguarding the health of water, air, and wildlife. The Forest Service manages the program through state forestry agencies to:

- Establish, manage, maintain, enhance, and restore NIPF lands;
- Enhance the productivity of timber, fish and wildlife habitat, soil, water, air quality, wetlands, and riparian buffers of these lands;
- Assist owners and managers to more actively manage NIPF lands and related resources;
- Reduce risk and help restore, recover, and mitigate the damage to forests caused by fire, insects, invasive species, disease, and damaging weather; and
- Encourage use of state, Federal, and private sector resource management expertise, financial assistance, and educational programs.

State forestry agencies can use FLEP funds to provide financial, educational, or technical assistance to NIPF owners to achieve a broad array of objectives, including (1) forest stewardship plan development, (2) afforestation and reforestation, (3) forest stand improvement, (4) agroforestry implementation, (5) water quality improvement and watershed protection, (6) fish and wildlife habitat protection, (7) forest health and protection, (8) invasive species control, (9) wildfire and catastrophic risk reduction, (10) wildfire and catastrophic event rehabilitation, and (11) special practices. Eligibility criteria for FLEP are broad, allowing more participation by Tribes, those who manage land that they rent (rather than own), and land under tenure systems other than outright ownership. FLEP allows treatment of up to 1,000 acres per year and variances of up to 5,000 acres if significant public benefits will accrue.

Economic action programs

Economic Action programs provide the opportunity for natural resource-dependent communities to strengthen their long-term, economic health. The Forest Service is uniquely positioned to link people and forests. Nearly 70 percent of rural counties are highly dependent on natural resource-based earnings, and over 75 percent of those counties are experiencing population growth and related changes. Economic Action programs bring communities, groups, and businesses together to create diversified economic activity built on forest resources. The programs are structured to help both rural and urban communities benefit. Partnerships, flexibility, and capacity building for long-term solutions are emphasized.

Economic Action programs help rural communities strengthen, diversify, and expand their local economies, improve transportation networks, and increase access to technology through grassroots partnerships. They build skills within rural communities to address social, environmental, and economic change through inclusive, community-led, collaborative processes. They also provide technology transfer, technical and financial assistance, and expanded networks for rural communities to build their capacity to utilize small diameter timber and underutilized species, as well as nontraditional or special forest products, and for integrating recreation, tourism, and other opportunities into sustainable strategies for change.

The delivery system for Economic Action programs includes State Foresters, Indian tribes, national forests and grasslands, communities, resource conservation and development councils, soil and water conservation districts, universities, businesses, and other cooperators. Economic Action programs help communities become more economically self-sufficient by creating jobs, improving competitiveness through value-added manufacturing, and stimulating more diverse markets for natural resources. Special focus includes helping build rural business infrastructures to utilize and market products from ecosystem management operations. The Economic Action Program includes four major program components: Economic Recovery, Rural Development, Forest Products Conservation and Recycling, and Wood in Transportation.

Economic recovery—This component assists eligible rural communities experiencing acute economic problems associated with changes in resource management policies and decisions. Assistance is directed toward communities located in or near national forest lands, to meet diverse economic, social, and environmental needs. Economic Recovery also builds relationships that result in actions at various scales, from individual businesses to communities to natural and heritage resource management issues, both in watersheds and across administrative boundaries.

Rural development—This component addresses the long-term health of rural areas by helping communities develop opportunities and enterprises through diversified uses of forest resources, including wood, recreation, wildlife, cultural and heritage resources, minerals, nontimber forest products, and scenic quality. Rural Development supports entrepreneurial efforts based on community strategies and long-term goals.

Forest products conservation and recycling—The Forest Products Conservation and Recycling (FPC&R) component supports a small cadre of Federal forest products utilization specialists trained in logging, sawmilling, drying, processing, marketing, engineering, and wood technology. These specialists are part of a national network of state, academic, and private-sector specialists. They cooperate in assisting other partners, communities, and businesses to improve forest products utilization, marketing, economic benefits, and environmental and processing efficiency of forest operations. Demand for this type of assistance is growing faster than it can be supplied. FPC&R assists the wood products industry with new harvesting, processing, and marketing options for small-diameter thinning, as it adapts to new, smaller, and lower valued resources. New approaches to small-diameter tree utilization are being developed and pilot tested, creating jobs while improving watershed health. These approaches include log sort yards, new wood products, new processes and uses, eco-industrial parks, and utilization conferences. FPC&R provides advice, gives technical information, and connects people through networks to lay the groundwork for fostering sustainable use of forests to promote economic development and a quality environment. There is substantial need for utilization and marketing expertise offered through the FPC&R network.

Wood in transportation—Approximately 30 percent of the 589,000 highway bridges across the nation need repair or replacement. The Wood In Transportation (WIT) program addresses this need by stimulating and expanding markets for wood in transportation applications. This includes highway and pedestrian bridges, sound barriers, signs, and railway and water transportation structures. WIT promotes development of markets that provide opportunities for businesses willing to process low-value and/or underutilized species made available through ecosystem restoration and maintenance activities. It provides simultaneous benefits to rural communities through a flexible mechanism for upgrading and maintaining rural transportation networks. WIT also advances forest health interests, such as increased utilization of eastern and western hardwoods, small diameter lodgepole and ponderosa pine in the Inland West, and western juniper and pinyon pine in the Southwest.

Pacific Northwest assistance

Through the Pacific Northwest Assistance (PNA) program and Jobs-in-the-Woods program, the Forest Service provides funds to rural areas experiencing acute financial problems, enabling them to diversify their economies. These programs are available to areas in western Washington, Oregon, and northern California that fall within the range of the northern spotted owl. The National Forest System funds the Jobs-in-the-Woods program, while State and Private Forestry provides coordination. The PNA program helps communities in the Pacific Northwest adversely affected by reduced Federal timber harvests to diversify and strengthen their economies by developing value-added wood products manufacturing enterprises and adopting short-range and long-range economic diversification strategies.

For the most part, community assistance work in the Pacific Northwest is a focused delivery of the National Economic Action program. Exceptions are Jobs-in-the-Woods and the Old Growth Diversification account. Jobs-in-the-Woods is designed to assist displaced woods workers by offering training and employment in ecosystem restoration. Partnerships provide much of the training and the bulk of restoration work, though not all of it, occurs on National Forest System lands. Old Growth Diversification consists of revolving loan funds endowed by Forest Service appropriations and administered by three affected states—Washington, Oregon, and California. Unlike other Forest Service rural community assistance funding, the Old Growth account provides direct funding to businesses. For example, Old Growth funded activities recruit light manufacturers, assist timber mill conversion from large diameter to small diameter feedstock, provide marketing assistance, and find value-adding opportunities for existing businesses.

Urban and Community Forestry

Urbanization is having a profound effect on natural resources and the quality of people's lives and health. Approximately 80 percent of the U.S. population lives in urban areas and these people are more and more removed from the values of resource stewardship and a relationship with the dynamic ecosystems they live in. Their communities' vitality is strongly dependent on the quality of their natural environments. Urban pressures and influences across the landscape are common problems affecting urban environments, livability of communities, and people within them. Managing and addressing these pressures requires a comprehensive approach to avoid continued deterioration of our natural resources and environments. The USDA Forest Service and state forestry agencies, in partnership with national and local organizations, cooperate to provide that comprehensive approach in caring for trees and forests where people live, work, and play.

Managed urban pine stand.

The Urban and Community Forestry program protects America's natural resources by providing technical and financial assistance to state and local governments. This offers them significant opportunity to improve the quality of life for town and city residents. There is a nationwide emphasis on maintaining, restoring, and improving the livability of urban areas through management of natural resources. The program also links an array of governmental and private resources and grassroots organizations as they raise and address environmental issues at the local, regional, and national level. It engages people in citizen-based, grass roots volunteer efforts to secure in-kind and financial support for community-based activities.

Annually, more than 10,000 communities and 7,000 volunteer organizations receive assistance in assessing, retaining, and protecting their natural environment as they experience land use changes and economic development. Planning, demonstration projects, and technical assistance to maintain, restore, and improve the health of trees, forests, and urban parks are primary focuses of the Urban and Community Forestry program.

This program helps people in urban areas and community settings sustain shade trees, forest lands, and open spaces, and addresses stewardship of urban natural resources. Important connections exist between quality of life in metropolitan areas and land consumption associated with urban sprawl. In addition, there is a strong economic case for conserving green open space to guide growth and revitalize city centers and older suburbs. The Urban and Community Forestry program responds to these needs by maintaining, restoring, and improving the health of urban trees, forests, and greenspaces. Through these efforts, the program promotes creation of healthier, more livable urban environments across the nation. The program will continue expanding partnerships with nongovernmental organizations to restore natural resources in older, declining cities and towns.

The Urban and Community Forestry program addresses issues linked to national policy for the natural environment in 45,000 communities and metropolitan areas where most of the nation's population live and work. Program outcomes help maintain and restore landscape character and sense of place, while also improving environmental quality, livability, and associated human and economic health of communities. The Urban and Community Forestry program enhances health and sustainable management of the nation's urban forests and related economies through partnership with state and local organizations.

This program assists selected cities, towns, and communities to assess, retain, and protect their natural environment as they experience economic development and land use changes (urbanization). It also demonstrates the importance of maintaining, restoring, and improving tree, forest, and natural resource health in older, more

mature cities and towns. Planning, demonstration projects, and technical assistance activities assure retention and placement of trees, forests, urban park, greenspace, and related vegetation for (1) mitigating air, water, soil, and noise pollution; (2) reducing energy use; (3) mitigating heat island effects and stormwater flooding in built-up environments; and (4) improving air quality. These activities focus on maintaining and enhancing the contribution of urban forests to watershed function, stormwater flood mitigation, and water quality maintanance and improvement.

Social environments improve with public awareness of the importance of trees and forests to cities and communities. To enhance people's physical and psychological well-being, natural resources in urban environments need to be managed, protected, conserved, and restored. This is done by building local commitment and capacity to develop local legislation; by planning for open space, greenspace, disaster mitigation, and resource budgets; and by creating opportunities for citizen involvement in community activities leading to improved human mental and physical health.

The Urban and Community Forestry program provides national leadership in demonstrating and delivering GIS-based ecological assessment technologies and capacity-building grants to towns and cities. The numbers of requests for Federal assistance and grants exceed the capacity of the existing program by eightfold. Community grants are made available on a matching basis. Nearly four dollars of private funds donation and in-kind services match every Federal dollar expended in the program.

Communities receiving technical and financial assistance are rated annually on their level of participation relative to urban forestry. Ratings are as follows: Project Level, Formative Level, Developmental Level, and Sustaining Level. The goal is to eventually have all communities achieve the highest level of participation (Sustaining Level) with respect to care of trees and forests. A community achieves the Sustaining Level when it has developed a comprehensive management plan, demonstrated a citizen support base, and provided budget and staff to implement their comprehensive plan.

Community experiences and relationships developed by the Urban and Community Forestry program are powerful ways to increase the number of citizens involved and informed about resource issues. Program expectations include:

- Continued integration with all Cooperative Forestry programs, especially those dealing with community issues, to assure a balance of activities in urban settings and continued support for work in rural communities;
- Continued integration with all State and Private Forestry programs, such as the National Fire Plan, Cooperative Fire, Conservation Education, and Forest Health, with a new focus on issues in the wildland urban interface;
- Increased outreach to urban national forests to assist forest supervisors in dealing with land use pressures from expanding urban centers and rural community issues;
- Improved external awareness and communication with partner organizations, the Congress, and urban constituencies to be an information conduit about forest and natural resource management; and
- Enhanced program management, program delivery, financial and technical assistance, and communication.

The Urban and Community Forestry program emphasizes: (1) maintaining and improving water and air quality and mitigating stormwater flooding, air pollution, and urban heat island effects; (2) conducting resource assessments that inform local public policy and decisionmaking; (3) creating awareness and engaging citizens in active volunteer work to protect, establish, and care for trees, forests, and greenspace, as with the national campaign for people to "Bring Life to Your Community" through planting and caring for trees; (4) ensuring community greening efforts are technically sound, sustainable, and address issues such as invasive plants and pest management; and (5) linking and managing the nation's "green" infrastructure by working with other partners to build more sustainable communities. Opportunities exist, through the Urban and Community Forestry program, to put people to work improving their communities through industrial land reclamation and urban forest restoration activities. The partnerships created and fostered by this program have the capacity to coordinate and manage efforts that will result in more vibrant and healthy communities across America.

Forest Health Management

The Forest Health Management program aims to maintain healthy, productive forest ecosystems by preventing, detecting, and suppressing damaging insects and diseases. It does this by coordinating and providing forest health protection, including (1) insect and disease management, across Federal, tribal, state, and private lands; and (2) safe and effective pesticide use by the Forest Service. The Forest Health Management program provides coordination when both Federal and non-Federal lands are threatened, and for reporting insect, disease, and forest health trends across all ownerships. It

Japanese ladybird beetle used for biological control of the gypsy moth (*Lymantria dispar*).

Forest insecticide spot treatment applied to prevent outbreaks of southern pine beetle (*Dendroctonus frontalis*) in a southeastern forest.

also contributes to development and application of new and improved technologies for use in forest insect and disease survey, monitoring, technical assistance, and prevention and suppression activities. The Forest Health Management program has major components on both Federal and cooperative lands.

Federal lands

The Federal Lands component of Forest Health Management is conducted in conjunction with the National Forest System, other Federal agencies (including the Departments of Defense and Interior), and tribal governments. Its goal is to maximize Federal efficiency in carrying out a coordinated program of forest insect and disease detection, monitoring, evaluation, prevention, and suppression on forest land.

Surveys and technical assistance—The Forest Health Management program provides professional forest health assistance, including forest insect and disease detection surveys and evaluations, for all Federal lands and tribal governments. Forest health surveys are an important component and evaluate major pest problems: gypsy moth, hemlock woolly adelgid, and other pests in the East; dwarf mistletoe, mountain pine beetle, Douglas-fir beetle, Douglas-fir tussock moth, western spruce budworm, spruce beetle, and root disease in the West; and southern pine beetle, annosus root disease, and fusiform rust in the South. The Forest Health Management program also supplies technical information, advice, and related material to Federal land management agencies and states on various techniques available to maintain healthy forests. Technical assistance in forest insect and disease management is provided to state agencies which, in turn, assist private landowners as part of the Cooperative Forestry program. The Forest Health Management program furnishes national leadership and coordination for all Federal and cooperative forest insect and disease management activities in cooperation with other Federal land management agencies, tribal governments, and states. This program also reports insect and disease outbreaks and trends and forest health conditions nationwide. Finally, it provides technical assistance and coordination in the use of pesticides by the Forest Service.

Prevention and suppression—The Forest Health Management program promotes prevention and suppression of forest insects and diseases on all Federal

and tribal lands. Prevention and suppression strategies and projects are coordinated with state forestry, agriculture, and environmental protection agencies, along with the USDA Animal and Plant Health Inspection Service relative to eradication of introduced forest pests. Prevention and suppression projects protect trees and timber, watershed functions, wildlife habitat, and recreation values, and directly reduce wildfire risks associated with the buildup of hazardous woody fuel that occur without prevention and suppression activities. Forest Health Management also develops, improves, and demonstrates new technologies, materials, methods, and strategies to improve effectiveness and efficiency of forest pest management.

Cooperative lands

Forest Health Management sponsors a cooperative program with states and territorities to maximize Federal and state efficiency in accomplishing a coordinated program of forest insect and disease detection, monitoring, evaluation, prevention, and suppression on forest land. This program focuses on land owned by states, local governments, private organizations, and individuals.

Surveys and technical assistance—In cooperation with states, Forest Health Management surveys and evaluates insects and diseases. It also provides states and private landowners with technical assistance, training, and information needed to manage forest insects and diseases and maintain healthy forests. The program also collects information from state and private lands to report insect and disease outbreaks and trends, assess the health of all the nation's forests, and to plan coordinated joint Federal and state pest management activities across mixed ownerships. Forest Health Management also furnishes Federal financial assistance to all 50 states, the District of Columbia, and current or former U.S. Trust Territories. Non-Federal forest acreage in a state is the primary basis for determining allocation of funds. The required minimum cost-share toward Federal funds is 50 percent, but states actually contribute an average of $1.25 for each Federal dollar expended.

Prevention and suppression—The Forest Health Management program provides prevention and suppression for forest insects and diseases, as well as gypsy moth eradication on state and private lands. Prevention and suppression projects protect trees and timber, watershed functions, wildlife habitat, and recreation values, and directly reduce wildfire risks associated with buildup of hazardous woody fuel. This program also supplies financial assistance to state agencies for prevention and suppression on state and private lands based on the following cost-share rates: 25 percent on non-Federal public lands; 33 1/3 percent on private land holdings greater than 500 acres in size; and 50 percent on private land holding less than 500 acres in size. Finally, Forest Health Management supports production and distribution of GYPCHEK, the gypsy moth biological control virus used in environmentally sensitive areas.

Cooperative Fire Protection

The Cooperative Fire Protection program provides technical and financial assistance to state and local fire agencies to promote efficient wildland fire protection. Program activities focus on nationally important issues, such as protecting homes in the wildland/urban interface and reducing Federal wildfire suppression costs. The program aims to improve efficiency and effectiveness of wildland fire protection by providing assistance to states. Types of assistance include: training, information gathering and dissemination, technical expertise, coordination and equipment, and financial support for hazard mitigation. The program also offers assistance to states for emergency fire suppression when life and property are threatened during an extreme fire emergency. Activities in the Cooperative Fire Protection program are organized under state fire assistance and volunteer fire assistance.

State fire assistance

State Fire Assistance provides most of the funding to administer and carry out the Cooperative Fire Protection program. It also supplies financial assistance to states for accomplishing tasks agreed to in regional plans as being in the national interest.

The State Fire Assistance program provides baseline technical and financial assistance to states. Over a billion acres of state and private lands are under protection of state and local fire agencies. Much of this land is adjacent to Federal lands and part of the wildland/urban interface. Efforts supported through Cooperative Fire Protection have reduced the average annual acreage burned on state and private lands to about 3 million acres per year in the last half of the 20th Century, compared to an annual average of 36.5 million acres during the first half. The Forest Service cost-shares at a rate of at least 50 percent of the state's contribution. On average, each Federal dollar leverages significantly more than two dollars in state funds.

The State Fire Assistance program provides financial assistance, technical training, and equipment to ensure Federal, state, and local agencies can deliver a uniform and

coordinated suppression response to wildfire. This is an important goal of the Federal Wildland Fire Management Policy and Program Review, conducted to ensure Federal policies are uniform and programs are cooperative and consistent across the landscape. The Policy and Program Review emphasizes fire planning and training in wildland fire suppression tactics, and the "incident command system" used for all emergency response actions nationally. In addition, the State Fire Assistance program furnishes funds to the states for community-based mitigation activities. These activities include hazardous fuels mitigation, community hazard mitigation, and education programs, including FIREWISE and prevention topics.

Federal excess personal property—The Federal Excess Personal Property program enables the Forest Service to acquire and loan fire suppression equipment to state and local fire agencies at no cost to the state. This program recycles 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 rural and wildland fire programs. States either use them directly or redistribute them to rural fire departments. Loaned 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. Conversion of an excess military truck chassis for use as a fire truck is typical. Since the program was implemented state and local fire agencies have received Federal excess personal property valued at over a billion dollars.

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

Smokey Bear—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.

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 to tackle the growing wildfire threat in the wildland/urban interface. The intent is to reduce the potential fire hazard associated with increasing numbers of homes in areas where forest and homes intermingle. As population and the desire to live in natural settings have increased, so has fire threat. The program seeks to educate the public about the problem, stimulate state and local governments to implement mitigation measures, and provide professional expertise, helping create a more fire-safe environment. An example is *FIREWISE,* a tool that assists communities, planners, insurance agencies, and others to mitigate losses to a community from wildland fire. Through presentations and workshop tools, such as fire mapping and wildfire simulations, about 1,000 community leaders and professionals, from 45 states and over 500 communities, have learned firsthand the complexities involved in building communities and citizens that are prepared for the effects of unwanted wildland fire.

Fire prevention—The Cooperative Forest Fire Prevention program provides a nationwide fire prevention program. Activities include public service advertising, educational and special prevention activities, licensing awards, corporate partnerships, and cooperation with other organizations to deliver the wildland fire prevention message. Both the Smokey Bear program and the Wildland/Urban Interface Fire Protection Initiative are major components of fire prevention, by helping to prevent 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 causes and developing efforts to

reduce person-caused fires. All the described programs aim to improve the states' ability to manage their fire problems. Fire protection on state and private land is basically a state or local responsibility. However, when state or local protection is inadequate, the Federal government is frequently called to assist. A Federal role is often necessary to efficiently transfer the latest technology, coordinate and encourage interstate cooperation, assess national trends, and disseminate information efficiently. It is also in the Federal government's best interest to have reliable firefighting forces available for extreme situations where Federal forces are not adequate. This is necessary because of the variability in fire seasons. It is efficient for all emergency organizations to plan for the norm, but to rely on outside cooperation and assistance when circumstances dictate.

Volunteer fire assistance

The Volunteer Fire Assistance program provides technical and financial assistance through states, to local firefighting organizations for protecting over a billion acres of state and private lands. The program targets volunteer fire departments that protect communities with populations of less than 10,000.

Local fire agencies are often the first line of defense in meeting expanded protection needs for wildland/urban interface areas threatened by wildfire. Of more than 35,000 local fire agencies nationwide, three-fourths are volunteer organizations. These volunteer fire departments protect almost half the United States population. The value of the service provided by volunteer firefighting organizations is estimated to exceed $36 billion annually.

The Volunteer Fire Assistance program supports local fire suppression efforts by providing grants, training programs, and technical assistance. On average, nearly 2,500 volunteer fire departments receive assistance through the program each year. The Forest Service grants funds to states, which cost-share with communities to leverage the value of the Federal investment and multiply results. The Volunteer Fire Assistance program promotes safe and effective initial attack by volunteer fire departments in wildland/urban interface areas. Assistance focuses on training, equipping, and organizing volunteer fire departments.

Fire and Aviation Management

The Fire and Aviation Management program protects life, property, and natural resources on 192 million acres of National Forest System lands. An additional 20 million acres of adjacent state, private, and other Federal lands are protected through fees or reciprocal protection agreements. Wildland fire management activities are conducted with the highest regard for firefighter and public safety. The Fire and Aviation Management program includes:

- Wildland fire preparedness activities on National Forest System and cooperative lands;
- Emergency wildland fire suppression on or adjacent to National Forest System lands or other lands under fire protection agreement;
- Hazardous fuel treatment;
- Support to Federal emergency response; and
- Emergency rehabilitation of burned-over National Forest System lands and affected water.

This program is guided by the principles and policies of the 1995 Federal Wildland Fire Management Policy and Program Review, updated in 2001. Ten principles are fundamental to the success of wildland fire management:

- The role of wildland fire as an essential ecological process and natural change agent will be incorporated into the land planning process.
- Fire management programs, plans, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all fire management activities.
- Firefighter and public safety is the first priority in every fire management activity.
- Fire management programs are economically viable, based upon values to be protected, costs, and land and resource management objectives.
- Fire management organizational needs are based on formal economic analysis of historical fire occurrence and workload to meet local protection needs.
- Fire management plans and activities are based upon the best available science.
- Fire management plans and activities incorporate public health and environmental quality considerations.
- Federal, state, tribal, and local interagency coordination and cooperation are essential.
- Standardization of policies and procedures among Federal agencies is an ongoing objective.

Fire and Aviation Management personnel have a large and complicated cooperative assistance role in the wildland fire suppression program. At every administrative level in the Forest Service, cooperative agreements exist that allow mutual and reciprocal assistance during wildland fire incidents. Agencies with wildland fire suppression responsibility realize that no agency, alone,

can respond adequately to all of the problems associated with wildland fire occurrence. As a result, agencies have developed cooperative assistance agreements and organized into centralized coordination centers that move firefighters and equipment where needed. These centers are situated locally, regionally (geographic area coordination centers), and nationally (the National Interagency Fire Center in Boise, ID). The principal mission of these coordination centers is cost effective and timely coordination of land management agency emergency response to wildland fire and other emergencies.

Five Federal land management agencies (Forest Service, USDI Bureau of Land Management, USDI National Park Service, USDI Bureau of Indian Affairs, and USDI Fish and Wildlife Service) and all 50 states have adopted common terminology, procedures, and practices that allow rapid and coordinated response to emergency situations. There are also agreements in place with the Department of Defense, National Guard units, Canada, and Mexico to cover other cooperative assistance and emergency situations affecting them. The National Wildfire Coordination Group, consisting of representatives of all Federal and state fire agencies, is responsible for developing and maintaining the wildland fire qualifications system, the incident command system, and training systems. The National Advanced Resource Technology Center, in Marana, Arizona, is an interagency center devoted to ensuring that all agencies receive consistent and high quality training in advanced wildland fire management.

The explosive nature of forest fires in recent years is a national concern. In August 2000, the President asked the Secretaries of the Departments of Agriculture and Interior to prepare a report recommending how to respond to severe ongoing fire activity, reduce impacts of fires on rural communities and the environment, and ensure sufficient firefighting resources in the future. The report, officially titled *Managing the Impacts of Wildfire on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000*, became known as the National Fire Plan (NFP). The NFP laid the foundation for a long-term program of work to reduce fire risk and consequences of severe wildland fires, and restore healthy fire-adapted ecosystems in the nation's forests and rangelands. The NFP recognizes the need to invest in long-term solutions to the buildup of excessive hazardous fuels (combustible vegetation) that threaten lives, property, and resources. Agencies also recognize the need to restore ecosystems and return fire to its natural role in the environment, keep firefighters and the public safe, and protect critical natural resources. NFP accomplishments are measured in terms of additional

firefighters hired and additional firefighting resources made available, additional fire-related research, hazardous fuels reduction, and rehabilitation and restoration projects completed.

Within this backdrop of policies and priorities, Fire and Aviation Management is organized around two broad program areas—Fire Preparedness and Fire Operations.

Fire preparedness

Fire Preparedness activities provide capability for the fire management organization to prevent, detect, and take prompt, effective initial attack suppression action on wildland fires. Preparedness activities include those associated with planning, prevention, detection, information and education, pre-incident training, equipment and supply purchase and replacement, and other preparedness activities. The Forest Service also helps other Federal agencies and states through cooperative agreements that provide for exchange of personnel and equipment during emergencies, training programs, planning assistance, joint use equipment contracts, and operation of interagency fire coordination centers. Fire Preparedness activities range from fire planning, to fire prevention and detection, to initial attack on wildfires, and include aviation management and allocation of national resources.

Fire management planning—The size and composition of the Fire Preparedness organizations on national forests are identified through an economics-based planning tool. The National Fire Management Analysis System (NFMAS) is an analytical tool used to identify the most economically efficient fire management organization. Building on the knowledge that fire suppression

costs are influenced by prevention, detection, and initial attack capabilities, NFMAS identifies the most efficient initial attack organization by projecting estimated fire suppression costs and changes in natural resource values for a range of organizations associated with different funding levels. Changes in resource values reflect damages incurred as a result of wildfires and the benefits of the residual forest, such as improved wildlife habitat. Analysis is based on historic data and economic efficiency principles. The NFMAS model helps develop the most efficient level of funding for the national fire management organization. The resulting appropriated budget is then allocated strategically among national, regional, and local units, using a benefit-cost optimization process. The preparedness allocation also funds national resources, such as the air tanker fleet and interagency hotshot crews. These resources are primarily used to support large escaped wildland fires.

Fire prevention—The fire prevention program seeks to minimize occurrence of human-caused wildland fire. Major elements within this program are public education (the Smokey Bear program and public service messages), law enforcement (industrial equipment operations schedules and inspections), and cooperative relationships (National Association of State Foresters and FIREWISE). Prevention activities also include restricting forest access in times of critical fire danger, limiting prescribed fires, restricting use of logging or other equipment, law enforcement, distributing educational literature, and personal contacts with visitors to National Forest System lands.

As more people choose to build homes, operate businesses, and recreate in areas where wildlands border urban areas, the threat to private property from wildland fire increases. Creating "defensible" or "survivable" space around structures can make the difference between returning to an intact home or a smoldering pile of ashes if a wildfire moves through the area.

Neither wildland firefighting agencies nor local fire departments can adequately protect the growing number of structures in interface areas. It is critical that private landowners take their own steps to protect their property. Many resources are now available to assist property owners, including a number of Web sites with excellent information on fire-resistant building materials, landscaping techniques, evacuation procedures, and so forth.

Fire detection—Fire detection comes from many different sources. The Forest Service maintains a network of fixed fire lookouts, contracts for aerial observation planes, and relies upon forest workers and visitors to locate newly occurring wildland fires. Early detection is a key element in controlling fire suppression expenses.

Initial attack—Initial attack refers to first response to a wildland fire occurrence. The Forest Service maintains an initial attack force of personnel and equipment, ready to deal with human- and lightning-caused wildland fire. The firefighter's primary job is to safely manage the occurrence of wildland fire. They use the principles in local land management and fire management plans to develop suppression strategies and tactics. These strategies and tactics range from aggressive attack to monitoring an occurrence that is providing ecological benefits.

Firefighting forces are mobilized in many configurations. Some firefighters are part of a hand crew or engine crew, some are assigned as part of a helicopter crew, and others are delivered from the air as smokejumpers or helicopter rappellers. While the primary mission of these firefighters is aimed at local wildland fire occurrence, they can also be called upon to support large mobilizations of personnel and equipment to fires anywhere in the country that have escaped initial attack, are threatening public safety and health, or are destructive to natural resources.

If they are not engaged in suppression activities, firefighters perform many tasks that contribute to the agency program. These tasks include recreation trail construction and maintenance, hazardous fuel reduction, building maintenance, and other forest management work.

Aviation management—The USDA Forest Service uses aircraft for a wide variety of missions, including operational personnel transport, research, forest rehabilitation, law enforcement support, aerial photography, infrared detection, and fire prevention and suppression. As of 2002, the Forest Service owns and operates 44 aircraft and annually contracts over 800 aircraft, fixed wing and helicopter. Aviation Management's primary mission is to support the ground firefighter through a variety of means, including safe delivery of smokejumpers and rappellers, air attack, firefighter and cargo transport, surveillance, aerial reconnaissance and fire intelligence gathering, and aerial delivery of fire retardant and water. Other specialized tasks are performed using airplanes and helicopters. Aircraft are used to locate and map fires, both ocularly and with infrared sensors, transporting cargo and personnel, and directing fire operation.

National resources—Some wildland suppression personnel and equipment are maintained and positioned as a supplement to local initial attack forces and as support to suppression of large fires. These resources are designated "national resources." As of 2002, national resources include a set of suppression equipment warehouses, a contract fleet of 44 retardant airtankers, 7 helicopters, 65 interagency suppression crews, 277 smokejumpers

Log grid constructed for soil erosion control in burned area emergency rehabilitatioin (BAER) project.

with support aircraft, and 2 aircraft with infrared sensor capability.

Fire operations

Fire Operations provide resources to (1) efficiently suppress wildland fires on or threatening National Forest System lands or other lands under a fire protection agreement, (2) rehabilitate burned-over National Forest System lands, and (3) reduce hazardous fuels. Some wildfires are "used" or managed to achieve resource benefits, depending on local planning and conditions.

Suppression operations—The suppression element within the Fire Operations program provides the direct support required to efficiently suppress wildland fires on or threatening National Forest System lands or other lands under a fire protection agreement. Suppression operations are also called extended attack, meaning suppression actions on fires that have escaped initial attack. Fire suppression activities are conducted with the highest regard for firefighter and public safety. Non-fire emergency management activities are conducted in support of the Federal Emergency Management Agency through Forest Service participation in the Federal Response Plan and other activities authorized by the Stafford Act of 1998 (P.L. 93-288 as amended).

Suppression of wildland fires burning on, or threatening, National Forest System land is a major hazardous program that varies in size from year to year. Fires are suppressed by ground and air attack. Ground attack includes use of hand crews, engines, and other mechanized equipment. Air attack includes smokejumpers, helicopters, air tankers, and other specialized aircraft for detection, surveillance, and transportation. Because of variability in fire conditions and firefighting costs from year to year, suppression expenditures above the appropriated level are financed by supplemental appropriations. Specialized tasks are performed using airplanes and helicopters. Aircraft locate and map fires visually and through infrared sensors, transport cargo and personnel, direct fire operation, and apply fire retardant.

Wildland fire respects neither political nor social boundaries. To mitigate the effects of this, Fire Operations leaders have developed a comprehensive system of interagency cooperation. A series of 11 interagency geographic area coordination centers and one national center are staffed throughout the year. Their mission is the cost effective and timely coordination of land management agency emergency response to wildland fire and other emergencies. By agreement, agencies share personnel and equipment during emergency response so that response actions are accomplished in a timely, efficient, and cost-effective manner.

Burned area emergency rehabilitation—Wildland fires often create situations that endanger natural resources, life, and property. Burned area emergency rehabilitation (BAER) projects may be needed to prevent or minimize threats to life and property, erosion and loss of soil productivity, deterioration of water quality, downstream damage, changes to ecosystem structure and function

(establishment of nonnative invasive species), or degradation of critical cultural and natural resources. Action must be quickly taken to minimize the consequences of a severe wildland fire. Trained specialists are assigned to large burns to survey, plan, implement, monitor, and maintain rehabilitation treatments. BAER project treatment options include seeding grasses, planting trees, and installing contour-felled logs. Rehabilitation measures can be expensive but constitute only about 5 percent of total suppression cost. Nonemergency replacement of fire damaged facilities and resources are programmed and budgeted through normal procedures.

Hazardous fuels reduction—Fire occurrence, fire behavior, damage from fire, and fire suppression costs can often be significantly influenced by managing natural fuels. The hazardous fuels program reduces the potential for large, destructive wildland fires by efficiently decreasing the volume of hazardous woody fuels in the forest and wildland-urban interface. Program activities plan, implement, and support fuel management, including inventory of hazardous fuels, analysis of treatment alternatives, determination and application of appropriate fuel treatment methods, and monitoring and evaluation of fuel treatment accomplishments.

Periodic applications of fire to landscapes, using wildland or prescribed fire, play a key role in restoring and maintaining fire-adapted ecosystems. The prolonged absence of fire and success of wildland fire suppression efforts have changed the characteristics of natural fire regimes in many ecosystems. Most notable are increased intervals between natural fires and an associated increase in fire behavior due to accumulation of fuels. These fuel accumulations, coupled with periods of drought and damage from insects and diseases, have created the conditions and potential for catastrophic wildfires in many areas across the country. Catastrophic wildfires compromise forest health and sustainable natural resource outputs. They also create a high risk to firefighters and public safety and health, as well as property loss and reduction in resource values.

Fuel treatment methods include prescribed fire, wildland fire managed for resource benefits, mechanical treatment, and chemical treatment. Program activities focus on high priority areas of fire-adapted ecosystems where risk of wildland fire and long-term damage to natural resources can be reduced through fuel treatment. The principal objectives of hazardous fuel treatment are to:

- Develop and implement a program of mechanical fuel reduction, wildland fire, and prescribed fire applications that reduce fuel loads and fire intensities. Reducing fuel loads will result in increased firefighter and public safety, improved property protection, lower suppression costs, reduced impacts of smoke production, and increased forest and range health.
- Manage wildland fires, under specific planned conditions, to achieve land and resource management objectives.
- Conduct the fuels reduction program in a manner consistent with legal authorities and land management objectives.
- Integrate hazardous fuels activities with the Cooperative Fire Protection program, particularly with respect to hazards in the wildland-urban interface area.
- Additional program objectives include increased use of excess woody material for fiber and energy production, improved water quality and yield, increased productivity of reforestation sites, improved recreation opportunities, increased grazing opportunities, and restoration and maintenance of fire-adapted ecosystems.

Fire use—**Fire use** is a major program element of Fire and Aviation Management. The program includes a combination of wildland fire use opportunities and prescribed fire applications to meet natural resource objectives. For centuries lightning-caused fires have created plant diversity, such as a mixture of wildlife habitats, while eliminating heavy fuel accumulation. Wildland fires are a fact of life and a natural component of ecosystems. **Wildland fire use means** http://www.fs.fed.us/fire/fire_new/fireuse/wildland_fire_use/use_index.html managing naturally ignited wildland fires to accomplish specific, prestated resource management objectives in predefined geographic areas, as outlined in fire management plans. Wildland fire use can manage fires so they burn in a natural way, providing benefits to other resources, and burning until fall rain or snow put them out. **Prescribed fires** http://www.fs.fed.us/fire/fire_new/fireuse/rxfire/rx_index.html are fires ignited by management actions to meet specific objectives. A written, line-officer-approved prescribed burn plan must exist, and National Environmental Protection Act requirements must be satisfied prior to prescribed fire ignition.

Administration and Organization

The Deputy Chief for State and Private Forestry is responsible for formulating and administrating cooperative programs at the national level. The Deputy Chief also coordinates with other agencies in the U.S. Department of Agriculture, states, tribes, and other agencies and organizations.

State and Private Forestry field programs are administered through the director of Northeastern Area State and Private Forestry located in Newtown Square, PA; the director of the International Institute of Tropical Forestry located in Rio Piedras, Puerto Rico; and regional foresters located at Forest Service regional offices in Juneau, AK; Missoula, MT; Vallejo, CA; Lakewood, CO; Portland, OR; Albuquerque, NM; Atlanta, GA; and Ogden, UT.

Relationships

More than any other area of the Forest Service, State and Private Forestry requires relationships with other units to accomplish its mission. In some cases, the relationship is a critical means to accomplish an end, as with agencies sharing firefighting resources. In other cases, the relationship is the end, as with coordination and liaison roles.

Other Forest Service programs

State and Private Forestry programs are closely integrated with Forest Service Research and Development, serving as an important link with state and Federal forestry agencies, industry, and nonindustrial private forest landowners in the transfer of technology from researchers to users of new knowledge. State and Private Forestry personnel participate with research scientists and user groups in selection of research projects, planning research, and inventorying and monitoring forest resources. Fire and Aviation Management also has a close relationship with the research function of the Forest Service. Each year, scientists undertake numerous research and development projects with a direct tie to Fire and Aviation Management concerns. In recent years, Congress has appropriated funds for the Joint Fire Sciences Program. Under this program, managers from the Department of the Interior, Forest Service, and research community select research and development projects with a direct benefit to Fire and Aviation Management. There are also two fire research labs that focus entirely on fire management—Riverside, CA, and Missoula, MT.

State and Private Forestry programs similarly have direct impacts on the protection and management of national forests and grasslands that are typically interspersed with or adjacent to private or other non-Federal lands. Cooperative Fire Protection programs are essential to protecting many lands, including National Forest System lands through reciprocal wildland fire protection agreements and close working relationships. Forest Health Protection programs help protect National Forest System lands from damaging forest insects, diseases, and noxious weeds. Through economic assistance programs, State and Private Forestry works closely with the National Forest System to enhance economic well-being of forest-dependant rural communities. Finally, Fire and Aviation Management helps support technology and development centers located at Missoula, MT, and San Dimas, CA. The Director of Engineering administers the centers. Center managers study and enhance existing equipment and systems and develop new equipment for wildland fire suppression.

State and Private Forestry programs are integrated into International Forestry programs where they cooperate to develop strategies to prevent introduction of exotic pests posing threats to the nation's rural and urban forests.

Other Federal agencies

Excess property—The Forest Service coordinates the Federal Excess Personal Property Program through the Director of Fire and Aviation Management. This program allows the Forest Service to acquire excess property from other Federal agencies and loan it to states needing equipment to support wildland fire suppression operations. For example, an excess truck might become a piece of firefighting equipment. This equipment remains Federal property and is subject to periodic inventory review.

Federal response plan—Fire and Aviation Management coordinates Forest Service participation in the Federal Response Plan. When needed, the Federal government furnishes state and local governments with necessary personnel, technical assistance, equipment, and other resources to provide effective disaster response. Over two-dozen Federal departments and agencies, along with the Red Cross, work through the Federal Emergency Management Agency to provide necessary support, recovery programs, and mitigation assistance.

National Fire Protection Administration—Representatives from Fire and Aviation Management participate on National Fire Protection Administration (NFPA) committees that work to reduce the burden of fire and other hazards on quality of life. The committees provide scientifically based codes and standards, research, training, and education to meet NFPA goals.

Aircraft Services—The USDI Office of Aircraft Services (OAS) is chartered to raise safety standards, increase aircraft efficiency, and promote economical operation of aircraft. OAS works with other Federal and state entities to meet these goals. The Forest Service partners with OAS to create a coordinated and nonconflicting aviation management program.

Animal and Plant Health Inspection Service—State and Private Forestry cooperates with the USDA Animal and Plant Health Inspection Service in the early detection, quarantine, and eradication of nonnative pests, such as the Asian long-horned beetle and gypsy moth, that pose a threat to the health of the nation's forests.

Department of Defense—State and Private Forestry provides technical and financial assistance to help protect Department of Defense facilities in the states from forest insects and diseases. Assistance is also provided to the Army Corps of Engineers.

Department of the Interior—State and Private Forestry provides technical and financial assistance to help protect lands administered by the Department of the Interior, including the National Park Service, the Bureau of Land Management, and tribal lands through the Bureau of Indian Affairs. This assistance helps protect lands from forest insects and diseases that pose significant threats to forest resources. In addition, State and Private Forestry works closely with various agencies in the Department of the Interior to protect all lands from wildland fires.

Others—State and Private Forestry coordinates with various Federal agencies on numerous programs aimed at improving conservation of the nation's natural resources. These programs focus on forestry incentives, environmental quality incentives, small watersheds, conservation reserves, resource conservation and development, wetland reserves, wildlife habitat incentives, agroforestry, and pesticide-use management and coordination.

Other programs

State forestry agencies and other non-Federal partners—State Foresters, or equivalent state officials, are the primary partners for State and Private Forestry programs. The National Association of State Foresters and Forest Service work together to protect the nation's forests from harmful insects, diseases, and wildland fire. Through technical advice, focused financial assistance, and conservation education, Federal resources are partnered to help bring forestry to all land managers, whether small woodlot owners, urban and community foresters, tribal foresters, state agencies, or Federal managers, in efficient and nonregulatory ways. Special partnerships with other agencies, nongovernmental organizations, and others help improve sustainability of the nation's rural and urban forests, as well as livability and economic well-being of communities and cities.

Fire prevention—Wildland fire prevention is a key part of the Federal and State Fire Management program. The Forest Service works with many agencies and organizations to promote the fire prevention message. Smokey Bear is a universally recognized symbol, and his message protected by a coalition of Federal and state agencies. These agencies work with the Ad Council to produce public service announcements related to wildland fire prevention. Another successful prevention program is FIREWISE. This program helps educate homeowners and business operators about fire-safe practices when living and working in the wildland-urban interface. FIREWISE members include Federal, state, and local fire professionals as well as representatives from retail, banking, insurance, chamber of commerce, civic, and other community organizations.

Research and Development

Forest Service Research and Development (R&D) is one of the world's leading forestry research organizations, conducting and sponsoring basic and applied scientific research. This research provides both credible and relevant knowledge about forests and rangelands and exciting new technologies that can be used to sustain the health, productivity, and diversity of private and public lands to meet the needs of present and future generations.

The mission of Forest Service R&D focuses on the contribution of knowledge needed for the sustainable management of the nation's forests and rangelands. Scientific information and new technologies increase the basic biological and physical knowledge of the composition, structure, and function of forest, rangeland, and aquatic ecosystems. Forest Service R&D is Federally mandated to provide new knowledge and technologies that will ensure sustainable natural resources for healthy watersheds, forest products, wildlife protection, recreation opportunities, and other benefits. In addition, Forest Service R&D is authorized to carry out research on an emergency basis when insects or disease-causing organisms impact conservation or environmental programs. The scope of the programs extends across all U.S. states and territories to Federal and non-Federal lands.

In order to meet the needs of public and private land managers, Forest Service R&D establishes priorities with input from Research Stations, National Forests, Congress, the Administration, and more. Research is prioritized according to (1) the nature and magnitude of current and anticipated problems and (2) information

required by managers for effective national resources management now and into the future. The scale of the problems and management needs differs between and among local, state, regional, national and even global levels. Research priorities are based on the Forest Service's mission to provide leadership in management of natural resources, mandates from Congress, Executive Branch priorities, and comments and suggestions from customers and peers.

Authorization

Public research in forestry began 127 years ago, when an amendment was attached to the free-seed clause of the Appropriations Act of 1876. The amendment provided $2,000 in funding for a person with "approved attainment, who is practically well acquainted with methods of statistical inquery [sic], and who has evinced an intimate acquaintance with [forestry matters]…" This was the first Federal appropriation devoted to forestry.

Dr. Franklin B. Hough received a congressional appointment to undertake a study encompassing forest consumption, importation and exportation, national wants, probable supply for the future, the means of preservation and renewal, the influence of forests on climates, and forestry methods used in other countries. Thus, a new governmental "organization" was formed that consisted solely of Hough, the organization's first forestry agent, and later its chief.

In 1883, Nathaniel H. Egleston replaced Hough and served until 1886, when Dr. Bernhard E. Fernow replaced him. As Chief of the Division of Forestry, Fernow set up scientific research programs and initiated cooperative forestry projects with the States, including the planting of trees in the Great Plains. In 1886, the Division of Forestry was given permanent status as part of the Department of Agriculture. Fernow continued as Chief until 1898, when Gifford Pinchot replaced him.

Pinchot established a Section of Special Investigations (Research). By 1902, it was an agency division directed by Raphael Zon with 55 employees and accounting for one-third of the $185,000 agency budget. Zon proposed creation of forest experiment stations to decentralize research. The first experiment station was established in 1908 at Fort Valley on the Coconino National Forest, then part of the Arizona Territory. The Forest Products Laboratory was set up in 1910 in cooperation with the University of Wisconsin. Research's importance to forest management was formalized in 1915 with the creation of a Branch of Research in the Forester's Office (national headquarters), headed by Earle Clapp.

By the 1920s, the Forest Service had 12 regional research stations. Two notable pieces of legislation were passed in the 1920s. The Clarke-McNary Act of 1924 included specific authorization for studies of problems in forest taxation and insurance of standing timber. The McSweeney-McNary Research Act of 1928 legitimized experiment stations, authorized broad-scale forest research, and provided appropriations. This act:

> "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 forestlands, 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...."

The McSweeney-McNary Act also authorized 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.

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. Amending the 1974 Act, the National Forest Management Act of 1976 contained further direction for studies related to forest and rangeland resources by including provisions for reports on opportunities for increasing use of fiber and wood wastes on National Forest lands. Several other acts provide authorities for Forest Service R&D:

Department of Agriculture Organic Act of 1944—Section 703 provides authority to erect, alter, and repair buildings necessary to carry out authorized work.

Granger-Thye Act of April 24, 1950—provides authority for advancing funds to cooperators for cooperative research.

Research Grants Act of 1958—provides authority to make grants to nonprofit institutions and organizations, with title to equipment purchased with such grants being vested with the nonprofit organization or institution.

McIntire-Stennis Act of 1962—authorizes the Secretary of Agriculture to cooperate and assist State colleges and universities in forestry research and to update facilities and equipment, on a matching fund basis.

Research Facilities Act of 1963—authorizes support of agricultural research (including forestry) at eligible institutions through Federal grant funds, on a matching funds basis, to help finance physical facilities and equipment as required for the effective conduct of agricultural research and related academic programs.

Agricultural Grants and Powers Act of 1965—provides authority to erect buildings and structures on non-Federal land, if a long-term lease on the land is obtained, and to make competitive grants to eligible institutions, including grants for facility renovation and refurbishment.

Food and Agriculture Act of 1977—provides authority for increased cooperation and coordination with state and other user groups; authorizes international research and extension; designates the U.S. Department of Agriculture as the lead agency for agricultural research, extension, and teaching; and eliminates some restrictions on the cooperative agreements and cost reimbursable agreements.

International Forestry Cooperation Act of 1990—authorizes support for international forestry and related natural resource activities outside the United States and its territories and possessions with a focus on countries that could have a substantial impact on emissions of greenhouse gasses related to global warming.

Food, Agriculture, Conservation, and Trade Act of 1990—provides six authorities, including establishment of a Semiarid Agroforestry Research, Development, and Demonstration Center; an International Forest Products Trade Institute; an International Institute of Tropical Forestry; and an Institute of Pacific Islands Forestry.

In 1978, the Forest and Rangeland Renewable Resources Research Act replaced the McSweeney-McNary Act of 1928 with a broader charter for research on forest and rangeland 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. The 1978 Act 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 rangeland resources in rural, suburban, and urban areas. Research must include, but not be limited to:

- Protection research related to protecting forest and rangeland resources, threatened and endangered flora and fauna, and wood products from fires, insects, diseases, noxious plants, animals, and air pollutants.
- Analysis and assessment research to develop and apply scientific knowledge to make and keep current a comprehensive survey and analysis of the present and prospective requirements for renewable resources of forests and rangelands and the supplies of such renewable resources.
- Management research related to managing, reproducing, planting, and growing vegetation on forests and rangelands for timber, forage, water, fish and wildlife, aesthetics, recreation, wilderness, and energy production and conservation.
- Environmental research related to (1) understanding and managing surface and subsurface water flow; (2) preventing and controlling erosion; restoring damaged or disturbed soils; (3) maintaining and improving wildlife and fish habitats; managing vegetation to reduce air and water pollution; and (4) understanding, predicting, and modifying weather, climate, and other environmental conditions affecting protection and management of forest and rangelands.
- Utilization research related to harvesting, transporting, processing, marketing, and distributing wood and other materials derived from forest and rangeland renewable resources, including recycling and utilizing wood fiber, and testing forest products.

The 1978 Act was amended several times to authorize energy production and conservation research, international natural resource cooperation, and recycling research.

Within this substantial backdrop of legal and administrative authorizations, Forest Service Research and Development is organized nationally under four broad program areas:

- Forest Resources Inventory and Monitoring
- Resource Valuation and Use Research
- Vegetation Management and Protection Research
- Wildlife, Fish, Watershed, and Air Research

Forest Resources Inventory and Monitoring

Forest ecosystem inventory and monitoring is critical to maintaining the ecological, economic, and social sustainability of America's forests. In absence of reliable information regarding forest status and trends, efforts to improve forest management and policy will be based on

guesswork, perceptions, and rhetoric. This area of research and development collects and analyzes data on the status, conditions, and trends of forest resources on both public and private lands, and provides results that characterize past, current, and future conditions to public and private land managers and other interested parties. Forest inventory and monitoring information is strongly desired by all parties with interests in forests: Federal and state lawmakers, land management officials, forest-based industries, environmental organizations, academic institutions and other research organizations, the media serving all of these interests, and the public. Everyone wants good information about forests.

The Forest Resources Inventory and Monitoring program supports these information needs through an integrated research program with three major components. Forest Inventory and Analysis reports on status and trends in the nation's forested resources. Forest Health Monitoring conducts related research on forest health. Monitoring and Methods Research provides more basic research, developing new indicators and measures for forest assessment and linking those measures to responses observed through other agency monitoring programs.

Forest inventory and analysis

The Forest Inventory and Analysis (FIA) program provides the only continuous inventory that periodically quantifies the status of forest ecosystems, including timber and nontimber information, across all land ownerships in the United States. The FIA program is the nation's forest census, reporting on forest ecosystem attributes including location, area, composition, and structure of forests; growth, mortality, and removals of trees; structure and distribution of nontree vegetation and woody debris; amount and types of wood products produced; and land ownership.

The FIA program is undergoing major changes required by the Agriculture Research, Extension, and Education Reform Act of 1998. These changes increased emphasis on state-Federal partnerships and cost sharing in order to deliver the full range of services called for in the legislation. Other changes include annualized inventory in all states; a five-year reporting of resource information in each state; development of nationally consistent data collection procedures for reliable multi-state analysis; and development of enhanced remote sensing capabilities for improved spatial analysis.

The FIA program depends on internal and external partnerships. Internally, both National Forest System (NFS) and State and Private Forestry (S&PF) provide funds and staff to implement the program. NFS contributes resources to support implementation of FIA on all National Forest lands. S&PF contributes funds to support forest health related data collection and analysis. States and other external stakeholders have a strong self-interest in helping to fully implement the new legislative mandate. Some partners make direct contributions of funds or staff to collaborate in program implementation; other partners provide a range of in-kind services that facilitate or add value to program outputs.

Key customers of the FIA program include state and Federal forest policymakers, State Foresters, forest industry and consultants, environmental organizations, state and Federal land managers, researchers, journalists and media interests, and a large portion of the public who care about the status of America's forests. All of these users rely in varying degrees on access to up- to-date, accurate data describing the current state of forested resources and their change over the past 100 years. FIA is expanding the scope of data elements collected by incorporating measurements of soil, understory vegetation, woody debris, crown conditions, and lichen communities. These measures were developed by the Forest Health Monitoring program (see below) and are now being collected on a subsample of FIA plots. FIA is also entering into a partnership with the USDI Geological Survey to incorporate satellite imagery into our sample system, increase sampling efficiency, and develop new products.

Forest health monitoring

The Forest Health Monitoring (FHM) program is designed to report on status and trends in forest health. It consists of three phases: (1) a detection monitoring component comprised of ground and aerial sampling designed to detect changes in forest health; (2) an evaluation component designed to assess causes of changes in forest health and provide guidance for appropriate management activities; and (3) an intensive site monitoring component designed to develop quantitative linkages between observed changes in forest health parameters and the likely long term effects on forest health.

FHM is a partnership between Forest Service R&D and State and Private Forestry. R&D contributes primarily to the intensive site component of FHM, conducting research on development of new indicators and on the establishment of linkages between indicators and observed effects in forests. The FHM program formerly included a field plot program component, also funded in part by R&D; this component has now been merged into the FIA program. State and Private Forestry contributes

almost $8 million and expertise in evaluation, monitoring, and forest health survey to the partnership.

Monitoring and methods research

Monitoring methods and applications research is needed to develop and test new techniques for understanding the role of biotic and abiotic agents and the impact of their interactions on forest ecosystems. New technology constantly provides new opportunities to increase the efficiency and effectiveness of forest monitoring programs. New questions posed by society constantly add to the list of information requirements, which we ask our Inventory and Monitoring programs to address. Land managers need to know how to interpret the results of monitoring activities and how to incorporate this information into their management practices.

Monitoring and Methods Research (MMR) addresses some of these needs. MMR consists of a wide array of small-scale research projects aimed at answering specific questions or developing techniques to address a specific monitoring need. These methods and technologies frequently require long-term studies where considerable research is needed to identify and correlate indicators that can assist in measuring the health, productivity, and sustainability of forest ecosystems. Examples of supported research include the application of high resolution satellite imagery for detecting outbreaks of insects, diseases, or invasive plants; development of habitat indicators needed to protect rare or threatened species; and development of air quality gradient models linked to lichen species community composition for monitoring changes in forest health. This research area also includes syntheses, through scientific conferences or publications, of existing state-of-the-art knowledge for monitoring forested ecosystems in order to make information more accessible to managers and other forestry practitioners.

Resource Valuation and Use Research

Meeting the needs of the nation's increasing and diverse population requires better understanding of social and economic tradeoffs of various resource management use and policy options and the role of technology in changing these tradeoffs. Objective, science-based information and technology will:

- Provide comprehensive analysis of present and anticipated uses of, demand for, and supply of the renewable resources of the nation, with consideration of the international situation.
- Develop new information on the benefits of community and urban ecosystems, as well as information to improve protection of these ecosystems from fire, insect, and disease.
- Integrate social, economic, and biological factors to help examine the sustainability of the nation's resources.
- Promote sustainability and conservation of forest resources through improved processing, design and treatment of products for durability, and recycling to reduce demand on natural resources.
- Develop environmentally and economically acceptable utilization systems for a range of biobased products, including bioenergy.
- Provide new data and information on recreation and cultural heritage.

Resource valuation and use research includes six areas of research, ranging from renewable resources economics research to forest products research and wilderness research.

Renewable resources economics

Efficient land use and management depend on knowledge of values associated with management inputs, resources, and outputs. To provide this knowledge, the Renewable Resources Economics Research program monitors markets for forest products, analyzes the economic efficiency of alternative management actions, and assesses the status and trends of the national and international renewable resource situation. Available markets for timber products often determine management options.

Current research emphasis areas include: (1) modeling timber supply and demand, taking into account international trade flows and situations; (2) evaluating the economic potential for the management of southern forests; (3) providing economic and social guidelines for multiple-use management of forests and rangelands for production of water, recreation, livestock, fish and wildlife, aesthetics, and timber; (4) analyzing alternative government policies and programs for improving management of forests, rangelands, and related resources, and (5) evaluating the economic and social costs and benefits of the preceding policies and programs, including the responses of private landowners, industry, and the public to them. For example, the RPA Assessment uses models of timber markets developed by this research program to develop projections of future market conditions.

Urban forestry

Urban and community forests serve many ecological and aesthetic functions while providing many benefits

to the more than 200 million people in the United States that live and work in cities, towns, and villages. Recent analysis found that metropolitan areas (urban counties) cover one-fourth of the 48 coterminous states and contain about 75 billion trees that cover one-third of the land. This average tree canopy-cover in urban and metropolitan areas is close to that for the overall United States (32.8 percent), demonstrating that urban areas have significant tree canopy.

Urban forestry research and development has evolved to include study of the urban forest ecosystems and wildlands at the urban-rural interface, as well as social and economic aspects of the population's use of, and impact on, this land area. Metropolitan population trends and characteristics and their natural resource needs must also be tracked and understood by urban land managers. Forest Service R&D evaluates the causes of urban sprawl and how vital urban ecosystems can be sustained.

Urban centers are now often the location for major new discoveries of invasive insect and vegetative disease outbreaks. As international trade and travel become more common, these threats become more acute in our urban forest ecosystems. Research will develop improved methodologies for conducting forest inventories and forest health monitoring in metropolitan areas, as required by existing legislation.

The Urban Forestry Research program will continue to develop more accurate measures of urban forest ecosystem benefits, such as (1) shade to reduce summer heat island effects and related energy costs; (2) improved human health potential through understanding of ultraviolet radiation; (3) improved air quality and carbon sequestration; (4) mitigation and control of rainfall runoff and flooding; (5) improved wildlife habitat; and (6) enhanced landscapes for recreation in the cities and communities. Urban forestry research will also continue to develop information on urban-wildland hydrologic processes in rapidly growing population centers, especially where dependence on high quality water often means dependence on water from National Forest System lands. Also, Forest Service R&D will continue to be a major participant in the National Science Foundation's Long Term Ecological Research in Baltimore and the Chesapeake Bay watershed.

Urban-wildland forest vegetation poses an increasing fire threat to the expanding populations in these land areas. Research will emphasize development of better ways to assess fire risk with new remote and on-the-ground technologies, and development of better information on how to educate the public on fire risk and management.

Wilderness

Increasing use of wilderness areas and development pressures outside of wilderness create stresses that threaten the biological and societal benefits derived from these unique areas. Forest Service wilderness researchers provide managers and policymakers with research results that improve understanding of the structure, function, and composition of wilderness ecosystems; the biological and social impacts of human activities on wilderness; the role of wilderness in larger social systems; and impacts of different policy and management alternatives on wilderness. Two Forest Service research units conduct wilderness-related research: the Southern Research Station's unit in Georgia and the Aldo Leopold Wilderness Research Institute in Montana.

The Southern Station's Recreation, Wilderness, Urban Forest, & Demographic Trends research unit assesses wilderness supply and demand, including values and uses associated with wilderness management as they relate to nearby urban and rural communities. However, wilderness-related research is a small portion of the unit's larger research agenda on social trends. Scientists conduct studies designed to maintain current statistics on sustainable management of wilderness areas, including national and local surveys. Priority research areas include:

- Survey of American households to characterize wilderness use, awareness, and attitudes towards protection alternatives
- Public perceptions of the importance and values associated with wilderness areas
- Role of wilderness in the lifestyles, quality of life, and economic livelihoods of residents near wilderness areas
- Theory, data, and methods for segmenting the American public to enhance outreach, education, and involvement with wilderness areas
- Sampling approaches for estimating recreation use of wilderness
- Indicators for monitoring the use and status of wilderness areas
- Methods and tools for delivering findings from research on wilderness.

The Aldo Leopold Wilderness Research Institute is the primary Federal research unit dedicated to developing knowledge needed to improve management of wilderness and other natural areas, both nationally and internationally. Formally established in 1993, the Leopold Institute operates under an interagency

agreement among the four wilderness management agencies (the Forest Service along with the USDI National Park Service, Bureau of Land Management, and Fish and Wildlife Service) and the Biological Resources Division of the USDI Geological Survey. Although the Forest Service's Rocky Mountain Research Station administers the Leopold Institute, managers and scientists from all five agencies play an active role in developing Institute programs and priorities. The primary goals of the Leopold Institute are to:

- Develop knowledge needed to protect and preserve wilderness and the ecological and social values derived from wilderness.
- Communicate and apply this knowledge to the wilderness management agencies and other user groups.

Current research includes: (1) use-density management in wilderness areas; (2) personal, societal, and ecological values of wilderness; (3) restoration of natural fire to wilderness areas; (4) development of a national wilderness preservation system database; and (5) use of natural variability concepts in managing ecological systems.

Recreation, social, and cultural

Social sciences address the human dimensions of natural resource protection and management. The disciplines and specialties of Forest Service research social scientists are many, including: economics, geography, sociology, social and environmental psychology, anthropology, archaeology, human ecology, political science, and landscape architecture. A broad range of research specialties are pursued, but can be broadly categorized as economic (described above under "Renewable Resources Economics"), recreation, social, and cultural heritage research.

Social scientists conducting recreation research assess changing patterns of recreation supply and demand, values, attitudes, behaviors, and satisfaction levels to help Forest Service managers and partners meet the growing demand for recreation products and services. Current outdoor recreation research addresses issues facing forest managers with studies that provide:

- Assessments of national and regional recreation demand, use, and supply trends.
- Models, methods, and technologies for accommodating increasing demands for recreation resources.
- Understanding recreation needs and perceptions of an ethnically diverse clientele.
- Knowledge, perceptions, and impacts of recreation fees on visitors.
- Understanding psychological factors affecting the recreation experience.

These and other studies give managers information needed to develop new recreation management strategies and adapt current recreation facilities and services to meet needs of visitors and partners.

Social science research also meets a broader information need about people and their relationship to forests and grasslands. This research assesses: (1) impacts of forest activities on communities; (2) the nature of collaboration and how communities and national forests can interact successfully; (3) how demographic patterns and changing ethnic, cultural, and social values affect forest management options; and (4) regional and local socio-economic conditions within which national forest decisions are made.

Research scientists within the social science program also conduct cultural heritage research. This research examines historic and contemporary societies' use of natural resources to help resolve current resource use conflicts, enhance heritage tourism opportunities, and achieve sustainable forest management. Current research includes: (1) economic, social, and cultural contributions of public lands grazing; (2) relationships between climate change, history, and sustainability; and (3) temporal and spatial modeling of anthropogenic landscapes.

Forest products utilization and processing

Forest products utilization and processing research provides science and technology needed to conserve the nation's forest resources as consumer demand for wood products increases. This work is done at the Forest Products Laboratory in Madison, WI, and a network of utilization research units in the Pacific Northwest, Northeast, and South. Forest products utilization research produces information and technology to help manufacturers, mills, and small business operators become more efficient and friendly to the environment. Since the beginning of the last century, research to improve technology has increased industrial wood productivity by 40 percent.

Utilization and processing research responds to the national goal of tripling the use of emerging biobased products and bioenergy by the year 2010, as well as specific issues of national significance: (1) use of wood frame construction in 90 percent of single-family houses; (2) annual per-capita consumption of 770 pounds

of paper and 880 pounds of lumber and composites; (3) millions of acres of western forests that are at risk for wildfire, disease, and insect attack due to overstocking with small diameter trees; and (4) the need to conserve forests, provide jobs, reduce landfill space, and reduce conflict over competing resources through wood fiber recycling.

Forest Service research will enhance the benefits of biobased products and bioenergy at all stages of development. Research will: (1) develop technology for increasing our nation's paper recycling rate; (2) develop innovative, recycled uses for renewable, wood-based materials; (3) develop biopulping and nonchlorine bleaching technologies to reduce carbon emissions and effluents; (4) develop nondestructive methods for determining defects in wood; and (5) identify utilization options for small diameter timber such as development of value-added products and bioenergy.

Examples of current research include:

- Pulp molded materials. Technology has been developed to produce three-dimensional wood fiber pulp molded material for use in structural and some light-duty, structural applications.
- Utilizing small diameter timber. A vast resource exists on millions of acres of overcrowded forest lands in the form of small diameter and low-valued timber. To reduce fire danger and improve forest health, Federal land management agencies are looking for markets for this material to offset the cost of thinning and removal. Engineered applications are being developed for this round timber, including innovative mechanical connection designs that maximize the engineering properties of this low-value material for use in high-value building construction applications.

Forest products use for human safety and health

People live, work, and play in virtual constant contact with wood products. They trust wood to hold up their floors and roofs, protect their personal hygiene, provide safe habitats and leisure products for their families, and provide safe food additives. This line of forest products research: (1) ensures that wood products can be properly designed, manufactured, treated, tested, and used; (2) provides a credible source of unbiased information to ensure safety of wood-based products in nonresidential construction through development of performance information for national consensus standards and codes; (3) improves designs for wood construction to ensure safety under hazardous conditions such as hurricanes, earthquakes, and fire; (4) improves durability and performance under conditions favorable to deterioration; (5) mitigates the environmental impacts of processing, use, and disposal of wood preservatives and adhesives; and (6) develops technologies to recycle salvaged wood decking and fencing into a variety of decay-resistant board products, thereby avoiding the need to landfill it.

The Forest Products Laboratory Center for Advanced Housing Technology conducts high priority research in coordination with industry, universities, and other Federal agencies. This research evaluates technology needed for both new and existing housing and will encompass all types of residential structures in which wood and/or wood-based products are used as primary or secondary building components. Emphasis is on the improved use of traditional wood products; use of recycled and engineered wood composite materials; energy and sound efficiency; indoor air quality and improved living environment; and natural disaster resistance. The Center focuses research not only on the housing structure, but also on the latest theories and ideas in landscape design; options for water conservation and recovery; and improved surrounding environment to make housing more livable.

Examples of current research include:

- Grading standards for lumber reclaimed from building deconstruction. According to the EPA, over 200,000 buildings in the United States are torn down and landfilled every year, most of them wood-frame buildings. There is great potential to salvage this solid wood lumber and use it again for home construction; however, no standards exist for regrading and reuse. The Forest Products Laboratory is working cooperatively with several wood industry partners to develop these standards. This research will save millions of board feet of usable lumber from being landfilled, while helping conserve our nation's natural resources and easing harvesting pressure on our existing forest resource.
- Creosote modification or replacement. Creosote is still an important and useful preservative treatment for some wood applications, but it can present severe handling problems due to surface deposits, vapor emissions, and skin irritations. A novel, highly stable creosote emulsion is being tested for treatment efficacy as a new environmental friendly yet effective preservative treatment for these wood products. In addition, new ways to bioprocess wood treated with copper-based preservatives (45% of all preservative formulations) is being developed and tested. If successful, this will provide a breakthrough in naturally recycling treated wood that has ended its service life.

Vegetation Management and Protection Research

Vegetation Management and Protection Research (VMPR) primarily addresses understanding and managing terrestrial ecosystem processes and interactions—nutrient cycles, energy flows, vegetation, and soil dynamics. This research focuses on enhancing forest and rangeland productivity and health; restoring degraded ecosystems; and predicting and managing disturbances. Major program areas include vegetation management; silviculture; carbon inventory; genetics; biotechnology; soils; forest and rangeland production; fire and other disturbances; native and nonnative insects; pathogens; plants; microbes; climate change; and forest operations. Associated program components shared with, but managed through other research and development programs, include water and water quality, riparian management, wildlife and wildlife habitat, threatened and endangered species, inventory and monitoring, economics, and forest products.

The mission of VMPR is to conserve, restore, and maintain natural resources in a sustainable manner and produce results that yield multiple benefits for people within our ecosystems. VMPR, therefore, recognizes its responsibility to provide the knowledge, range of options, and practical technologies to forest and rangeland owners, communities, and managers to help meet the changing demands on the resource base, while maintaining sustainable lands. VMPR develops knowledge and tools to better understand the dynamics, structure, and productivity of forest and rangeland systems. Studies are conducted under the following areas.

Forest and rangeland management

Scientific and technical information is critical for understanding how to manage and protect forest and rangeland vegetation, and for producing an array of products and services, while maintaining health, productivity, and environmental values. VMPR provides the technical knowledge base, essential tools, techniques and guidelines, and models to maintain and restore ecological function, diversity, and productivity of the nation's forests and rangelands. This requires an understanding of vegetation dynamics (in the context of our chemical, physical, and social environment) and how management practices affect the productivity, sustainability, biodiversity, and character of forest and rangeland ecosystems.

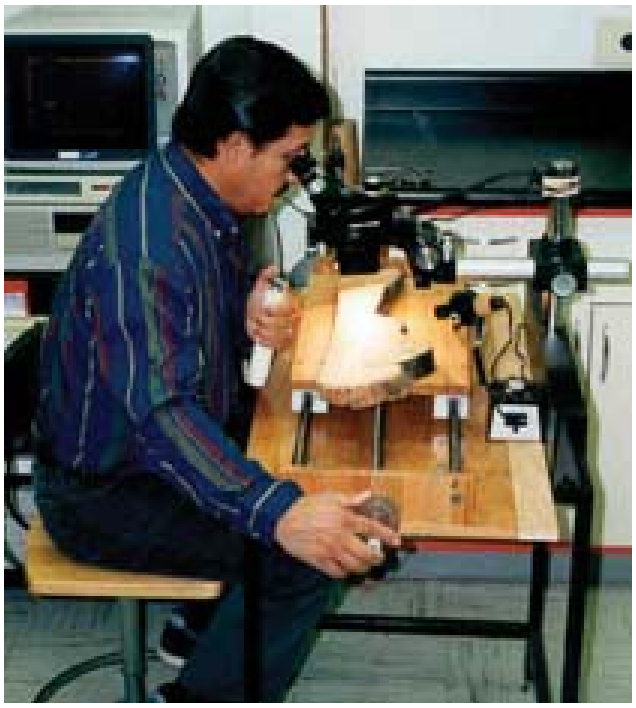
Areas of emphasis include:

- The role of natural and human-induced disturbance in sustaining healthy and productive ecosystems, focusing on recurring and ongoing disturbances such as fire, nonnative invasive species, insect and disease, drought, wind events, floods, and effects of animals.
- How ecological processes govern the structure, function, health, and productivity in forests and rangelands, and how global climate change, the environment, and social systems affect the frequency and amplitude of disturbance.
- Returning degraded ecosystems to properly functioning systems by restoring essential components responsible for ecosystem structure, composition, and function.
- Vegetation dynamics, long-term recovery potential, and ways of accelerating the recovery potential.
- The interaction and aggregate effects of landscape processes, events, and changes within longer temporal and larger spatial scales.
- Prevention and mitigation of nonnative species invasions associated with disturbances, including models to measure, predict, monitor, and mitigate disturbances to decrease response and recovery costs.
- Introducing disturbance events to increase productivity, sustainability, and environmental quality, including the effect of human activities on patterns and profiles of disturbance events.

Fundamental plant science

To sustain healthy, diverse, and productive forests and rangelands, scientists and managers must understand the basic biological and ecological processes governing these systems. For this reason, a significant portion of the VMPR Research and Development program focuses on ecology, genetics, biotechnology, and plant physiology. This effort measures, analyzes, and models the interactions of environmental, biochemical, genetic, physiological, biological, and ecological factors regulating the composition, structure, function, and growth of forest and rangeland vegetation. These factors include water and nutrient relationships, carbon allocations and storage patterns, and physiological processes regulating plant defense mechanisms for resistance to various biotic and abiotic factors, such as heat, drought, cold, insects and diseases, fire, and pollutants.

Priority research areas focus on: (1) the role of belowground processes in the health of forest and rangeland ecosystems; (2) detecting pollutants in remote forest locations; and (3) how plants and soils hold carbon and nitrogen, and how much can be held in forest and rangeland ecosystems before they leak these compounds.



Scientists can reconstruct the history of fire in forests by dating patterns of fire scars in cross-sections of trees.

Silvicultural applications

Silvicultural research and development provides the primary applied ecology knowledge base for forest management by defining the effects of management practices on vegetation composition, reproduction, growth, dynamics, and forest health. Silvicultural practices are needed to maintain and enhance production of fiber and other forest products, biological diversity, wildlife habitat, fuels management, carbon storage, and watershed protection. For example, tree seeding and planting is used to restore degraded lands, manage sites after extreme natural disturbance events, and adjust to human impacts.

Silvicultural research and development addresses ongoing needs for improved regeneration and restoration of forest vegetation, and improving the economic and environmental effectiveness of fuels treatments, harvesting, and wildlife habitat improvements. Ongoing research addresses concerns about the effects of silvicultural practices on biodiversity, and soil, air, and water quality. Priority research areas include:

- Biology and culture of growth and development of conifer and hardwood tree species.
- Quantitative relationships of tree growth, stand structure, and silvicultural practices to ecosystem productivity, including quality and quantity of wood and abundance and diversity of other biota in forest stands and landscapes.
- Silvicultural systems to meet diverse management goals.

Forest operations and engineering

Forest operations provide access, regeneration, cultural treatments, harvesting, and utilization as part of active forest management. Managers of both public and private forests need cost-effective techniques and technology to provide a full array of values and services, while protecting and enhancing the health and productivity of forest resources. Improved science and technology includes:

- Landscape scale planning and visualization;
- Technologies that are light-on-the-land and protect soil and water resources;
- Science-based “best management practices” and techniques that ensure sustainability;
- Management and utilization systems that are economical in small-diameter stands; and
- Cost effective ways to apply forest management practices at all levels and forest types.

Cost effective, environmentally acceptable operations are critical to the U.S. to meet the needs for future generations and to remain internationally competitive. The science and technology developed from forest operations and engineering research make it possible for landowners and forest managers to engage in active forest management that is acceptable to the public.

Research technicians obtain tree age through an increment core.

Invasive insects, diseases, and plants

Native and nonnative invasive insects, diseases, and plants can cause serious damage to forest and rangeland health and productivity. Forest pests and pathogens, such as white pine blister rust, root diseases, gypsy moth, and bark beetles, are a major cause of tree mortality in many regions of the United States. Nonnative invasive species, in particular, are a rapidly escalating problem due to increasing introductions through global trade and travel. Losses due to nonnative invasive species include reduced property values, altered fire cycles, decreased water yield, increased soil erosion, impacts on commodity and noncommodity resources, potential shifts in forest types, and damage to structures.

Invasive species research and development uses both long-term ecological studies and short-term applied research to develop knowledge and tools that are essential for preventing and mitigating severe impacts to the nation's forests and rangelands and for restoring degraded ecosystems. Past accomplishments include:

- Tools for slowing the spread of gypsy moth;
- Rapid identification of Asian gypsy moth that allowed quick detection and eradication;
- Improved survey and control guidelines for Asian longhorned beetle based on pesticide efficacy testing and study of host plant susceptibility;
- Evaluation of impacts and development of control options for cheatgrass, Miconia, and other invasive plants; and
- Implementation of an integrated research program for rapid detection and control of the Sudden Oak Death pathogen.

The current research program focuses on studies that can increase our understanding of how both native and non-native species affect forest and rangeland health, and, conversely, how forest and rangeland conditions, management actions, and environmental stresses influence insects, diseases, and plant damage trends. Research includes:

- Weed ecology studies in high elevation and grasslands, with emphasis on biologically based controls;
- Ecological studies to support restoration of sites after treatment of weeds;
- Monitoring protocols for invasive plants;
- Integrated control strategies and technologies for invasive insects and pathogens threatening forest and rangeland health; and
- Knowledge and technology that support pest risk assessments.

Quantitative analysis

Forest and rangelands are complex systems that are functionally integrated across spatial and temporal scales. Natural resource policy and management must be based on scientific understanding of how the resources function and respond to change. The Quantitative Analysis program promotes integration of disciplines to design experiments, analyze results, and synthesize and make predictions about complex systems across spatial and temporal scales. Research emphasis areas include:

- Quantifying forest and rangeland system processes at multiple scales;
- Integrating our understanding of forest and rangeland system function and process at multiple scales;
- Developing management strategies based on this integrated understanding; and
- Developing prediction systems of forest and rangeland response to treatment alternatives.

Specific research focuses on: (1) measurement, analysis, and modeling of forest ecosystems in a changing environment; (2) quantitative methods for modeling ecosystem response; (3) integrating social and biophysical sciences for natural resource management; (4) management of natural disturbance regimes; (5) the effects of environment and management on forest ecosystem processes; (6) sustaining alpine and forest ecosystems under atmospheric and terrestrial disturbances; and (7) the biological foundations of southern forest productivity and sustainability.

Fire sciences

Fire has been a periodic disturbance in most natural ecosystems for millennia. These ecosystems have evolved with fire and often depend on fire for regeneration and rejuvenation. But fire is also a destructive force that can cause serious and costly damage to resources, life, and property. Fire suppression and other activities since European settlement have disrupted historic fire cycles and have led to declines in forest health, susceptibility to insects and disease, and unnatural fuel buildups in many areas. The National Fire Plan recognizes the need to modify our fire management systems to restore ecosystem health, assure long-term productivity, and minimize resource damage and effects on life, property, and society. The Fire Sciences Research program helps

Using rainfall simulation equipment, scientists compare postfire emergency rehabilitation treatments.

provide the scientific basis for fire management needed to support the National Fire Plan.

Fire research and development focus on:

- Knowledge and tools to make these changes and to evaluate their effects;
- Models and decision support systems to enhance firefighting capacity and preparedness;
- Strategies for postfire rehabilitation and restoration treatments, and management of invasive species to help restore ecosystem health;
- Improved approaches for assessing and monitoring fuels and fire risk, for fuel modification, and for economically viable utilization of small diameter materials;
- Social and economic dimensions of fire and fuel management;
- Ecosystem responses to alternate fire management treatments (including emissions, air and water quality, wildlife, site productivity, and health);
- Improved models of effects of weather and other factors on fire behavior and smoke impacts; and
- Methods for protecting wildland-urban interface communities.

Research results are not only utilized by Forest Service fire management programs, but by a wide array of other local, national, and international fire management agencies.

Global change

Relationships between climate changes and forests and rangelands can have tremendous social and economic implications. Understanding these relationships enables managers to manipulate forest and rangeland systems to enhance beneficial changes and to mitigate detrimental regional and global impacts. The Global Change research program is a broad, multidisciplinary, collaborative approach that integrates other research programs. For example, biomass increases of U.S. forest lands over the last 40 years added millions of metric tons of carbon, enough to offset 25 percent of U.S. emissions for that period, and account for a significant portion of the missing carbon in the global carbon cycle. Similarly, increased amounts of carbon in harvested wood and large reforestation programs may have a substantial effect on the rate of carbon sequestration.

Studies focus on:

- United States' carbon budget and the rate of carbon sequestration;
- Energy efficiency in the forest products sector, while reducing carbon dioxide emissions from fossil fuels and sequestering carbon in long lasting forest products;
- Fires and air quality (greenhouse gas emissions which increase global warming), using aircraft remote sensing and other sophisticated monitoring technology;
- Role of global change in modifying the frequency and severity of ecosystem disturbances such as fires and insect and disease outbreaks; and
- Changes in forest growth and composition due to global changes and their impacts on habitats of threatened and endangered species.

Wildlife, Fish, Watershed, and Atmospheric Sciences Research

The diversity and viability of fish and wildlife populations and communities, the purity or quality of water and air, and the productivity and quality of soils are key indicators of the health and sustainability of forest, rangeland, and aquatic ecosystems. These attributes also serve as important indicators of the effects of management and other human activities on ecosystems and their component processes and species. Research and development in this area enhances understanding of organisms, populations, ecosystems, and ecological processes. Research provides results and knowledge that are essential in managing forests and rangelands to sustain air, water, and soil quality and biological diversity.

Information provided by this research is crucial to the Forest Service's ability to comply with requirements of key environmental statutes, including the National Forest Management Act of 1976, Endangered Species Act of 1973, Clean Water Act of 1977, and Clean Air Act of 1955.

Scientists conducting research in this area work closely with resource managers to synthesize research results; provide knowledge and technology in support of management; develop information required to enhance forest and rangeland noncommodity resource values; and develop, adapt, and evaluate management approaches. Priority areas of research include wildlife and fish habitats, with strong emphasis on threatened, endangered, and sensitive (TES) species; watershed processes including water quality and quantity; atmospheric science; and soils.

Wildlife and fish habitat

Wildlife and fish habitat research focuses on conservation of species and ecosystems, and on maintaining species viability, through protecting, restoring, and managing habitats in managed landscapes. The research goal is to provide land managers with guidelines for integrating species conservation and protection of wildlife and fish habitat with other forest management activities. Information developed by research has played a critical role in forest land management decisions in the past few decades, allowing land managers to reverse population declines of threatened and endangered species, such as the Puerto Rican parrot, red-cockaded woodpecker, and several inland fishes. Research information has also been instrumental in developing conservation plans for sensitive species, such as the California spotted owl, northern goshawk, and the Rio Grande cutthroat trout, providing effective protection without the need for formal listing. Avoiding listing contributes to species conservation, preserves management flexibility, and keeps the forest open for many other uses.

There are high costs associated with management of TES species. Most land management appeals and litigation result from managers not having adequate information to develop conservation plans. Time-consuming appeals and litigation not only increase the cost of land management, but also limit opportunities for managing forest resources and uses. Long-term research goals are to develop the scientific knowledge base for effective management of wildlife and fish habitats, for maintaining diverse and viable populations of animal and plant species, for reducing the need for species listings, for reducing the number and complexity of appeals and litigation, and for preserving greater latitude in and reduced costs of land management. Research focuses on enhancing knowledge of the habitat and ecosystem requirements of wildlife and fish species, with special emphasis on TES species; on developing and furnishing technical support for agency approaches to population viability analyses; and on supplying the technical basis for developing recovery plans for endangered species and conservation plans for sensitive species.

Northern spotted owl (*Strix occidentalis caurina*) perched in a western redcedar (*Thuja plicata*).

Wildlife habitat—Over 1,100 species of animals and plants are Federally listed as threatened or endangered. Approximately 360 of these species are associated with national forests and grasslands. Another 2,500 species are categorized as sensitive, meaning a species for which continued population viability is a concern. National forest managers are seriously challenged to maintain diverse and viable populations of plants and animals and to comply with provisions of the National Forest Management Act of 1976 and the Endangered Species Act of 1973. Forest Service R&D provides managers with technical information needed to select appropriate sensitive and keystone species for focus and to sustain

plant and animal populations by protecting, managing, and restoring high quality habitat. Special emphasis is placed on threatened and endangered species, and on declining or vulnerable species and communities such as neotropical migratory birds, old-growth forests, and riparian areas. Managers use information generated by Forest Service R&D to develop recovery plans for endangered species and conservation plans for sensitive species, so listing will not be required. A unique aspect of Forest Service wildlife habitat research is an emphasis on integrating wildlife habitat management with other forest uses.

Aquatic habitat—The American Fisheries Society estimates that populations of over 300 freshwater native fishes and over 200 anadromous fish stocks are at risk. As fish populations decline, commercial and subsistence fish harvests will similarly decline and people will be denied highly valued recreational opportunities. Forest Service R&D plays a key role in sustaining our nation's fisheries. For some native fishes, national forests provide 50 percent or more of the aquatic habitats that sustain naturally reproducing populations. Forest Service R&D is the only research program in the country with a primary focus on protecting, managing, and restoring fish habitat. Research objectives include: (1) defining habitat and ecosystem requirements; (2) identifying factors limiting populations; (3) developing methods to protect, improve and restore habitats; and (4) developing cost-effective methods to monitor and evaluate habitats and populations. Additionally, Forest Service fisheries research supports national management initiatives such as "Rise to the Future" and "Bring Back the Natives." Research scientists have provided the technical foundation for developing management strategies with comprehensive habitat conservation assessments for the bull trout and inland cutthroat trout. Scientists were also instrumental in developing PACFISH, the national strategy for restoring anadromous fish habitats in Pacific Coast watersheds.

Forest Service research will continue to focus on providing new information on watershed and habitat requirements of aquatic species and ecosystems. Specific R&D efforts are focused on salmonids and related anadromous species in the Pacific Northwest, and on native fishes and aquatic invertebrates (e.g., mollusks, crayfish) in all forested regions of the country. A large number and variety of these species are TES species.

Watershed

Forest Service watershed research is primarily oriented toward understanding, protecting, and restoring watershed and riparian functions. Basic and applied research on the effects of land management and other

These instruments measure streamflow and precipitation.

human and natural disturbances on functioning of these landscape elements include: (1) research to develop and test the effectiveness of Best Management Practices and (2) studies of the effects of fire, grazing, logging, roads, and atmospheric deposition on watershed and riparian ecosystems. This research program area emphasizes public drinking water sources, erosion, in-stream flows, effects of roads and management, and linkages between cycles of water and key nutrients, such as nitrogen, carbon, and sulfur. Additionally, scientists working in this program area cooperate extensively with the National Science Foundation's Long Term Ecological Research Program.

Forest management practices and other human activities directly affect the quality and quantity of water that enters streams, rivers, lakes, and ground water. Understanding these impacts is important because people value and depend upon reliable sources of clean water. They depend on safe sources of drinking water to protect public health. They enjoy recreation that occurs on or near healthy and attractive water bodies. They value fish and wildlife that depend on high quality habitats in streams, rivers, or lakes. In response to these public benefits, Forest Service R&D has maintained a long-standing research program focused on understanding effects of forest and rangeland management and related human and natural disturbances on the quality of water and watersheds.

Research on watershed processes is necessary to assure the public that providing benefits of clean and reliable sources of water is an integral part of managing forests and grasslands. Protecting water quality requires sustaining properly functioning and resilient watershed ecosystems. Scientific understanding is needed to distinguish healthy from degraded watersheds and to furnish the technical basis for restoring degraded watersheds to a functioning, healthy, and sustainable condition. Long-term experimental watershed studies are key to understanding how healthy watersheds function. Knowing how watersheds function provides the technical basis for understanding what processes enhance or impair the quantity and quality of water coming from forests. Research results provide the basis for developing techniques to assess, protect, manage, and restore forested watersheds. Results also are essential to sustaining clean drinking water for human consumption, high quality waters for recreation, and critical habitat for fish and aquatic and riparian wildlife. Understanding watershed processes is fundamental to (1) protecting vulnerable areas such as floodplains, human drinking water sources, and riparian areas; (2) reducing erosion and landslides; (3) maintaining the quantity and timing of streamflows, water quality, and aquatic biodiversity; (4) understanding and managing the transport of nutrients and toxic substances in the environment; and (4) managing forest roads.

Research focuses on processes that regulate the quantity, quality, and timing of water flowing through and from forests, as well as their interactions with other physical, chemical, and biological processes (e.g., erosion and transport of pollutants). Long-term research results provide the basis for:

- Analyzing watersheds to restore salmon in the Pacific Northwest;
- Assessing the effects of management on watersheds and aquatic ecosystems;
- Defining in-stream flow needs of aquatic species and communities;
- Evaluating the effectiveness of burned area rehabilitation practices;
- Assessing the impacts of acidic deposition on water quality and fish populations;
- Understanding linkages between the cycles of water and nutrients;
- Establishing guidelines to protect public drinking water sources;
- Evaluating the effects of forest roads on streamflow and erosion and developing the scientific basis for roads policy;
- Developing and evaluating effectiveness of Best Management Practices in controlling nonpoint source pollution from forest watersheds; and
- Understanding and mitigating water resource impacts of hydropower operations.

Research also develops the technical basis for guidelines and Best Management Practices for use in managing and restoring riparian areas and in mitigating wetland decline.

Collaborating with the National Science Foundation and numerous university partners in the nationwide Long Term Ecological Research (LTER) Network, six Forest Service experimental watersheds are the focus of integrated watershed and ecosystem studies that make major contributions to the basic understanding of how land use and health contribute to the condition of watersheds and aquatic ecosystems. No other Federal agency maintains as many intensive LTER research sites as does the Forest Service.

Atmospheric sciences

Forest Service atmospheric sciences research addresses how ecosystems respond to atmospheric factors such as temperature, precipitation, and chemical composition, as well as smoke from forest fires and other biomass burning. Burning is a national issue because of increased concerns over fuels buildup and use of prescribed fire in ecosystem management. Exposure of firefighters and citizens to smoke from forest fires, changes in visibility and haze, and smoke contributions to regional and local air pollution are all of concern. Forest Service R&D conducts research on effects of smoke on human health, relationships between onsite meteorology and smoke dispersion, and impacts of smoke on air quality and visibility. Atmospheric sciences research also provides information to state air regulatory programs, and supports the Environmental Protection Agency's efforts to develop air quality standards and protect air quality and related values in wilderness areas.

Forests are strongly dependent on the quality of air and on variability in weather and climate. Ozone and other atmospheric contaminants can impair growth of trees and forests. Air pollution and rainwater contamination can also change the biological structure of forests and rangelands. Solar radiation, modified as it passes through the atmosphere, can cause either benefit or potential harm (e.g., increases in ultraviolet radiation). Forest Service atmospheric sciences research strives to understand effects of air pollution, weather, and climate on ecosystem function and productivity on public lands. Forest Service R&D has improved understanding of how weather affects forest fires and smoke, thereby protecting forest resources and the public. It has increased understanding of impacts of air pollution and acidic deposition on forested watersheds and aquatic ecosystems throughout the country. Forest Service research methods for assessing forest air pollution are also being used in other countries, including the Czech Republic, Mexico, and Bulgaria. Forest Service R&D has also provided new information on restoring and maintaining forest and rangeland productivity during periods of short-term climate variability and episodes of extreme weather (e.g., forest blowdown, drought). Forest Service atmospheric sciences research works effectively and cooperatively with partners such as state agencies, National Oceanic and Atmospheric Administration, National Park Service, and Environmental Protection Agency, often supplementing their programs with critical information on air issues on public lands. Atmospheric sciences research interfaces with other agency research on climate change, fire effects, forest health, watersheds, soils, and wildlife and fisheries.

Forest Service atmospheric sciences research is developing new tools to mitigate effects of weather on fire occurrence and fire spread while managing impacts of forest fire smoke on air quality. Additionally, research is evaluating the extent to which air pollutants (e.g., ozone, atmospheric deposition) damage forest and rangeland health and productivity. This will allow managers to work with states to reduce emissions. Also, research is continuing on understanding and mitigating impacts of short-term climate variability (such as El Niña and La Niño) on vegetation and water resources. Additional research is focused on understanding the influence of climate variability and extreme events on forest and rangeland health, productivity, and carbon storage.

Forest Service R&D is developing an atlas displaying atmospheric disturbance climatology to assess potential climate impacts on natural resources in the North-Central and Northeastern United States. This also includes work on solar radiation, climatology, and measurements, including ultraviolet radiation, and the potential for ecosystem effects. In a related area, Forest Service R&D is developing procedures and models for situating weather stations to diagnose threatening fire or weather conditions. These same predictive tools are used to aid in assessing fire weather to better understand fire behavior and risks. In the area of smoke management, research is developing systems to predict the atmospheric capacity to disperse forest fire smoke and to select the best times for using prescribed fires—times when smoke will rapidly disperse and not lead to violations of air quality standards. In relation to air quality measurements, Forest Service R&D is developing standards for characterizing and measuring effects of pollutants such as ozone, nitrogen, sulfur, and photochemicals deposited from the atmosphere on wild and planted forest lands, and for monitoring how ecosystems may be affected by changes in concentrations of pollutants over time.

Soil science

Forest Service soil science research encompasses a wide array of subjects related to biological conditions and processes below ground. Research emphasizes processes regulating the cycles of nutrients (particularly carbon and nitrogen), rooting and plant growth relations, microbiological functions and effects, and soil physical conditions. One special national program emphasis is the Long-Term Soil Productivity program. In this coordinated research effort, soil scientists from Forest Service R&D and professionals from the

National Forest System work together in a cooperative national study to find answers to questions concerning management impacts to long-term soil productivity. Findings from this research are providing new information on how changes in soil organic matter and porosity affect fundamental processes controlling forest health, productivity, and sustainability. Results also enable a more thorough understanding of the basic functions of forest soils. This knowledge is being applied to restore ecosystem health, maintain and enhance long-term forest productivity, incorporate improved monitoring techniques, and improve sustainable forest management practices.

Administration and Organization

The Forest Service Research program is directed at the national level by a Deputy Chief of the Forest Service for Research and Development. The Deputy Chief leads a headquarters staff of 65 senior scientists and support staff, organized into four broad program areas.

The Forest Service R&D program is carried out through the system of six regional research stations and a national laboratory. They are headquartered at:

Asheville, NC	Southern Research Station
Albany, CA	Pacific Southwest Research Station
Fort Collins, CO	Rocky Mountain Research Station
Madison, WI	Forest Products Laboratory
Newtown Square, PA	Northeastern Research Station
Portland, OR	Pacific Northwest Research Station
St. Paul, MN	North Central Research Station

In addition, the International Institute of Tropical Forestry, located at Rio Piedras, Puerto Rico, has research as one of its three major functions.

Research and development activities are accomplished by research personnel assigned to research work units. Units have a subject matter orientation and may have a geographic orientation, such as "fire behavior" or "the ecology and culture of Lake States forests." Each station and the Forest Products Laboratory consist of 15 to 20 research work units. Some work units are located at station headquarters and others are scattered across the station territory. Some are located on university campuses while others are located in one-of-a-kind laboratory facilities. All together, research and development activities are conducted at 65 different locations across the United States. Nearly all the work units have ongoing cooperative relationships with partners, including state forestry agencies, universities, firms, and other nongovernmental organizations. The combination of Federal, state, and private collaboration creates significant synergy, yielding benefits for the United States as a whole that far exceed the benefits that any single sector could generate alone.

Forest Service R&D administers a network of 83 experimental forests, watersheds, and ranges, a key component of the research infrastructure. These facilities are used for ecological field studies. They are invaluable assets because they are strategically located in areas representative of all the major ecosystems in the nation. Further, the fact that these sites are dedicated to research makes them especially valuable because they enable long-term research to be followed over many decades. Research on some sites extends back more than 70 years. These sites are also highly valued by research cooperators as places where they can install studies that complement work underway by Forest Service researchers.

Research is also conducted at over 300 research natural areas (RNAs) and on numerous experimental sites on the lands of public, industrial, or other cooperators. The number of RNAs has more than doubled over the past decade. This resulted from a thorough biological reconnaissance of potential sites on national forests and grasslands. Current policy restricts research on RNAs to nondestructive sampling and monitoring activities. In the future, RNAs are expected to become increasingly valuable to researchers, both inside and outside the agency, as places where baseline conditions can be monitored in the absence of direct human intervention in the ecosystems.

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

Relationships

In order to accomplish its mission, Forest Service R&D has become involved with a wide variety of organizations, some within the Forest Service and many outside. In some cases, Forest Service R&D conducts the research; in other cases, it sponsors research; in other cases, it cooperates.

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 programs with states and private forest operators, administered by State and Private Forestry. All branches of the Forest Service participate in research to help solve forestry and rangeland 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 other devices, such as symposia and field demonstrations on specific problems and subjects. Close association of researchers with National Forest System staffs, state forestry agencies, forest industries, and conservation organizations facilitates prompt application of research findings. Research activities also are linked with other major programs of the Forest Service through the process of long-range strategic planning and program budget development.

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 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. During a typical year, agreements will total millions of dollars and involve hundreds of organizations, the vast majority being colleges and universities. Conversely, a significant amount of Forest Service research is conducted under 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.

State agricultural and forestry institutions

Although the Forest Service has long been responsible for a major portion of publicly financed forestry and associated rangeland research in the United States, other Federal, state, and private organizations also conduct or support research in forest and rangeland management and utilization, or closely related fields. Of particular importance, in this respect, is the coordinated Federal-state program of research involving state agricultural experiment stations and forestry schools operated by the USDA Cooperative State Research, Education, and Extension Service (CSREES). For over a century, 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. This program has included many studies related to forest and rangeland management and use, although limited funds have been allocated for specific forestry projects.

McIntire-Stennis—The Cooperative Forestry Research Program Act of 1962, commonly known as the McIntire-Stennis Act, provided the legislative basis for expanded Federal funding of state institutions for research specifically related to forestry and associated rangeland problems. Under this Act, Federal funds are made available through CSREES to help carry out programs of forestry research at (1) land grant colleges or agricultural experiment stations, and (2) other state-supported colleges and universities offering graduate training in 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, and amount to tens of millions of dollars.

Smith-Lever—Funding for extension activities has helped transfer new technology to farm, ranch, and forest landowners through the Smith-Lever Act. Of the $276 million appropriated for extension activities in FY 2001, roughly 7-10 percent was spent on natural resources extension activities; about half of that was for forestry extension purposes.

Competitive grants—Statistics from the Current Research Information System (CRIS), which tracks grant activity across all Federal agencies, show that $41 million in grants were issued for natural resources research in FY 2000. CSREES administers the main USDA competitive grants program, the National Research Initiative (NRI). The NRI was funded at $105.7 million in FY 2001. Approximately 20 percent of this total is awarded to proposals that focus on some aspect of natural resources (forestry, range, wildlife and fisheries habitat, and outdoor recreation). Of the NRI funds awarded in FY 2001, $5.3 million was specifically identified as forestry research in CRIS.

Agricultural Research Service

The comprehensive research program of the USDA Agricultural Research Service deals with complex problems such as photosynthesis, plant genetics, and plant

physiology. This research provides knowledge that can be applied more or less directly to forestry and rangeland problems. Other related investigations include: (1) investigations to improve rangeland forage; (2) 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; and (3) research on soil and water management, largely oriented to agricultural watersheds but also including investigations related to forests and associated lands. Among these are studies of strip mine reclamation, including effects of using fertilizers and industrial wastes.

Natural Resources Conservation Service

The Soil and Water Resources Conservation Act of 1977 authorizes the Secretary of Agriculture through the Natural Resources 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, 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. A joint Natural Resources Conservation Service/Forest Service liaison committee has been established to coordinate the basic assumptions and data used in the appraisal and assessment.

Resource surveys, assessments, and watershed investigations conducted by the Natural Resources Conservation Service are closely related to the forest surveys and renewable resource assessments conducted by the Forest Service. The Forest Service cooperates with the Natural Resources Conservation Service in these programs. The National Resource Inventory provides a nationwide inventory of land/cover use, soil erosion, potential cropland, conservation needs, water bodies and streams, flood prone areas, riparian vegetation, rangeland condition, and other vegetation data. At the same time, the Forest Service conducts rangeland inventories on the National Forest System. The Forest Service and Natural Resources Conservation Service coordinate resource inventories, jointly determine data needs and procedures, avoid duplication, and assure that data collected are mutually usable. The Natural Resources Conservation Service also has national leadership for the National Cooperative Soil Survey, which provides data on soils in each county, but works in cooperation with the Forest Service for soil surveys on National Forest System lands. Finally, much of the work on river basin surveys and investigations is conducted under the Watershed Protection and Flood Prevention Act of 1954. This Act provided for cooperative surveys and investigations of river basins to serve as a guide for rural development programs. Forest Service cooperation with the Natural Resources Conservation Service includes responsibility for the "forestry aspects" of river basin planning, for planning related to rangelands, for analyses and projections of economic activity relating to multiple uses and 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.

Other USDA agencies

Other agencies in the U.S. Department of Agriculture also conduct research or 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 a variety of informal working arrangements among scientists.

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 rangeland 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 Natural Resources Conservation Service and the Forest Service in river basin and related water investigations, and in other intradepartmental studies such as pesticide impact evaluations.

National Agricultural Statistics Service—The National Agricultural Statistics Service (NASS) cooperates with state agencies in reporting prices of timber and timber products. Price reports help the Forest Service monitor the economic health of the timber industry and serve as input data for models of timber markets. These models help the Forest Service project harvest rates and regeneration needs, which provide signals about needed nursery seedling production and cost-sharing and technical assistance programs provided by State and Private Forestry. NASS statisticians also consult with Forest Service researchers regarding statistical design of research projects and landowner surveys.

Other Federal agencies

The Forest Service has long cooperated with other Federal agencies, particularly agencies 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 research stations, has been financed by these cooperating agencies.

In addition to financial relations with other Federal agencies, Forest Service R&D units also participate in cooperative, multiagency research organizations. For example, in the Aldo Leopold Wilderness Research Institute, Forest Service scientists collaborate and are co-located with scientists from several Department of the Interior agencies, such as the U.S. Geological Survey. Similarly, a series of Cooperative Ecosystem Studies Units are located on university campuses throughout the country. Forest Service scientists are assigned to these units, as are scientists from universities and other Federal agencies.

Bureau of Land Management—The USDI Bureau of Land Management supports a limited program of research and development related to forests and rangelands, as authorized in the Federal Land Policy and Management Act of 1976. Studies are largely conducted through cooperative agreements with universities and Federal research agencies, including the Forest Service. These studies mostly involve problems encountered in the management of Federal lands relating to watershed protection, timber production, rangeland 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 are prepared for "major" activities, as required by the National Environmental Policy Act of 1969.

National Park Service—The USDI National 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. Forest Service R&D cooperates with the National Park Service and other agencies to create Cooperative Ecosystem Study Units (CESU's). Each CESU is a consortium of Federal agencies and a university, aimed at helping the Federal agencies solve pressing natural resource issues. The Forest Service is a charter member of several of the CESU's in regions with significant amounts of National Forest System lands. Additionally, the Forest Inventory and Analysis program conducts inventory and forest health monitoring activities in national parks, under memoranda of understanding with individual national parks. Finally, The Forest Service and National Park Service cooperate extensively in research on air quality and on impacts of air pollution on forests, streams, and wilderness areas.

Fish and Wildlife Service—The USDI Fish and Wildlife Service 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. Scientists from both agencies also conduct cooperative studies of wildlife and habitat problems.

Geological Survey—The USDI Geological Survey administers a cooperative program of contracts and grants with University Water Resources Research Institutes, under the Water Resources Research Act of 1964. The Geological Survey has related responsibilities to transfer technology relating to water resources. The Forest Service is developing cooperative relationships with the Geological Survey's water programs, where the Survey's experts provide data and analyses on the nation's water situation, including research on watersheds, hydrology, and water quality. Forest Service R&D is also cooperating with the Geological Survey and other agencies to create Cooperative Ecosystem Study Units, aimed at helping Federal agencies solve pressing natural resource issues. Because many research scientists in the Department of the Interior have been incorporated into the Geological Survey's Biological Resources Division, existing cooperative research relationships have been transferred along with the agency researchers to the Geological Survey

Environmental Protection Agency—The Environmental Protection Agency finances a substantial program of cooperative research, including studies by the Forest Service. Environmental Protection Agency sponsored research in the Forest Service includes 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.

Other agencies—The National Science Foundation provides some grants for research projects, which relate to forestry and rangeland problems. The Foundation and Forest Service R&D collaborate directly in ongoing research through the Long-Term Ecological Research Program. The Tennessee Valley Authority conducts 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.

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. Forest Service R&D also has a particularly strong relationship with the National Council of the Paper Industry for Air and Stream Improvement and its Forestry Environmental program. Extensive research collaboration between the two organizations occurs in areas related to air and water quality, wildlife populations and habitat, and forest productivity. Other industries, such as the chemical and machinery industries, also conduct research that is beneficial in solving certain forestry or rangeland 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.

General public

The Forest Service and other research agencies and organizations achieve public involvement in their forestry and rangeland research programs, in part, by using advisory committees. Thus, the Food and Agriculture Act of 1977 directed the Secretary of Agriculture to establish the Joint Council on Food and Agricultural Sciences to foster coordination of 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.

The Forest Research Advisory Committee Act of 1981 originally created the Forest Research Advisory Committee (FRAC). This committee reviews plans and goals of research supported by the Forest Service and CSREES, and makes annual recommendations to the Secretary of Agriculture on research priorities. FRAC consists of 20 members representing government agencies, forest industries, forestry schools, volunteer groups, and the environmental community. FRAC is a committee, formally chartered under provisions of the Federal Advisory Committee Act (FACA) of 1972. FACA affects Forest Service research by limiting the number of committees, boards, councils, and similar groups to those formally established and managed according to FACA-specified standards. FACA specifies the purpose of and how advisory committees are established, procedures used, fiscal and administrative provisions, and termination.

Research work units at the regional stations are normally chartered for five years. As part of the rechartering process, representatives from the station leadership team and Washington Office staff experts commonly conduct a public meeting to receive comments on the importance and usefulness of the research accomplished the past five years and ascertain public sentiment regarding problem areas and projects to work on in the next five years. The public comments are weighed heavily in decisions about future program directions or termination of ongoing work. Panels of industry representatives are consulted periodically to review and help coordinate planned research at 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, rangeland brush control, or other problems of land management. Use of 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.

International Programs

International Programs coordinates expertise of Forest Service land managers, scientists, and policymakers

with overseas assignments in the areas of disaster response coordination, technical cooperation, and policy assistance. The focus is on key natural resource problems and issues in countries with significant forest resources and important forest-related trade with the United States. Through International Programs, the Forest Service provides leadership and cooperation with forestry organizations and scientists throughout the world. Along with universities and other United States research organizations, the Forest Service cooperates in various joint research projects with foreign members of the International Union of Forest Research Organizations. 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.

The Forest Service also cooperates with the U.S. Agency for International Development (USAID) and the USDA Foreign Agriculture Service, Office of International Cooperation and Development. Together, they help developing countries with technical aspects of forest, range, and watershed projects, and coordinate disaster response and relief efforts.

Authorization

The Forest Service has been involved in international activities since 1903 with the founding of the Luquillo Forest, now the Caribbean National Forest in Puerto Rico. The Forest Products Lab in Madison, Wisconsin, began a program of tropical wood research in 1910, and the McSweeney-McNary Act of 1928 authorized the establishment of a forest experiment station, now the International Institute for Tropical Forestry, in Rio Piedras, Puerto Rico.

In 1950, President Truman announced bilateral assistance to newly independent countries and to other developing nations. Over the next two decades the Forest Service furnished over 150 professionals for long- and short-term technical assistance assignments overseas, and over 2,500 foreign nationals participated in Forest Service training programs.

In 1958, the Foreign Forestry Service was established in the Office of the Deputy Chief for Research. In 1980, USAID established the Forest Resource Management Project, which led to the Forestry Support program under the Research and Development branch of the Forest Service, as well as a joint USAID-Peace Corps Initiative. In 1985, in collaboration with the USAID's Office of Foreign Disaster Assistance, the Disaster Assistance Support program of the Forest Service was established.

In 1990, Congress directed the Forest Service to assume a greater role in international environmental affairs through the International Forestry Cooperation Act of 1990 and the Global Climate Change Prevention Act of 1990. In 1991, the Forest Service established the International Forestry program to carry out this work. In 1997, due to reorganization and budget cuts, International Forestry was reorganized and renamed the Office of International Programs and includes work focused on Technical Cooperation, Policy, as well as the Disaster Assistance Support program.

Disaster Assistance Support

Since 1985, the Disaster Assistance Support Program (DASP) and its Disaster Assistance Response Teams (DART) have provided support personnel and humanitarian relief for international disasters, both natural and human-caused, including fires, floods, drought, famine, earthquakes, and civil strife. Working with the USAID's Bureau for Humanitarian Response and the Office of Foreign Disaster Assistance (OFDA), DASP taps Forest Service expertise to provide assistance in disaster prevention, preparedness, and emergency response. DARTs use the incident command system adopted by the Forest Service to respond efficiently to emergency requests for mobilizing personnel, equipment, and supplies.

Since its inception, DASP has provided relief teams to many countries, including Angola, Namibia, Somalia, Rwanda, Sudan, and South Africa, as well as Peru, Turkey, Yugoslavia, El Salvador, and Mexico. In the early 1990s, the Forest Service through DASP developed the DART structure within OFDA. To date, over 240 employees from the Forest Service and the Department of the Interior have participated in training to prepare for work in the OFDA operations center or for overseas assignments. The 32-hour DART training course focuses on: interagency roles and relationships; OFDA disaster response options and procedures; health, safety, and overseas security; cross-cultural awareness; and DART functions and organization. In 1999 alone, 70 Forest Service and Bureau of Land Management personnel from National Forests, Regional Offices, and the National Interagency Fire Center participated in OFDA assignments. The humanitarian assistance provided by DASP and OFDA helps reduce the economic, social, and political impacts of disasters in this increasingly networked world, lessening long-term impacts of the disasters and hastening recovery time.

Technical Cooperation

The Technical Cooperation unit of International Programs works with a wide range of partners in specific countries and regions of the world with significant forest resources. The program focuses resources on key issues of interest and importance to the people of the United States. Technical Cooperation targets five major areas within sustainable forest management: invasive species, migratory species, trade and economic aspects of forest management, fire and fire ecology, and protected areas management.

Invasive species—Invasive species introduced from foreign countries have degraded habitats and threatened forest health in many areas of the United States. Researchers currently estimate that over 20 destructive forest pests are likely to enter the United States in the coming decade. International Programs works with other Forest Service units, international research agencies, and universities to emphasize control strategies for pests already in the United States and prevent further introductions.

Migratory species—Habitat critical for many migratory species is diminishing worldwide, threatening their survival. Approximately 40 percent of the United States population participates in outdoor recreation activities related to fish and wildlife—generating over $100 billion annually for American businesses and communities. Much of this activity centers on species that migrate every year to countries outside the United States, where riparian and wetland areas may not be adequately protected. International Programs focuses on restoring and maintaining these critical habitat areas for the protection of migratory species.

Trade and economic aspects of forest management—As one of the world's largest international traders in forest products, the United States depends on the long-term viability of forests everywhere. United States competitiveness suffers when the prices in other producer countries do not reflect the cost of regeneration and environmental protection. Under-priced timber sold on the world market adversely affects the United States timber industry. Therefore, International Programs promotes sustainable management of forests in other countries through improving forest management policy, introducing reduced impact logging techniques, promoting regeneration, and addressing the socioeconomic issues underlying unsustainable management practices.

Fire and fire ecology—Recent devastating wildfires in Mexico and the United States serve as a reminder of the impact of wildfires as they affect air quality, public health, and the economy on both sides of the border. Collaboration between Forest Service researchers and counterparts overseas increases understanding of fire chemistry and meteorology, the interrelationships between fire behavior and climate, fire mitigation strategies, the influence of fire on forest management, and techniques for rehabilitation of burned areas.

Protected areas management—Designations such as wild and scenic rivers and wilderness areas connote various levels of protection for natural areas of the United States. Internationally, these designations fall under the umbrella term, protected areas. International Programs supports activities that address management and policy issues of protected forest areas due to their importance both economically and ecologically. While there is broad agreement that protected forest areas are beneficial, particularly because they foster biodiversity, including migratory and endangered species, there is need for consistent information about the status of these areas, successful management strategies, and the most effective tools for policymaking and funding.

Policy Programs

The Policy unit of International Programs: (1) advances U.S. policies and priorities regarding natural resource issues in multilateral fora such as the United Nations Forum on Forests, the Montreal Process for the Conservation and Sustainable Management of Temperate and Boreal Forests, and the Convention on International Trade of Endangered Species; (2) facilitates understanding and domestic implementation of actions negotiated in international fora; and (3) engages in bilateral policy development on a wide range of issues, including building capacity in monitoring and assessing forest trends, developing national level forest policies and plans, and addressing illegal logging.

Administration and Organization

International Programs reports directly to the Chief of the Forest Service. A director and three assistant directors, one each for Disaster Assistance Support, Technical Cooperation, and Policy Programs, manage International Programs. Within Technical Cooperation there are coordinators for Mexico and Brazil, Latin America, Asia, Africa, and Russia and associated newly independent states. International Programs also includes an Outreach and Partnerships Team. Within Policy

Programs, staff members are responsible for maintaining relationships with specific international organizations and developing or clarifying policies aimed at sustainable forest management. The Disaster Assistance Support program provides guidance and training to Forest Service employees recruited for disaster response assignments both at the Washington, DC, office and operations center, and overseas.

Relationships

With other Forest Service programs—International Programs works closely with several Forest Service units, including Research and Development, National Forest System, and State and Private Forestry, using expertise of the Forest Service to help international partners. International Programs also works with the International Institute for Tropical Forestry (Rio Piedras, Puerto Rico), Pacific Northwest Research Station (Portland, Oregon), Institute for Pacific Islands Forestry (Oahu, Hawaii), Forest Health Technology Enterprise Team (Morgantown, West Virginia), and Forest Service Inventory and Monitoring Institute (Fort Collins, Colorado).

Other programs—International Programs has had a close association with USAID, specifically the Forestry Team within USAID's Economic Growth Agriculture & Trade Bureau and the Office of Foreign Disaster Assistance. The Technical Cooperation staff often work directly with individual USAID missions or regional offices engaged in natural resource management. All DASP activities are funded through USAID/OFDA. In addition, International Programs works closely with the USDA Foreign Agriculture Service, Office of International Cooperation and Development, to manage technical assistance contracts with non-U.S. based organizations or consultants, or to arrange for natural resource practitioners from other countries to attend training sessions. International Programs also participates in several key research and policy organizations, including the International Tropical Timber Organization, the Central African Regional Program for the Environment, the North American Forestry Commission, and the Sustainability Roundtable. International Programs also works closely with a number of nonprofit conservation organizations, including partnerships with Ducks Unlimited, Partners in Flight, The Nature Conservancy, and the Jewish National Fund.

General public—International Programs responds to requests from the public for internally produced publications. In addition, the International Programs Web site provides 24-hours-a-day information on our international activities and partnerships. This extensive database identifies individuals and organizations involved in natural resource management worldwide, serves as a mailing list for our newsletter, and provides a resource for technical assistance.

Law Enforcement and Investigations

The Law Enforcement and Investigations (LEI) program protects safety of the public and Forest Service employees on National Forest System lands, and protects natural resources and other property under the agency's jurisdiction. LEI cooperates with Federal, state, and local law enforcement agencies, and other Forest Service programs to achieve these goals. LEI has the following primary responsibilities:

- Provide a highly visible patrol presence and prompt response to public and employee safety incidents and violations of law and regulation;
- Conduct criminal and civil investigations;
- Maintain strong relationships with cooperating law enforcement agencies; and
- Reduce production of domestic cannabis and other controlled substances on, and smuggling of illegal drugs through, National Forest System lands.

Increased forest visitation, urban encroachment, and increasingly urbanized users impact National Forest System lands, thus increasing health and safety risks to the public and employees and threatening resource

viability. Consequently, the demands on agency law enforcement personnel continue to increase.

Authorization

Beginning with the Organic Act of 1897, a number of laws and regulations provide the Forest Service with authority to establish regulations and rules for administration and protection of the National Forest System and civil and criminal jurisdiction over those lands. However, several significant authorities directly affect LEI. The Arrest for Violations of Laws and Regulations Act of 1905 authorizes "all Forest Officers (persons employed by the Forest Service) to make arrests for the violations of laws and regulations relating to the National Forests." However, Forest Service policy limits this authority to employees who have been specially trained and are authorized by the Chief of the Forest Service or the Director of LEI to carry such authority, including law enforcement officers and criminal investigators (special agents).

There are two additional, important LEI authorizations. First, the Cooperation by Secretary of Agriculture with States and Political Subdivisions in Law Enforcement Act of 1971 authorizes the Forest Service to enter into cooperative law enforcement agreements with either state or local law enforcement agencies for purpose of reimbursing extraordinary expenses incurred while enforcing state laws on National Forest System lands. Second, the National Forest System Drug Control Act of 1986 authorizes Forest Service law enforcement officers and special agents to carry firearms, make arrests, serve warrants and other processes, conduct searches, seize evidence, and investigate violations. That Act also authorized enforcement of the Federal drug laws under the Controlled Substance Act of 1970 and other violations relating to controlled substances either on or affecting National Forest System lands. Within this authorizing framework LEI has three main program areas: enforcement activities, investigative activities, and drug enforcement activities.

Enforcement

Uniformed law enforcement officers are responsible to:

- Conduct patrols on National Forest System lands to prevent and detect crime and to provide assistance and information to the public;
- Provide timely and effective response to accidents, investigations, crimes in progress (domestic disputes in campgrounds, assaults, gang activity, resource damage, theft of government property, etc.), search and rescue, medical and emergency assistance, hazardous materials spills, and other first-responder incidents;
- Facilitate cooperative crime prevention efforts in local communities, with other agency programs, communities, partners, and other law enforcement agencies;
- Respond to unplanned incidents, including citizen protests, threats to employees or government property, large group or commercial events, drug parties, fire emergencies, and acts of ecoterrorism;
- Adjudicate misdemeanor violations by issuing warnings or citations;
- Conduct preliminary investigations of felonies and serious misdemeanors to obtain adequate information for adjudication or further investigation;
- Provide reimbursement, through cooperative law enforcement agreements, to state and local law enforcement agencies for extraordinary patrol and drug enforcement expenses incurred while enforcing state law on National Forest System lands; and
- Provide support to Forest Service efforts in preventing and responding to workplace violence, and ensuring employee and facility safety and security.

Investigations

LEI has seven primary investigative priorities: (1) assaults and threats to agency employees and facilities;(2) timber and other forest product theft; (3) wildland fire; (4) archeological resource theft and damage; (5) illegal drug production, hazardous material dumping, and cross-border smuggling; (6) domestic terrorism; and (7) recovery of financial damages to the Federal government. LEI investigations have resulted in significant convictions in all the above areas. LEI personnel are recognized experts in timber theft and wildland fire investigation and have been asked to assist foreign countries and other domestic agencies in these areas.

Criminal investigators are responsible for:

- Conducting criminal and civil investigations related to National Forest System lands and agency interests, while complying with guidelines set forth in the President's Council on Integrity and Efficiency, "Quality Standards for Investigations";

- Conducting internal and USDA Office of Inspector General hotline complaint, criminal misconduct investigations of agency employees and government programs; and
- Developing, improving, and demonstrating new technologies, materials, methods, and strategies to advance the effectiveness and efficiency of agency enforcement and investigative activities.

Drug Enforcement

The rise of drug-related crime and violence is a worrisome trend now surfacing on National Forest System lands, and is probably one of the most dangerous. Illegal drug activity directly affects the administration of national forests and grasslands, creates a significant safety risk for the public and agency employees, and has serious detrimental effects on natural resources. The National Forest System Drug Control Act of 1986, along with memoranda of understanding with the USDJ Drug Enforcement Administration, makes the Forest Service primarily responsibility for enforcement of Federal drug laws on National Forest System lands. Drug enforcement on national forests and grasslands often requires unique skills and abilities, such as those gained by LEI officers while performing law enforcement duties in a wildland environment. Three primary drug enforcement issues affect National Forest System lands: (1) marijuana cultivation, (2) methamphetamine production and dumpsites, and (3) smuggling illegal drugs across international borders. Nearly every national forest can report some type of illicit drug activity. Marijuana cultivation and methamphetamine production utilize numerous toxic chemicals, fertilizers, and other hazardous agents that invade natural environments and can have negative effects on soils, watersheds, vegetation, and wildlife. Also, drug producers poached game, as evidenced by bear and dear carcasses found near drug sites.

Organization and Administration

LEI operates with a centralized reporting structure that provides investigative independence, as required by budget appropriation language in 1994. Field personnel report upward through supervisory channels to the Director of LEI, who reports directly to the Chief of the Forest Service. This organization structure ensures that supervision and oversight of the law enforcement program and its staff are carried out by appropriate LEI personnel (not National Forest System personnel). This structure affords the highest possible integrity of operations and investigations as well as reducing liability to the agency and individual officers. This type of organization also allows LEI personnel to rapidly respond to emergency incidents nationwide. The LEI organizational structure is similar in structure to the NFS regional and forest organization, thus allowing local decisionmaking and a high level of coordination with other Forest Service programs and the public.

Relationships

LEI accomplishes its mission by maintaining strong cooperative relationships with the public and with Federal, state, and local law enforcement agencies. County sheriff's departments are a vital part of the LEI program. They provide dispatch services, backup to LEI officers, and assistance in investigations and patrol activities. In some cases, state police or fish and game agencies also perform these activities. In return, LEI provides often-critical support to these agencies in remote working areas.

LEI is dedicated to eliminating the drug threat on National Forest System lands. This necessitates participating in task forces and creating partnerships with Federal, state, and local law enforcement agencies. LEI relies on state national guard units, the active and reserve military, and the Civil Air Patrol for many of its counterdrug missions. The resources they provide, mostly in aviation assets, are critical to the overall effectiveness of drug detection and eradication on National Forest System lands. LEI is an associate with the White House Office of National Drug Control Policy and its High Intensity Drug Trafficking Area (HIDTA) program. The HIDTA program allows the Forest Service to leverage and share resources and intelligence with other agencies combating illegal drugs.

LEI personnel work extensively with personnel from other Federal agencies to handle a variety of crimes that occur on National Forest System lands. Other agencies include the USDJ Federal Bureau of Investigation and Drug Enforcement Administration; the USDT Customs Service and Bureau of Alcohol, Tobacco, and Firearms; the U.S. Border Patrol; the USDA Office of Inspector General; and the USDI National Park Service and Bureau of Land Management. LEI also works closely with other program areas of the Forest Service, such as recreation, wilderness, timber, range, wildlife, and fire management to accomplish the Agency mission – "Caring for the Land and Serving People."

Senior, Youth, and Volunteer Programs

The Senior, Youth, and Volunteer Programs (SYVP) provides work, training, and education for the unemployed, underemployed, elderly, young, and others with special needs. Programs administered by SYVP include: Youth Conservation Corps, Job Corps, Senior Community Service Employment Program, Volunteers in the National Forests, and Hosted Programs. The Job Corps and the Senior Community Service Employment Program are funded by the Department of Labor; other programs are financed through Forest Service funds.

Authorization

The Forest Service participates in cooperative employment and training programs, such as those authorized by:

- Youth Conservation Corps Act of 1970—established the Youth Conservation Corps as a pilot program. The Act was amended in 1974, to expand the Youth Conservation Corps program and make it permanent.
- Workforce Investment Act of 1998—continued the authority for the establishment of the Job Corps program for economically disadvantaged young men and women, ages 16-24 to be provided basic education and job training. The Act also included seven new responsibilities to be carried out by center program staff in cooperation with contractors.
- Older Americans Act of 1965—established the Senior Community Service Employment Program. The Older American Act was reauthorized in 2000.
- Volunteers in the National Forest Act of 1972, as amended—formalized Forest Service authority to accept services of individuals as Volunteers without incurring a wage liability. It also gave the agency authority to cover volunteers under the Tort Claims Act of 1948 and the Federal Employees Compensation Act of 1966 for injuries and reimbursement of incidental expenses.

Hosted Programs use many authorities to enter agreements with state, county, and local governments, including the Workforce Investment Act of 1998, the Cooperative Funds and Deposit Act of 1975, and the National and Community Service Trust Act of 1993.

Youth Conservation Corps

The Youth Conservation Corps (YCC) was established in 1971 and is jointly administered by the Forest Service, the USDI Fish and Wildlife Service, and the USDI National Park Service. The YCC is a summer employment program for young men and women, ages 15-18, from all segments of society. Enrollees work, learn, and earn together by accomplishing projects that further the development and conservation of the natural resources of the United States. The three objectives of the program are:

- To accomplish needed conservation work on public lands;
- To provide gainful employment for 15-18 year olds regardless of gender, social, economic, ethnic, and racial classifications; and
- To develop in participating youth an understanding and appreciation of the nation's natural environment and heritage.

Conservation work-learn projects vary, depending on geographical location of the National Forest System lands. YCC activities include projects such as recreation facility construction and maintenance, range and wildlife habitat improvement work, timber stand improvement, trail construction and maintenance, visitor information services, and soil and water conservation projects. Youths are selected randomly for YCC programs within a reasonable commuting distance from their residence. The goal is to achieve a diverse, 50 percent male/female participation. YCC participants are usually employed in a nonresidential setting for 8 weeks and receive the Federal or state minimum wage (whichever is higher) for 40 hours a week.

Job Corps

Job Corps is the nation's largest residential training program for young women and men between ages 16 and 24, who are U.S. citizens or legal residents. Since 1964, the Job Corps has trained generations of young adults through intensive education, vocational training, work experience, and counseling. The Job Corps program has prepared millions of young adults for meaningful work. The program is administered and funded by the U.S. Department of Labor (DOL). Through an agreement with the DOL, the Forest Service operates 18 residential, coeducational, Job Corps civilian conservation centers in 5 regions on 15 national forests in 12 states.

The Job Corps' mission is to create a safe, secure, supportive, and clean environment for participating youths that is conducive to their developing the maximum academic, vocational, social, and employability skills. This will enable them to obtain the tools necessary to be employable, earn living wages now and in the future, and become productive and responsible members of society. Job Corps students receive room, board, health care, clothing, counseling, and a monthly allowance instead of wages.

Job Corps centers emphasize employment-skills training and job placement. Centers offer a wide range of vocational training, but differ in the specific training offered. Options include auto mechanics, basic forestry, brick masonry, business and clerical skills, basic nursing, carpentry, painting, urban forestry, dispensing optician, welding, plastering, painting, culinary arts, computer aided design, electrical repair, building and apartment maintenance, and others. On graduation, placement counselors assist students find employment. Students from Forest Service centers lead the nation with the highest average starting wage for Job Corps graduates. The students also receive a readjustment allowance to help them make a smooth transition into the world of work. The program provides benefits to business, communities, the Forest Service (through work accomplishment and firefighting on National Forest System lands), and, most importantly, disadvantaged young adults.

Senior Community Service Employment Program

The Forest Service, in cooperation with the U.S. Department of Labor (DOL), sponsors the Senior Community Service Employment Program (SCSEP), as authorized under the Older Americans Act of 1965, as amended. SCSEP is funded annually by the DOL. The states, nine national nonprofit organizations, and the Forest Service (the only Federal agency) administer SCSEP on behalf of the DOL. The Forest Service has operated a SCSEP program since 1972 through an interagency agreement with DOL.

SCSEP is designed to provide disadvantaged persons, age 55 and older, with part-time employment, supplemental income, work experience, training, and transition to public and private sector labor markets. Seniors are provided with a variety of training programs to prepare them for community service assignments or employment in the private sector. Programs include on-the-job-training, classroom training, and work experience. Training opportunities are available in computer literacy, office administration, English as a second language, accounting, warehousing, and much more. SCSEP participants also assist the Forest Service by accomplishing conservation work. In addition to the age requirement, SCSEP participants must meet income and poverty guidelines, and reside in the state where the Forest Service SCSEP projects are located.

Placement is an important program element. The national SCSEP unsubsidized placement goal is 20 percent. The Forest Service goal is to exceed the 20 percent placement target annually.

Volunteers in the National Forests

The Volunteers in the National Forests (VIF) program offers participants the opportunity to contribute their talents and services to assist in managing the nation's natural resources. Participants may include individuals and sponsored groups/organizations from all walks of life. Objectives of the VIF program are to:

- Recruit, train, and use the services of volunteers to complement regular Forest Service staff in interpretive functions, visitor services, conservation measures, and development, or other related activities in or related to areas administered by the Secretary of Agriculture through the Forest Service;
- Provide the volunteer with experience that is personally rewarding and challenging; and
- Maintain and improve the level and quality of services to the public.

The VIF program has provided assistance in natural resource protection and management programs at nominal costs since 1972. Volunteers may assist in all Forest Service programs or activities except law enforcement. The work accomplished by the volunteers enables the Forest Service to meet higher standards of service and to accomplish work that might not be done otherwise. In the history of the program, more than 1.5 million volunteers have participated in recreation, resource protection and management, cooperative and international forestry, research, and wildlife projects.

VIF is not an employment program and volunteers need not be citizens of the United States. In fact, there is an international component to the VIF program that hosts participants from numerous countries. The Forest Service sometimes provides the volunteer's incidental expenses, such as transportation, uniforms, lodging, and subsistence.

The Forest Service is also involved in other volunteer efforts. The Touch America Program (TAP) includes

special emphasis on participation by persons aged 14 to 17 years. TAP provides greater opportunities for youth to gain work experience and environmental awareness while working on public lands. TAP is a partnership of private sector organizations sponsoring teenage young people to do conservation work. In another volunteer effort, the Forest Service is a lead agency in the nine-agency Federal Interagency Team on Volunteerism. The Team's vision is to establish a productive partnership that shares and enhances volunteer resources and services focused on accomplishing agencies' missions. During the annual National Volunteers Week in April, volunteer service awards are presented to individuals, sponsors, corporations, retirees, international visitors, youth, campground hosts, Forest Service employees, and Forest Service units for their contributions.

Hosted Programs

The Forest Service serves as a host agency by providing work opportunities for programs administered by other governmental agencies and nonprofit organizations. For example, the Forest Service serves as a host agency for the Cooperative Minimum-Security Inmates Work program within the USDJ Federal Bureau of Prisons. The Forest Service also has partnerships with the Student Conservation Association and many state and local conservation corps who are members of National Association of Service and Conservation Corps.

Under a hosted program, the sponsoring organization provides funding and supervision for people to work for the Forest Service. The Forest Service provides conservation training, work opportunities on national forests, and monitors results. Programs are administered through written agreements delineating responsibilities, enrollee status, wages, supervision, and operational details. Hosted agreements can be with individuals; state, county, and other Federal agencies; private and nonprofit organizations; Indian tribes; and for-profit organizations.

Administration and Organization

Programs administered through SYVP involve some unusual funding arrangements. For example, funding for the operations of the Senior Community Service Employment Program and the Job Corps program primarily comes from the U.S. Department of Labor. These programs are administered through grants/agreements with the Department of Labor. However, funding for the Youth Conservation Corps, Hosted Programs, and Volunteers comes from monies appropriated to the Forest Service.

The mission of SYVP is 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. Except for the Job Corps, a staff of program managers located at the Washington Office work with regional and station coordinators, who in turn work with staff at the national forest, district, and research unit levels that identify and implement work assignments and/or projects to accomplish the specific program objectives. SYVP program managers work under the administrative guidance of the staff director for the overall SYVP.

For the Job Corps program, oversight and direction are given from the WO-SYVP staff director and staff to the field office director. The field office director and a staff of program managers located in Golden, Colorado, work with U.S. Department of Labor national and regional offices, contractors, 18 Job Corps center directors and staff to administer the centers, ensure polices and procedures are followed, and provide a safe and secure environment for the students. Local forest supervisors' offices and the Forest Service's Region 2 headquarters office provide basic administrative support for the centers and the program through negotiated agreements.

The Youth Conservation Corps program continues to be authorized, though funding is awkward. Since 1980, the program has operated without appropriated separate funding. Annual appropriations acts have directed the Forest Service, USDI Fish and Wildlife Service, and USDI National Park Service to utilize not less than some specified amount of agency funds for high priority projects to be carried out by the YCC program.

Relationships

With other Forest Service programs—The SYVP programs are closely related and integrated with other Forest Service programs. SYVP is one of the most diverse staffs in the agency with over 900 employees. SYVP contributes the agency's goals of equal opportunity and the Continuous Improvement Process (CIP), and accomplishes needed conservation work on NFS lands. SYVP performs work in nine major resource categories, with the majority of the work being accomplished in recreation areas. Job Corps students and staff assist in firefighting efforts. The SYVP staff serves on various task force and committees, including corporate training, partnership councils, recruitment

councils, CIP, Civil Rights, and others. Many programs' graduates become employees of the Forest Service.

Other programs—SYVP programs are also administered in other natural resource agencies by other national sponsors, local communities, and national and state profit and nonprofit organizations. There are 119 Job Corps centers nationwide that are funded by the Department of Labor and administered by the USDI National Park Service, Fish and Wildlife Service, and Bureau of Reclamation, and private national contractors.

General public—The SYVP staff and enrollees participate in many other programs on the local and national levels. This includes involvement with community relations' councils, local community workforce investment boards, town hall meetings, Points of Light Foundation, Boy Scouts and Girl Scouts, volunteer organizations, national minority organizations, Make a Difference Day, colleges and universities, and Rotary Clubs. The SYVP has partnered with the armed services, youth and senior organizations, one stop centers, unemployment offices, educational institutions, and others to assist us in meeting the needs of our participants.

Capital Improvement and Maintenance

The Forest Service owns an extensive infrastructure of physical assets, including ranger stations, research laboratories, lookouts, roads and bridges, and so on. The Capital Improvement and Maintenance Program supports this infrastructure for (1) safe and efficient public and administrative uses, and (2) quality recreation experiences with minimal impact to the ecosystem stability and condition.

The Capital Improvement and Maintenance Program, formerly called "Reconstruction and Maintenance," includes three major program areas: Facilities, Roads, and Trails. Each program area includes maintenance, capital improvement, and operations. Planning, survey, design, contract preparation, and contract administration are included in this program, along with the acquisition and maintenance costs of real property assets.

Maintenance is the act of keeping fixed assets in acceptable condition. It includes preventive maintenance, normal repairs, replacement of parts and structural components, and other activities so that the asset continues to provide acceptable service and achieves its expected life. Maintenance does not include activities aimed at expanding the capacity or upgrading the asset to serve needs significantly different from those originally intended. Maintenance includes work needed to meet laws, regulations, codes, and other legal direction as long as the original intent or purpose of the fixed asset is not changed.

Capital improvement includes the construction, installation, or assembly of a new fixed asset, or the significant alteration, expansion, or extension of an existing fixed asset to accommodate a change of purpose.

Operation includes activities related to the normal performance of the functions for which a fixed asset or component is intended to be used. Costs such as utilities (electricity, water, sewage), fuel, janitorial services, window cleaning, rodent and pest control, upkeep of grounds, vehicle rentals, waste management, and personnel costs for operating staff are generally included within the scope of operations and are not considered maintenance costs.

Authorization

The Capital Improvement and Maintenance program is authorized by general provisions of the Organic Act of 1897, the Granger-Thye Act of 1950, the National Forest Roads and Trails Act of 1964, the National Trails System Act of 1968, the Forest and Rangelands Renewable Resources Planning Act of 1974, as amended, the National Forest Management Act of 1976, the Forest and Rangeland Renewable Resources Research Act of 1978, and other legislation. These laws establish the National Forest System and provide for the management of that system by the Forest Service. An infrastructure of buildings, roads, recreation facilities, and other constructed assets is required for the proper management of the National Forest System. The Forest Service is also required to meet local building codes, traffic safety standards, and various rules established for management and use all of Federal lands. Capital Improvement and Maintenance is organized around three broad program areas: facilities, roads, and trails.

Facilities

The Facilities program provides for the capital improvement, maintenance, and program operations of the multi-billion dollar infrastructure related to recreation, research, fire, administrative, and other facilities, including site components such as roads and utilities. This program includes acquisition of buildings and other facilities necessary to carry out the mission of the Forest Service, as well as disposing of deteriorated or

otherwise unneeded facilities. The Facilities program includes two basic activities: maintenance and capital improvements.

Facilities maintenance—The facilities maintenance program provides for the routine and cyclical repair and maintenance of over 25,000 (non-recreation) buildings and other facilities. Annual maintenance funding needs have been increasing due to the aging of facilities and the critically low level of building replacements. A total of $280 million is needed annually to keep the current deferred maintenance and capital improvement backlog from growing. The research program supports the needs of scientists and staff for facilities and equipment that are adequate, safe, and commensurate with the type of research being performed, and promotes increased quality and productivity of research. Additionally, routine and cyclical repair of the national recreation facilities is a growing concern within the Forest Service. Recreation facilities have the capacity of nearly 2.1 million people at one time. There are 23,000 developed recreation facilities. Over one-half have exceeded their design life, and more than one-quarter are now over 40 years old.

Facilities capital improvement—This program includes capital improvement projects that emphasize the replacement of existing facilities to help address the facility maintenance and capital improvement backlog, and the construction of mission-critical facilities. This program also includes capital improvement projects that emphasize the reconstruction and rehabilitation of high priority recreation facilities. Additionally, this program provides for the reconstruction and rehabilitation of facilities that support special events such as the 2002 Winter Olympics and the Lewis and Clark Bicentennial. Finally, this program supports the needs of scientists and staff for facilities and equipment that are adequate, safe, and commensurate with the type of research being performed, and promotes increased quality and productivity of research.

Roads

The National Forest System Roads program provides for the maintenance, capital improvement, and operation of over 380,000 miles of roads on National Forest System lands. Of this, 20 percent are open to passenger car traffic, 58 percent open to pickups and other high-clearance vehicles, and 22 percent are closed. A portion of the program's funds is spent on decommissioning unneeded roads.

The distinction between "roads" and "trails" is not always clear. For purposes of this document, a road is a motor vehicle travelway over 50 inches wide, unless designated and managed as a trail. Thus, travelways such as "jeep trails" are discussed in the trails section following this section on roads.

The National Forest Road System is an integral part of the rural transportation network. It extends the limited private road systems operated by the states and counties within the National Forest System. It is operated and maintained to provide safe access for all forest users and to provide access for resource program activities. All Resource Protection and Utilization programs depend upon the system for access. Over 90 percent of road system use is by recreationists who make over 800 million visits annually to recreation opportunities accessed by the road system.

The road system is in poor condition and continuing to deteriorate. The deterioration affects road users, resource programs, and the resources themselves. Road repair and maintenance can significantly improve water quality in the National Forest System.

A science-based road analysis is used to advise decisionmakers regarding decisions to construct, maintain, and decommission roads. One outcome of roads analysis is reconciliation of the existing open road system with the available road maintenance budget. Appropriations in the 1990s were much less than what was necessary to sustain the current mileage of open roads at current service levels without unacceptable consequences. By going through roads analysis, opportunities are identified to invest in roads to reduce future maintenance needs. More significantly, actions are identified to reduce the number of open roads and the service levels of roads remaining open to what can be sustained in an environmentally acceptable manner with available maintenance funding. While implementation of these actions increases user costs and decreases ease of public access, it is the only long-term way to assure compliance with safety and environmental protection laws and regulations at current funding levels.

Another outcome of roads analysis is "road management objectives" (RMO's). Each national forest road exists for at least one specifically identified purpose, which is documented in its RMO. RMO's are implementation documents for the access and travel management needs and objectives set forth in forest plans. Roads are only constructed, operated, and maintained to standards necessary to meet RMO's. When no forest plan implementation purpose is identified for a road, it is identified as a road to be decommissioned. Performing roads analysis usually identifies roads that no longer serve any purpose whatsoever. Decommissioning unneeded roads improves forest ecosystems and reduces

future maintenance needs. Priorities for expenditures of limited road funds are to (1) address emergency and critical health and safety needs; (2) address resource protection and mission accomplishment needs; and (3) keep roads analysis current.

Road maintenance—This part of the Roads program is divided into four primary areas: annual road maintenance, deferred road maintenance, road operations, and decommissioning. Annual and deferred maintenance includes: (1) improving drainage to assure that water drains from the road surfaces, thus protecting the environment and investments from damage; (2) surfacing and maintaining roadway pavement on over 9,000 miles of paved road and surface maintenance on 370,000 miles of gravel and native surface road; (3) clearing vegetation from hazardous roadside trees and brushing roadsides to keep road slopes stable; (4) rehabilitating or replacing bridges and other structures identified as deficient; (5) signing and controlling traffic, including traffic engineering work to assure roads are safe for their intended uses as well as maintaining road signs, gates, guardrails, and related facilities; and (6) making investments necessary to bring roads into compliance with laws, regulations, and standards that came into effect after roads were constructed.

Road capital improvements—This part of the program contributes to safe, efficient, and environmentally sound access for the multiple uses of the NFS. Capital improvements include the construction of new roads, alteration or expansion of existing roads to provide for different uses (e.g., changing a logging road to a recreation road), or adding capacity (e.g., changing a single lane bridge to a two lane bridge). It includes purchasing road rights-of-ways on roads across private property to NFS lands where there is currently no public access. Road capital improvement funds are also used for engineering support for roads to be constructed on timber sales, including surveys, designs, reviews, and contract administration.

Road operations—Road operations activities include management and oversight of commercial hauling; management of cooperative road agreements with counties and other partners; development and operation of traffic management strategies; and providing current information such as signs, maps, road restriction status, and commercial use requirements to road users. Decommissioning terminates a facility's function as a road. Roads to be decommissioned include both NFS roads that are no longer needed for NFS management, and unclassified roads that exist on NFS lands. Unclassified roads are (1) roads that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks, and (2) roads that were once under permit or other authorization and not decommissioned upon the termination of the authorization. There are over 60,000 miles of unclassified roads within national forests and about 2,500 miles are being decommissioned per year. The agency actively seeks public involvement in road decommissioning and in the issue of accessing public lands.

Trail bridge accessing wilderness.

Trails

The Trails program provides for the operation, maintenance, rehabilitation, and improvement of trails. The NFS contains about 133,000 miles of trails, accounting for over half of the nation's inventoried trail system. Almost 100,000 miles of trails occur outside wilderness areas and about 33,000 are inside of wilderness areas. The trail system accommodates about 55 million recreation visitor days of hiking, horseback riding, cross-country skiing, mountain biking, and off-highway vehicle use a year. The trail program helps support private sector annual outdoor product sales of $10 billion that include such items as footwear, backpacks, camping gear, mountain bikes, winter sports equipment, and outdoor accessories.

Trails serve a wide constituency at a relatively low cost. Some trails are available for mechanized uses like bicycling, motorcycling, snowmobiling, and riding all-terrain vehicles. Trails provide important transportation routes for forest firefighters, law enforcement, and other administrative personnel, as well as recreation service partners and outfitters-guides operating on National Forest System lands. Trail maintenance funding is used to protect the capital investment by keeping trails open for access and protecting vegetation, soil, and water quality. Work includes clearing the pathway of encroaching vegetation and fallen trees, and repairing or improving trail signs, treadways, drainage facilities, and bridges.

The Trails program includes three basic activities: maintenance, capital improvements, and operations. Maintenance of trails includes annual maintenance and deferred maintenance. Capital improvement includes new trail construction. This program includes survey, design, contract preparation, and contract administration. Trails operations activities include the managing and oversight of trail planning and use; coordinating with counties and other partners; developing and operating management strategies; and providing current information such as signs, maps, status, and commercial use restrictions to users.

Administration and Organization

The Deputy Chief for the National Forest System, supported by the Director of Engineering and the Director of Recreation, directs the Capital Improvement and Maintenance Program at the national level. The Deputy Chief and supporting headquarters staffs have multiple responsibilities. They are responsible for the formulation and administration of this program for the Forest Service; coordination with other federal departments and agencies, states, and other organizations; and program review and general direction of the capital improvement and maintenance work carried out at the regional offices, research stations, national forests, and other centers of NFS programs.

The major part of program activities is carried out through a decentralized field organization that includes nine regional offices and eight research stations. On-the-ground management within the NFS is conducted through 156 National Forests and 20 National Grasslands.

Relationships

With other Forest Service programs—The facilities and transportation system provided by the Capital Improvement and Maintenance program serves all functions, staffs, and programs in the Forest Service. Offices, warehouses, visitor centers, laboratories, etc., are the workspace of the many disciplines represented in the Forest Service. The transportation system of roads and trails provides access to NFS lands for all resource programs, fire protection, and management activities of the Forest Service. Because roads, trails, and facilities are so important to the mission of the Forest Service, and because they can have significant impacts on the resources, coordination with other programs is essential in providing this important part of the infrastructure.

Other programs—In order to provide an efficient and seamless transportation system of roads and trails, close coordination is carried out with other federal land management agencies, states, counties, and transportation and recreation planning organizations. The Forest Service works closely with various regulatory and oversight agencies such as the Federal Highway Administration, the Environmental Protection Agency, and the General Services Administration. Together, they develop rules and standard processes that provide a safe and efficient infrastructure, and minimize adverse impacts on the environment.

General public—The facilities and transportation system provided by the Capital Improvement and Maintenance program provides for public access and use of the NFS. Each year the recreation facilities funded by this program provide the public with over 200 million persons-at-one-time days of developed facility capacity. The growing participation of many groups and individuals in NFS 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, large numbers of Environmental Impact Statements for "major" Forest Service actions are widely reviewed not only by federal and state agencies, but also by many private organizations and individuals. The Forest and Rangeland Renewable Resources Planning Act of 1974 and the National Forest Management Act of 1976 likewise require public involvement in the development of resource assessments, land management plans for each unit of the NFS, and the formulation of Forest Service programs. Relationships with the public in these and related Forest Service activities involve public hearings, many meetings, and correspondence with individuals and organizations.

Legislative References

Acceptance of Gifts Act of 1978. Act of October 10, 1978. P.L. 95-442, 92 Stat. 1065; 7 U.S.C. 2269.

Agricultural Experiment Station Act of 1887 (Hatch Act). Act of March 2, 1887. Ch. 314, 24 Stat. 440; 7 U.S.C. 361a et seq.

Agricultural Grants and Powers Act of 1965. Act of Aug. 4, 1965. P. L. 89-106, 79 Stat. 431; 7 U.S.C. 2250a and 450i, as amended by P.L. 107-76, sec. 775, 115 Stat. 746; and P.L. 107-171, sec. 6403(b), 116 Stat. 429; sec. 7136, 116 Stat. 436; and sec. 7211, 116 Stat. 447.

Agriculture Research, Extension, and Education Reform Act of 1998. Act of June 23, 1998. P.L. 105-185, 112 Stat. 523; 7 U.S.C. 7601(note).

Appropriations Act of 1876. Act of August 15, 1876. 19 Stat. 166.

Archaeological Resources Protection Act of 1979. Act of October 31, 1979. P.L. 96-95, 93 Stat. 721, as amended; 16 U.S.C. 470aa-470mm.

Arizona and New Mexico Enabling Act of 1910. Act of June 20, 1910. P.L. 61-219, 36 Stat. 557, 568, as amended.

Arrest for Violations of Laws and Regulations Act of 1905. Act of March 3, 1905. P.L. 58-138, Ch. 1405, 33 Stat. 873; 16 U.S.C. 559.

Bankhead-Jones Farm Tenant Act of 1937. Act of July 22, 1937. P.L. 75-210, Ch. 517, 50 Stat. 522, as amended; 7 U.S.C. 1010-1012.

Boundary Waters Canoe Area Act of 1978. Act of October 21, 1978. P.L. 95-495, Sec. 3, 92 Stat. 1649; 16 U.S.C. 1132 (note).

Carlson-Foley Act of 1968 (Control of Noxious Plants). Act of October 17, 1968. P.L. 90-583, 82 Stat. 1146; 43 U.S.C. 1241.

Chief Financial Officers Act of 1990. Act of November 15, 1990. P.L. 101-576, 104 Stat. 2839; 31 U.S.C. 503, 3512, 3515, 3521, 9105, 9106.

Clarke-McNary Act of 1924. Act of June 7, 1924. P.L. 68-270, Ch. 348, 43 Stat. 653, as amended; 16 U.S.C. 505, 568, 568a, 569, 570.

Clean Air Act of 1955. Act of July 14, 1955. P.L. 84-159, 69 Stat. 322, as amended; 42 U.S.C. 7401 et seq.

Clean Air Act (amendment) of 1977. Act of August 7, 1977. P.L. 95-95, 91 Stat. 685; 42 U.S.C. 7401 et seq.

Clean Air Act (amendment) of 1990. Act of November 15, 1990. P.L. 101-549, 104 Stat. 2468; 42 U.S.C. 7401 et seq.

Clean Water Act (amendment) of 1977. Act of December 27, 1977. P.L. 95-217, 91 Stat. 1567; 33 U.S.C. 1251-1387.

Clean Water Act (amendment) of 1987. Act of February 4, 1987. P.L. 100-4, 101 Stat. 7; 33 U.S.C. 1330.

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Act of December 11, 1980. P.L. 96-510, 94 Stat. 2767; 42 U.S.C. 9601- 9675.

Controlled Substances Act of 1970. Act of October 27, 1970. P.L. 91-513, 84 Stat. 1245; 21 U.S.C. 801 et seq.

Cooperation by Secretary of Agriculture with States and Political Subdivisions in Law Enforcement Act of 1971. Act of August 10, 1971. P.L. 92-82, 85 Stat. 303; 16 U.S.C. 551a.

Cooperative Forest Management Act of 1950. Act of August 25, 1950. P.L. 81-729, Ch. 781, 64 Stat. 473, as amended; 16 U.S.C. 568c, 568d.

Cooperative Forestry Assistance Act of 1978. Act of July 1, 1978. P.L. 95-313, 92 Stat. 365, as amended; 16 U.S.C. 2101(note), 2101-2103, 2103a, 2103b, 2104-2105.

Cooperative Funds and Deposits Act of 1975. Act of December 12, 1975. P.L. 94-148, 89 Stat. 804; 16 U.S.C. 565a-1 through 565a-3.

Cooperative Wildlife Habitat Management Act of 1974. Act of October 18, 1974. P.L. 93-452, 88 Stat. 1369; 16 U.S.C. 670g.

Creative Act of 1891. Act of March 3, 1891. 26 Stat. 1103; 16 U.S.C. 471, repealed by P.L. 94-579, Title VII , 704(a), October 21, 1976, 90 Stat. 2792.

Department of Agriculture Organic Act of 1944. Act of September 21, 1944. P.L. 78-425, Ch. 412, 58 Stat. 736 as amended; 16 U.S.C. 526, 527, 554b, 554c, 559a, 567(note), 572a, 579a, 580, 580a; 7 U.S.C. 2225, 2231, 2232, 2244, 2249, 2250, 2256-2258.

Department of Agriculture Organic Act of 1956. Act of August 3, 1956. P.L. 84-979, Ch. 950, 70 Stat. 1032; 7 U.S.C. 428a, 2228, 2233; 16 U.S.C. 579b.

Dingell-Johnson (Fish Restoration) Act of 1950. Act of August 9, 1950. P.L. 98-369, 68 Stat. 430; 16 U.S.C. 777.

Eastern Wilderness Act of 1975. Act of January 3, 1975. P.L. 93-622, 88 Stat. 2096; 16 U.S.C. 1132(note).

Economy Act of 1932. Act of June 30, 1932. P.L. 72-212, Ch. 314, 47 Stat. 418; 31 U.S.C. 1535.

Education Land Grant Act of 2000. Act of December 28, 2000. P.L. 106-577, 114 Stat. 3070; 16 U.S.C. 479a.

Emergency Relief Appropriations Act of 1935. Act of April 8, 1935. 49 Stat. 115; U.S.C. 721, 722(note).

Endangered Species Act of 1973. Act of December 28, 1973. P.L. 93-205, 87 Stat. 884, as amended; 16 U.S.C. 1531-1536, 1538-1540.

Federal Advisory Committee Act (FACA) of 1972. Act of October 6, 1972. P.L. 92-463, 86 Stat. 770; 5 U.S.C. Appendix 1.

Federal Aid Highway Act of 1973. Act of August 13, 1973. P.L. 93-87, 87 Stat. 250; 23 U.S.C. 101 et seq.

Federal Employees Compensation Act of 1966. Act of September 6, 1966. P.L. 89-554, 80 Stat. 532; 5 U.S.C. 8101 et seq.

Federal Environmental Pesticide Control Act of 1972. Act of October 21, 1972. P.L. 92- 516, 86 Stat. 873; 7 U.S.C. 136 et seq.

Federal Land Policy and Management Act of 1976. Act of October 21, 1976. P.L. 94- 579, 90 Stat. 2743, as amended; 43 U.S.C. 1701(note), 1701-1702, 1711-1723, 1732- 1737, 1740-1742, 1744, 1746-1748, 1751-1753, 1761-1771, 1781-1782.

Federal Noxious Weed Act of 1974. Act of January 3, 1975. P.L. 93-629, as amended, 81 Stat. 2148; 7 U.S.C. 2801(note), 2801-2814.

Flood Control Act of 1944. Act of December 22, 1944. P.L. 78-534, 58 Stat. 887, as amended by 68 Stat. 666 and 76 Stat. 808; 16 U.S.C. 460d, 33 U.S.C. 701b.

Food, Agriculture, Conservation, and Trade Act of 1990. Act of November 28, 1990. P.L. 101-624, 194 Stat. 335; 16 U.S.C. 2101.

Food and Agriculture Act of 1977 (National Agricultural Research, Extension, and Teaching Policy Act of 1977). Act of September 29, 1977. P.L. 95-113, Title XIV, 91 Stat. 981, as amended; 7 U.S.C. 450i, 3101-3103, 3121, 3122-3128, 3322, 3324, 3331-3333, 3336; 42 U.S.C. 6651.

Forest and Rangeland Renewable Resources Planning Act of 1974. Act of August 17, 1974. P.L. 93-378, 88 Stat. 476, as amended; 16 U.S.C. 1600(note), 1600-1614.

Forest and Rangeland Renewable Resources Research Act of 1978. Act of June 30, 1978. P.L. 95-307, 92 Stat. 353, as amended; 16 U.S.C. 1600(note), 1641(note), 1641-1648.

Forest Research Advisory Committee Act of 1981. Act of December 22, 1981. P.L. 97- 98, 95 Stat. 1213; 16 U.S.C. 582a-4 and 582a-5.

Forest Resource Conservation and Shortage Relief Act of 1990. Act of August 20, 1990. P.L. 101-382, Title IV, 104 Stat. 714; 16 U.S.C. 620(note), 620a-j.

Forest Stewardship Act of 1990 (1990 National Farm Bill). Act of November 28, 1990. P.L. 101-624, Title XII, Chapter 5, 104 Stat. 3521; 16 U.S.C. 582a, 582a-8, 1648, 1642(note), 1647a, 2101(note), 2106a, 2112(note), 6601(note).

General Exchange Act of 1922. Act of March 20, 1922. P.L. 67-173, Ch. 105, 42 Stat. 465; 16 U.S.C. 485, 486.

Geothermal Steam Act of 1970. Act of December 24, 1970. P.L. 91-581, 84 Stat. 1566; 30 U.S.C. 1001-1003, 1005-1007, 1011, 1013-1014, 1016, 1021-1025.

Global Climate Change Prevention Act of 1990. Act of November 28, 1990. P.L. 101- 624, Title XXIV, 104 Stat. 4058; 7 U.S.C. 2007(note), 6702-10.

Government Performance and Results Act of 1993. Act of August 3, 1993. P.L. 103-62, 107 Stat. 285; 5 U.S.C. 306, 31 U.S.C. 1105(a)(29); 31 U.S.C. 115-117, 9703-9704, 1118-1119.

Granger-Thye Act of 1950. Act of April 24, 1950. P.L. 81-478, Ch. 97, 64 Stat. 82; 16 U.S.C. 490, 504a, 555, 557, 571c, 572, 579a, 580c-*l*, 581i-*l*.

Interchange with Department of Defense Act of 1956. Act of July 26, 1956. P.L. 84-404, 70 Stat. 656, as amended; 16 U.S.C. 505a, 505b.

International Forestry Cooperation Act of 1990. Act of November 5, 1990. P.L. 101-513, Title VI, 104 Stat. 2070; 16 U.S.C. 4501(note), 4501-4503, 4503a-d, 4504-4505.

Land and Water Conservation Fund Act of 1965. Act of September 3, 1964. P.L. 88-578, 78 Stat. 897, as amended; 16 U.S.C. 460*l*-4(note); 460*l*-4 through 6a, 460*l*-7 through 460*l*-10, 460*l*-10a-d, 460*l*-11.

McIntire-Stennis Act of 1962. Act of October 10, 1962. P.L. 87-788, 76 Stat. 806, as amended; 16 U.S.C. 582a, 582a-1 through a-7.

McSweeney-McNary Act of 1928. Act of May 22, 1928. P.L. 70-466, 45 Stat. 699-702,as amended; 16 U.S.C. 581, 581a, 581b-581. Repealed and codified as 16 U.S.C. 1641.

Mineral Leasing Act of 1920. Act of February 25, 1920. P.L. 66-146, 41 Stat. 437, as amended; 30 U.S.C. 181(note), 181-187, 187a-b, 188-195, 201-202, 202a, 203-208, 208-1, 209, 211-214, 221-226, 226-2, 226-3, 227-229, 229a, 241, 251, 261-263.

Mineral Leasing Act for Acquired Lands of 1947. Act of August 7, 1947. P.L. 80-382, Ch. 513, 61 Stat. 913, as amended; 30 U.S.C. 351(note), 351-360.

Mineral Materials Act (Common Varieties of) of 1947. Act of July 31, 1947. P.L. 80-291, Ch. 406, 61 Stat. 681, as amended; 30 U.S.C. 601-604.

Mining Law of 1872. Act of May 10, 1872. Ch. 152, 17 Stat. 91; 30 U.S.C. 22, 28, 28b.

Multiple Use and Sustained Yield Act of 1960. Act of June 12, 1960. P.L. 86-517, 74 Stat. 215; 16 U.S.C. 528(note), 528-531.

Multiple Use Mining Act of 1955. Act of July 23, 1955. P.L. 84-167, 69 Stat. 368, as amended; 30 U.S.C. 611-615.

National and Community Service Trust Act of 1993. Act of September 21, 1993. P.L. 103-82, 107 Stat. 785; 42 U.S.C. 12501.

National Environmental Policy Act of 1969. Act of January 1, 1970. P.L. 91-190, 83 Stat. 852; 42 U.S.C. 4321(note), 4321, 4331-4335, 4341-4346, 4346a-b, 4347.

National Farm Bill of 1990 (Agriculture, Conservation, and Trade Act of 1990). Act of November 28, 1990. P.L. 101-624, Title XV, Chapter 5, 104 Stat. 3632; 7 U.S.C. 936b, 946(note), 950aaa-4, 1691(note), 1927(a)(3), 1932(f), 6601, 6601(note), 6611- 6617, 2001a, 2001a(note), 2007(note), 2204d, 2661(note), 2662, 2662(note), 3125b, 6702-10; 13 U.S.C. 141(note), 142(note).

National Farm Bill of 1996 (Federal Agriculture Improvement and Reform Act of 1996). Act of April 4, 1996. P.L. 104-127, 110 Stat. 888-1197; 7 U.S.C. 7201(note).

National Forest-Dependent Rural Communities Economic Diversification Act of 1990. Act of November 28, 1990. P.L. 101-624, Title XIII, subtitle 6, Ch. 2, 2372-2379, 104 Stat. 4046-4049; 7 U.S.C. 611 et seq., as amended by P.L. 106-113, Div. B, 1000(a)(3) (Title III, 395), November 29, 1999. 113 Stat. 1535, 150a-203.

National Forest Management Act of 1976. Act of October 22, 1976. P.L. 94-588, 90 Stat. 2949, as amended; 16 U.S.C. 472a, 476, 476 (note), 500, 513-516, 518, 521b, 528(note), 576b, 594-2(note), 1600(note), 1601(note), 1600-1602, 1604, 1606, 1608-1614.

National Forest Roads and Trails Act of 1964. Act of October 13, 1964. P.L. 88-657, 78 Stat. 1089, as amended; 16 U.S.C. 532-538.

National Forest System Drug Control Act of 1986. Act of October 27, 1986. P.L. 99-570, Title XV, 100 Stat. 3207-191, as amended; 16 U.S.C. 559b(note), 559b-559g.

National Historic Preservation Act of 1966. Act of October 15, 1966. P.L. 89-665, 80 Stat. 915, as amended; 16 U.S.C. 470, 470-1, 470a, 470f, 470h, 470h-1, 470h-2, 470i, 470j, 470v, 470w-3.

National Industrial Recovery Act of 1933. Act of June 16, 1933. P.L. 73-67, Ch. 90, 48 Stat. 195; 40 U.S.C. 401, 403(a), 408.

National Trails System Act of 1968. Act of October 2, 1968. P.L. 90-543, 82 Stat. 919, as amended; 16 U.S.C. 1241(note), 1241-1251.

Norris-Doxey Cooperative Farm Forestry Act of 1937. Act of May 18, 1937. P.L. 75-95, 50 Stat. 188. Repealed by P.L. 81-729, Ch. 781, 64 Stat. 473; 16 U.S.C. 568b.

Older Americans Act of 1965. Act of July 14, 1965. P.L. 89-73, 79 Stat. 218; 42 U.S.C. 3058, 7058a.

Omnibus Appropriations Act for Interior and Related Agencies of 1999. Act of October 21, 1998. P.L. 105-277, 112 Stat. 2681 et seq.

Oregon-California Land Grant Act of 1954. Act of June 24, 1954. P.L. 83-426, 68 Stat. 271; 43 U.S.C. 1181 f-g.

Organic Administration Act of 1897. Act of June 4, 1897. Ch. 2, 30 Stat. 11, as amended; 16 U.S.C. 473-475, 477-482, 551.

Payments in Lieu of Taxes Act of 1976. Act of October 20, 1976. P.L. 94-565, 90 Stat. 2662; 31 U.S.C. 1601-1607.
Plant Protection Act of 2000. Act of June 20, 2000. P.L. 106-224, 114 Stat. 358; 7 U.S.C. 411.
Pittman-Robinson (Wildlife Restoration) Act of 1937. Act of September 2, 1937. P.L. 75- 415, 50 Stat. 917; 16 U.S.C. 669-669j.
Reciprocal Fire Protection Act of 1955. Act of May 27, 1955. P.L. 84-46, 69 Stat. 66; 42 U.S.C. 1856a.
Recreational Boating Safety and Facilities Improvement Act of 1980. Act of October 14, 1980. P.L. 96-451, Title III, 94 Stat. 1983 as amended; 26 U.S.C. various sections, 16 U.S.C. 1606a.
Rescissions Act of 1995. Act of July 27, 1995. P.L. 104-19, 109 Stat. 194.
Research Facilities Act of 1963. Act of July 22, 1963. P.L. 88-74, 77 Stat. 90; 7 U.S.C. 390 et seq.
Research Grants Act of 1958. Act of September 6, 1958. P.L. 85-934, 72 Stat. 1793; 42 U.S.C. 1891-1893.
Rural Development Act of 1972. Act of August 30, 1972. P.L. 92-419, 86 Stat. 657; 7 U.S.C. 2669.
Safe Drinking Water Act Amendments of 1977. Act of November 16, 1977. P.L. 95-190, 91 Stat. 1397; 42 U.S.C. 300f, 300j-6, 300j-8, et seq.
Secure Rural Schools and Community Self-Determination Act of 2000. Act of October 30, 2000. P.L. 106-393, 114 Stat. 1607; 16 U.S.C. 500(note).
Small Business Act of 1953. Act of July 30, 1953. P.L. 83-167, Ch. 282, Title II, Sec. 201-223, 67 Stat. 232, as amended, 15 U.S.C. 631-632, 637b, 644, 651.
Small Tracts Act of 1983. Act of January 12, 1983. P.L. 97-465, 96 Stat. 2535; 16 U.S.C. 521c-521i.
Smith-Lever Act of 1914. Act of May 8, 1914. P.L. 63-95, 38 Stat. 372; 7 U.S.C. 341 et seq.
Soil and Water Resources Conservation Act of 1977. Act of November 18, 1977. P.L. 95- 192, 91 Stat. 1407; 16 U.S.C. 2001(note), 2001-2009.
Stafford Act of 1974. Act of May 22, 1974. P.L. 93-288, 88 Stat. 143; 42 U.S.C. 5121- 5205.
Surface Mining Control and Reclamation Act of 1977. Act of August 3, 1977. P.L. 95-87, 91 Stat. 445; 30 U.S.C. 1201, 1201(note), 1236, 1272, 1305.
Timber Sales Bidding Act of 1978. Act of February 20, 1978. P.L. 95-233, 92 Stat. 32 as amended; 16 U.S.C. 472a(e).
Tort Claims Procedure Act of 1948. Act June 25, 1948. P.L. 80-773, Ch. 646, 62 Stat. 983, as amended; 28 U.S.C. 2671 et seq.
Townsite Act of 1958. Act of July 31, 1958. P.L. 85-569, 72 Stat. 438, as amended; 16 U.S.C. 478a.
Transfer Act of 1960 (Functions Transfer (Interior to Agriculture)). Act of June 11, 1960. P.L. 86-509, 74 Stat. 205; 7 U.S.C. 2201(note).
Twenty-five Percent Fund Act of 1908. Act of May 23, 1908. P.L. 60-136, Ch. 192, 35 Stat. 260, as amended; 16 U.S.C. 500, 553, 556d.
Volunteers in the National Forest Act of 1972. Act of May 18, 1972. P.L. 92-300, 88 Stat. 147, as amended; 16 U.S.C. 558a(note), 558a-558d.
Water Resources Research Act of 1964. Act of July 16, 1964. P.L. 88-379, 78 Stat. 329 as amended; 42 U.S.C. 1961 et seq. Repealed by P.L. 95-467, 92 Stat. 13.
Watershed Protection and Flood Prevention Act of 1954. Act of August 4, 1954. P.L. 83- 566, 68 Stat. 666, as amended; 16 U.S.C. 1001(note), 1001-1003, 1003a, 1004-1006, 1006a-b, 1008, 1010; 33 U.S.C. 701b(note).
Weeks Act of 1911. Act of March 1, 1911. P.L. 61-435, Ch. 186, 36 Stat. 961, as amended; 16 U.S.C. 480, 500, 515, 516, 517, 517a, 518, 519, 521, 552, 563.
Wild and Scenic Rivers Act of 1968. Act of October 2, 1968. P.L. 90-542, 82 Stat. 906, as amended; 16 U.S.C. 1271(note), 1271-1287.
Wilderness Act of 1964. Act of September 3, 1964. P.L. 88-577, 78 Stat. 890, as amended; 16 U.S.C. 1131(note), 1131-1136.
Wildfire Suppression Assistance Act of 1989. Act of September 9, 1988. P.L. 100-428, 102 Stat. 1615; 42 U.S.C. 1856m-1856o.
Workforce Investment Act (WIA) of 1998. Act of August 7, 1998. P.L. 105-220, 112 Stat. 936; 29 U.S.C. 794d.
Youth Conservation Corps Act of 1970. Act of August 13, 1970. P.L. 91-378, 84 Stat. 794, as amended; 16 U.S.C. 1701-1706.

Other References

Abandoned Mine Lands Watershed Cleanup Initiative. (2002, September 25—last update). *USGS* [Homepage of Abandoned Mine Lands Watershed Cleanup Initiative], [Online]. Available: http://www.usgs.gov/themes/factsheet/095-99/ [2002, December 23].
Federal Response Plan. (2002, November 18—last update). *FRP* [Homepage of Federal Emergency Management Agency: Federal Response Plan]. [Online]. Available: http://www.fema.gov/rrr/frp/ [2002, December 23].
Federal Wildland Fire Management Policy and Program Review. (1996, September 6—last update). [Homepage of Federal Wildland Fire Management Policy and Program Review Implementation Action Plan Report], [Online]. Available: http://www.fs.fed.us/land/wdiap.htm [2002, December 23].
Joint Fire Sciences Program. (2002, December 12-last update). [Homepage of the Joint Fire Sciences Program], [Online]. Available: http://www.nifc.gov/joint_fire_sci [2002, December 23].
National Fire Plan: Managing the Impacts of Wildfire on the Communities and the Environment. (2002, December 23—last update). [Homepage of the National Fire Plan], [Online]. Available: http://www.fireplan.gov [2002, December 23].
National Research Initiative. (2002, October 7—last update). [Homepage of the National Research Initiative], [Online]. Available: http://www.reeusda.gov/nri/ [2002, December 23].
NSF Long Term Ecological Research Program. (2002). [Homepage of NSF Long Term Ecological Research Program], [Online]. Available: http://lternet.edu/ [2002, December 23].
Recreation Agenda. (2000, December). [Homepage of USDA Forest Service Recreation Agenda], [Online]. Available: http://www.fs.fed.us/recreation/programs/strategy/rec_agenda_ht.html [2002, December 23].
RPA Assessment and Supporting Publications. (2002, September 18 – last update) [Homepage of The RPA Assessment and Supporting Publications], [Online]. Available: http://www.fs.fed.us/pl/rpa/list.htm [2003, January 3].
Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management. (2001, May 7—last update). [Homepage of cleanwater.gov: Unified Federal Policy

for a Watershed Approach to Federal Land and Resource Management], [Online]. Available: http://www.cleanwater.gov/ufp/ [2002, December 23].

USDA Forest Service Strategic Plan (2000 Revision). (2002, November 27—last update). [Homepage of the USDA Forest Service Strategic Plan (2000 Revision)], [Online]. Available: http://fsweb.wo.fs.fed.us/rpa/ [2002, December 23].

Wilderness Stewardship—A Strategic Plan. (1995). [Homepage of 1995 Interagency Wilderness Strategic Plan], [Online]. Available: http://planning.nps.gov/wilderness/document/I-21.pdf [2002, December 23].

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