

## **U.S. Forest Service Research : Its Administration and Management**

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### **ABSTRACT**

The U.S. Forest Service administers the world's largest forestry research organization. From its modest beginning in 1876, some 30 years before the United States national forest system was established, the research branch has devoted its effort to meet current and future information needs of the forestry community of the United States, not just for the U.S. Forest Service. The research branch is one of three major administrative units of the U.S. Forest Service. The others being the National Forest System and State and Private Forestry. Currently the National Forest System comprises 155 national forests, 19 national grasslands, and 18 utilization projects located in 44 states, Puerto Rico, and the Virgin Islands. The National Forest System manages these areas for a large array of uses and benefits including timber, water, forage, wildlife, recreation, minerals, and wilderness. It is through the State and Private Forestry branch that the U.S. Forest Service cooperates and coordinates forestry activities and programs with state and local governments, forest industries, and private landowners. These activities include financial and technical assistance in disease, insect, and fire protection; plan forestry programs; improve harvesting and marketing practices; and transfer forestry research results to user groups. Forestry research is carried out through eight regional Forest Experiment Stations and the Forest Product Laboratory. Studies are maintained at 70 administrative sites, and at 115 experimental forest and grasslands. All of the current sciences that composed modern forestry are included in the research program. These range from forest biology (i.e. silviculture, ecology, physiology, and genetics) to the physical, mathematical, engineering, managerial, and social sciences. The levels of research range from application, developmental, and basic research. Research planning and priority identification is an ongoing process with elements of the research program changing to meet short-term critical information needs (i.e. protection research) to long-term opportunities (i.e. biotechnology). Research planning and priority setting is done in cooperation with National Forest Systems, forest industries, universities, and individual groups such as environmental, wilderness, or wildlife organizations. There is an ongoing review process of research administration, organization, and science content to maintain quality of research. In the U.S. Forest Service the research responsibility is not completed until the new information is being applied by the various user group; i.e. technology transfer program. Research planning and development in the U.S. Forest Service is a dynamic activity. Programs for the year 2000 and beyond are now in the planning stage.

### **INTRODUCTION**

Forestry today in order to meet the increasing

and changing needs of an ever expanding society must have current information based on modern science practices. It will be through careful research, development and application that forestry

organizations with their limited resources will increase forest productivity, improve wood utilization, ensure and maintain water quantity and quality, maintain wildlife and fish population and provide an abundance of recreation opportunities. The demands on the modern forester to produce an array of goods and services places a premium on current and appropriate knowledge. Scientists cannot depend solely on the experiences of the past, but must anticipate as well as plan for the next generation of management challenges. Scientists must also be solvers of current problems. It should be remembered that forestry consists of both the science as well as the practical arts applied to the use and management of forests and related natural resources.

### EARLY HISTORY

Today, the U.S. Forest Service, administers the world's largest forestry research organization. Such was not always the case. From its modest beginning in 1876, some 30 years before the establishment of the United States National Forest System, the research branch had devoted its resources to provide current and reliable information and advice to all of the forestry communities of the United States. In 1876, a Division of Forestry consisting of only one professional, Franklin B. Hough, was established in the United States Department of Agriculture. Its purpose was "to prosecute investigations and inquiries pertaining to practically all matters relating to forest production, consumption and influences". It should be noted that at this time there was no U.S. Forest Service, or other federal agency managing the forest resource. By 1886, this small research organization was considering both biological and economic forestry problems, and initiated a national wood technology research effort. In 1887, among the many useful studies published was the *Nomenclature of the Arborecent Flora of the United States* by G.B. Sudworth. This was the first of a large series of studies on the

identification, nomenclature and distribution of woody plants of the United States published by the U.S. Forest Service. Such studies are being continued. In 1889, Gifford Pinchot became Chief of the Division of Forestry. During the short period that Mr. Pinchot headed the research office, a rigorous national research effort was initiated. It was during this period that several species introduction centers were established and numerous field studies were initiated including the establishment of permanent growth plots on both federal and private lands. During this same period the small but active research office went through some name changes, including Section of Special Investigations, Division of Forest Investigation and Office of Silvics.

A major event took place in 1905, when the Bureau of Forestry was established to manage the expanding Forest Reserve System. This Bureau of Forestry later became the U.S. Forest Service of today. In essence forestry research was now part of a much larger national organization. At this time, there was some loss of identity. During this period of reorganization of federal forestry, major changes were taking in the research structure. Previously, all research had been essentially managed from an office in Washington, D.C. Starting in 1905, research was decentralized into regional units that had a high degree of independence from the national office. This was due in part to the large distances involved, the isolation of experimental areas and the biological differences between regions of the country. In 1908, a system of Forest Experiment Stations were established in the western United States. The first Experiment Station was established at Fort Valley, Arizona. Others soon followed in Colorado, Idaho, California, Washington and Utah. Many of the original field locations are still being used today. These were all in the West, many located on or associated with the newly established Forest formed Bureau of Forestry. Still both private companies and the States in the Eastern United States recognized the need for current forestry information and in 1921,

the Appalachian Forest Experiment Station, Asheville, North Carolina was established. Today, Asheville is the headquarters of our Southeastern Experiment Station. Although wood technology was an original research area by the young research organization, forest products concerns were soon neglected. But in 1910, with a sense of urgency, the Forest Product Laboratory was established at Madison, Wisconsin. It remains today as one of the finest centers for research in the area of wood technology and forest products development.

During 1915, range research was added to the responsibilities of the Bureau of Forestry and the Santa Rita Experimental Range was added to the other experimental areas.

The importance and the value of a research organization was reaffirmed on June 1, 1915, when a Branch of Research was reestablished. However, it took a new law in 1928, McSweeney-McNary Act, that finally established a modern research organization and built the foundation of the current program. Under this imaginative law, 12 regional forest and range experiment stations were established to serve the research needs of major geographic areas of the United States. The basic organization, then established remains today. The Station Director became responsible for the coordination and development of research programs for a given region.

During one year following this act, additional Experiment Forest Experiment Stations were established in Puerto Rico and Alaska. Since 1928, there has been a series of reorganizations, with some of the original Experiment Stations combining, and a reshaping of their administrative responsibilities. Still, the basic concept of 1928 has been maintained with the establishment of regional programs to meet regional needs. To strengthen this concept in 1946 and again in 1947, funds were provided for research centers within the Experiment Stations. Research centers were organizational units to meet the research needs of smaller areas of common forest types and economic conditions. This was a reaction to a growing awareness for more

concentrated research on the various forest types and specialized problems and needs of an expanding post-World War forestry program. Research in the older Experimental Stations were expanded and additional experimental areas were established to meet the new information needs. For the most part during this initial post-War period, the emphasis was on short-term and immediate problems facing the forest manager. Still some basic research was initiated. It was a period when a number of valuable long term silvicultural studies, first established in the 1930's, were greatly expanded.

The McSweeney-McNary Act also placed in motion in 1930 the first complete forest survey in the United States. This survey is now updated on a regular basis including an in depth assessment of the current and future forest resources and the demands for future forest products and forest uses.

## **CURRENT U.S. FOREST SERVICE ORGANIZATION**

Forestry Research is one of three major administrative components of the U.S. Forest Service. The others being the National Forest Systems and State and Private Forestry.

### **National Forest System**

Currently, the National Forest System manages 155 national forests (the old forest reserve system), 19 national grasslands and 18 utilization projects located in 44 states, Puerto Rico and the Virgin Islands. The National Forest System manages these areas for a large array of uses and benefits including timber, water, forage, wildlife, recreation, minerals, and wilderness. The National Forest System is the largest component of the U.S. Forest Service, with an annual budget approaching \$2.0 Billion.

### **State And Private Forestry**

It is through the State and Private Forestry branch that the U.S. Forest Service cooperates and coordinates forestry activities and programs with

state and local governments, forest industries, and private landowners. Current activities include financial and technical assistance in disease, insect, and fire protection; plan forestry programs; improve harvesting and marketing practices; transfer forestry research results to user groups. The Forest Pest Management Staff of State and Private Forestry has the responsibilities of assessing insect and disease damage on National Forest lands as well as on State and Private forest lands. This staff also organizes, plans and assist in insect and disease control activities on forest lands.

### Forest Research

Forest Research is carried out through eight Experiment Stations and the Forest Products Laboratory. Studies are conducted at 70 administrative sites and at 115 experimental forests and grasslands. During the current year (Fiscal Year 1987), there are 200 Research Work Units, the functional research administrative unit, conducting 2800 studies on 800 research problems. This is being done by 735 scientists. In addition, approximately 7 percent of the current budget of \$123 million supports extramural research i.e. research studies by universities and other organizations. Furthermore, \$6 million is devoted to a competitive grants program in support of basic forestry research. All of the current sciences that compose modern forestry are included in the research effort. These range from forest biology to the physical, mathematical, engineering, managerial and social sciences. The levels of research include application, developmental and basic. Although the majority of the studies are directed toward operational and forest management problems, there is a growing portion of basic and fundamental science being supported directly or indirectly by the U.S. Forest Service.

## RESEARCH ORGANIZATION

As noted in the brief review of the U.S. Forest Service Research history, research was first

directed from the Washington, D.C. headquarters and then later the program become decentralized. Currently, there is a planning and coordination staff in Washington, D.C. The actual research is carried out at the eight Experiment Stations and Forest Products Laboratory.

### Headquarters

Overall policy and coordination is directed by the Deputy Chief of Research. He is supported by seven technical and planning staff groups which include Timber Management, Insect and Disease, Forest Products and Engineering, Forest Fire and Atmospheric Science, Forest Environment, Forest Resource Economics and International Forestry. These staffs provide technical advice, coordination and budget planning and development to the Deputy Chief of Research and to the Experiment Stations. The research staffs also provide one link with other government organizations, forest industry and private groups.

The staff groups working closely with other elements of the U.S. Forest Service, educational institutions or other forestry organizations have a major responsibility for future planning, and direction of the program. The staff groups have the responsibility of conducting systematic program reviews and evaluations for the Deputy Chief. In addition, the Staff Groups take the lead in coordinating research programs that involve more than one Experiment Station. Frequently, staff groups take the lead in initiating joint programs with other federal agencies, industrial or private groups.

### Experiment Stations

The action arm of the research organization is the eight Experiment Stations and Forest Products Laboratory. They are composed of a Station Director, several Assistant Directors and a modest support staff for administrative purposes. The functional research element is the Research Work Unit. A Station is composed of 25 or more Research Work Units representing the various

disciplines of forest science. Each Research Work Unit has a stated research mission and addresses one or more research problems. In composition, a Research Work Unit is composed of a Project Leader and one or more scientists and supporting staff.

## PROBLEM IDENTIFICATION AND PRIORITY SETTING

Research problem identification and priority setting is a key element in the effectiveness of any research organization. Since the U.S. Forest Service serves the whole forestry community in the United States, research identification takes place with many organizations and at various levels of administration. This is an ongoing process. Within the Forest Service research in coordination with National Forest System staffs continuously identify information and research needs. These are most frequently further developed in joint staff papers setting research needs and priorities. Periodically joint national planning meetings are held with various forestry groups for the sole purpose of identifying research needs. Not unfrequently local forestry situations stimulate a research need that must be considered. In a more organized way, the research staff is constantly assessing future forestry information needs and this often leads to problem identification. Resource managers within and outside the U.S. Forest Service contribute their information concerns and needs. These are constantly being evaluated by the various research staffs. Then by a process of constant evaluations at several levels, priority research problems are identified. In final problem selection staff ability, funding and importance of the research are all considered.

The problem mix for any given Research Work Unit is being constantly evaluated to determine if the research will be continued or even expanded. Among the current criteria are:

1. Importance (timeliness) of research addressed.
2. Relation to national goal and mission of U.S.

- Department of Agriculture and Forest Service.
3. Impact of the research.
4. Probability of success.
5. Suitability of research approach.
6. Personnel qualification, organization structure and adequacy of funding.

There are periodic evaluations and reviews of the existing research program. This is both necessary and essential to make sure that the research is of the highest priority and can be accomplished. A basic set of criteria have been established to determine whether research should be redirected or even stopped. These include:

1. Research completed or nearing completion.
2. Inadequate critical mass including technical skills, funding, facilities and associated resources
3. Low impact or success probability.
4. Outside of U.S. Forest Service mission scope i.e. some other organization can or should do it.

In any year, approximately 15 to 20 percent of the research program is redirected into other problem areas, or terminated.

## COOPERATIVE RESEARCH SUPPORT

It is neither feasible nor possible for the U.S. Forest Service Research to meet all of the research needs of the United States. Other organizations, especially forestry schools and forest industry conduct needed and necessary research. To strengthen these programs the U.S. Forest Service devotes between 7 to 12 percent of its budget in support of cooperative research. These are projects of mutual interest and tend to support directly or indirectly U.S. Forest Service priorities. In this way, often unique skills not found in the U.S. Forest Service are directed to Forest Service problems and issues. It is a useful means of obtaining certain skills for limited periods.

To encourage and strengthen more basic research in forestry, the U.S. Forest Service working with forestry schools have developed a competitive

grants program in forestry. Currently, approximately \$6 million is directed to a wide range of biological as well as engineering and harvesting research problems. In this program, anyone in the United States is eligible to submit a basic research grant proposal. Selection is made by a series of peer review panels.

### TECHNOLOGY TRANSFER

Research is of little value unless it is used to advance the science of forestry directly or by stimulating new knowledge or technology. Scientists are encouraged and rewarded for getting their research into practice. Considerable effort in planning and development is placed on technology transfer. Although not all scientists are as active as others each Experiment Station has developed one or more technology transfer plans since special

skills are needed to be successful.

### CONCLUSION

This has been a very brief review of the research planning, organization and management of the U. S. Forest Service. Time stands still for no man, and the same is true for research organizations. Already, we have begun the initial planning for the next generation of research in the year 2000 and beyond. We can expect major organizational changes, as well as in subject areas. We have begun pioneering research in forest biotechnology, computer sciences and in wood technology. When we gather next, the story to be told may well be very different. Research needs and their solutions are dynamic, and so should be the organizations that house the future research staffs and the management that directs them.