

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
SNOQUALMIE NATIONAL FOREST



L - Uses  
Recreation  
Summer Homes

Naches Ranger Station  
Naches, Washington  
March 11, 1936

National Forest Reporter,  
Yakima Herold,  
Yakima, Washington

Dear Sir:

Reference is made to our recent telephone conversation in which you expressed a desire for more information regarding the Summer Home Lots the Forest Service has made available to the public in this district.

On this, the Naches District of the Snoqualmie National Forest, we have at present 314 lots surveyed for summer home use. Of this number 184 permits have already been issued and 175 permittees have already constructed their cabin. The lots are located along the Naches, American, and Bumping Rivers and Bumping Lake in 22 different tracts. The following is a list of the Summer Home Tracts where lots are yet available together with the number of lots available in each tract:

Cedar Springs	2
Cliffdell	7
Gold Creek	4
Lost Creek	22
Idlwild	2
Indian Flat	2
Willow Springs	2
Bumping Crossing	6
Edgewater	9
Bumping Lake	16
American Forks	19
Idlehour	6
Miner's Creek	20
Pleasant Valley	2
Timber Creek	10
Union Creek	1
	<hr/>
Total	130

To obtain use of one of these lots for summer home purposes it is necessary to make application through the District Forest Ranger who in turn secures approval by the Forest Supervisor. A rental fee of \$15.00 per year is charged which becomes due on the

first of January. The special use permit under which the lots are rented is not cancelled as long as the permittee complies with government regulations.

In order to keep up a certain standard for summer homes and prevent "shacks" from being built on the National Forest all plans must be approved before building starts. Of course strict sanitary regulations must be enforced. I have enclosed a copy of a mimeographed paper entitled, "Information in Regards to Summer Homes on the National Forest" which explains in more detail the requirements applicable to summer homes on the National Forest.

The Forest Service is willing to show any one interested in Summer Homes/ Lots what ones are available at any time, but would prefer to do it by appointment to avoid delay and waste of time. However, at the present time snow conditions make it impossible to find the corners.

The American Forks Tract is located quite near the American River Resort and Ski Lodge and is quite ideally located for persons interested in both summer and winter recreation on the National Forest. There are nineteen lots available in this group.

I trust that I have given you the information you desired.

Yours very truly,



M. M. Nelson  
Acting District Ranger



UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

Information in Regards to Summer Homes  
on National Forest Lands.

A. Method of Obtaining Summer Homes Site -- Application blanks for summer home lots may be obtained from the District Ranger's office. The application accompanied with a building plan must be returned to the Ranger's office. Upon the Ranger's approval, the application and the plans will be submitted to the Supervisor of the Forest. Upon the approval of the supervisor the party applying is eligible to lease the lot for as long a period as they comply with the regulations and pay their annual rental fee amounting to \$15.00 per year. Improvement work on the lot may be started upon payment of the first year rental fee. Permittees are advised to read information on back of application before starting improvement work on their lot.

B. Location of the Site -- Summer homes must be built where they are not noticeable from the main highway. It is advisable where possible to build homes out of sight of all roads other than the summer home group road. The house must ~~not~~ be located on the edge of streams or rivers (high water often causes damage), nor can it be located directly on the boundary lines of the lot, but they are to be located at least 20 feet from any of the boundary lines. All building sites must be approved by the District Ranger or his representative before construction begins.

C. Adaptation to the Site --- The building should be adapted to its site; it should "fit the ground". Great variations in the height of foundations should be avoided. In general, foundations should be low.

D. Building Materials --- Building materials should be suitable to the forest and as far as practicable, native to the locality. Buildings of sawed lumber are quite suitable; unplanned lumber is generally better than planed; stained finish is usually better than painted. Wide siding is preferable to narrow siding because wide horizontal lines blend more easily with the forest background.

E. Building Design

1. Foundations should be low and inconspicuous. They may be partially hidden by foundation planting, using only such shrubs, vines, ferns, etc., as are native to the immediate locality.

2. Walls should present clean, interesting surfaces, and the various wall areas should keep some geometrical relation to each other. If these areas are all unrelated, hit-or-miss, the result is much less pleasing.

3. Windows and doors should generally be of uniform size or of uniform shape, or should bear an obvious geometrical relation to one another. They should be equally spaced or the spacing should show some interesting pattern.

4. Roofs should present an interesting pattern; slopes of various roof areas should usually be the same; broken valleys and ridges should be strictly banned; shingles should be used in most cases; tin and other unpleasing material should be barred. Roofs should not be broken up too much.



5. Porches should fit the house. As far as possible they should be an integral part of the main body. An appearance of being stuck on is evidence of bad design. If the house would look as well or better with the porch removed, the design is obviously faulty. Construction should be substantial.

6. Chimneys must be fireproof and substantial. That is flues must be constructed of brick, masonry, or poured concrete, with a lining of terra cotta or cement tile. Standard brick or masonry flues by a reliable mason will be accepted. Tile or tin chimneys will be cause for rejection of application or cancellation of permit.

7. Toilets of the pail chemical type or cesspool type are recommended. Pit privies are satisfactory if located and built under proper consideration. They must be flyproof and at least 150 feet from streams, lakes, rivers and habitations. To be flyproof, a pit privy must be well sealed around the base, must have all windows or openings screened, and must have seat cover over the holes. It is recommended that the seat covers be of the type that drop down on the hole when the toilet is not in use. At periodic intervals the toilet should be treated with chloride of lime or creosote dip. Toilets should be kept as clean and odorless as possible. Pit privies should be moved before the hole is completely filled. At least 12 inches of dirt must be put over filled holes. The design of the standard Forest Service toilet, which is plain and inexpensive, but is sanitary, can be obtained at the office of the District Ranger.

8. Garbage pits must be sanitary and flyproof. All deposits of garbage should be either immediately burned or buried. Garbage can properly be deposited in garbage pits covered with flyproof covers. Tin cans are to be buried or burned and buried. Cans containing food particles can be burned, flattened and buried. A good location for a garbage pit is near the start of the trail going to the toilet. The design of the garbage pits used by the Forest Service may be obtained from the District Ranger.

10. Decoration should be extremely simple; in most cases it should be altogether lacking. "Gingerbread work" and "Dodads" of every sort are highly unsuited to forest camps.

10. In general simplicity is the keynote of good design. Good proportions, a feeling of naturalness, an air of dignity, count much more than any dolling up. Everything ornate, elaborate, pretentious, showy, tricky, fussy or peculiar is necessarily bad.



UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
SNOQUALMIE NATIONAL FOREST



ADDRESS REPLY TO  
FOREST SUPERVISOR  
AND REFER TO

FEDERAL OFFICE BUILDING  
SEATTLE 4, WASHINGTON

I  
PUBLICATIONS - Snoqualmie  
Distribution  
(Chief's Annual Report, 1953)

March 22, 1954

Dear Sir:

We are enclosing for your review an excerpt containing the essentials of the annual report of the Chief of the Forest Service. We hope it will be of interest to you.

In this report, Mr. McArdle has devoted a large part of his discussion to the management of the forage resource. Grazing and national forest ranges are closely linked with the agricultural economy of the West. National forest ranges provide forage in the summer and are an integral part of the year-round operation of a rancher. Grazing lands in the national forests contain the headwaters of major streams used for irrigation, hydroelectric power, domestic and industrial purposes. The Chief's emphasis on this phase is timely because a review of Forest Service grazing policies and problems has been in the forefront of public attention for some time.

The report also covers progress made in the management of water, timber, recreation, and wildlife resources on the national forests and describes the highlights of the cooperative programs carried on through the states and with private land owners. It outlines research activities conducted by the Forest Service, most of them in cooperation with the State agricultural and forest experiment stations, forest schools, and forest industries.

The vast resources of the national forests and their effect on the success of industry, business, and the economic and social welfare of dependent individuals and communities is emphasized in the report by Mr. McArdle. Our Pacific Northwest region, comprising 19 national forests in Oregon and Washington is, of course, a part of this national forest system and contributes directly to the welfare of people of these two states because of its timber and other resources.

Much yet remains to be done to develop potential sustained capabilities of the national forests. There will be many problems to reconcile in the interest of the greatest number of people over the longest period of time.

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Your continued interest in the programs and objectives of the Forest Service are very much appreciated. If at any time there are questions concerning our work programs, and accomplishments, any members of the Snoqualmie Forest will be pleased to discuss them with you.

Very truly yours,

*L. O. Barrett*

L. O. BARRETT  
Forest Supervisor

Enclosure



encl  
1954 mar 22

Report of the Forest Service, 1953

Excerpts From

# Report of the Chief of the Forest Service, 1953

## Grazing on the National Forests



UNITED STATES DEPARTMENT OF AGRICULTURE



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## II

## Report of the Chief of the Forest Service, 1953

[Transmitted September 15, 1953]

### MAJOR ACTIONS

The Forest Service engages in the following major activities: (1) The administration of 181 million acres of Federally owned land in 153 national forests; (2) cooperation with States and private owners in fire protection, tree planting, and forest management; and (3) forest, range, and watershed research through regional forest and range experiment stations and the forest products laboratory.

During the past year, the national forests have been the source of our most critical problems. This is to be expected and will continue to be so. It could hardly be otherwise, because the vast resources of the national forests affect the success or failure of countless business enterprises, and the economic and social well-being of countless thousands of American citizens and the communities in which they reside.

National-forest activities in the past year included supervising the cut of 5.16 billion board feet of timber and making some 22,000 new timber-sale contracts; grazing of some 1 million cattle and 3 million sheep under 23,500 permits; accommodating 33 million recreational visits, including 9 million visits from hunters and fishermen; administering 55,500 special-use permits for summer homes, resorts, telephone lines, water development, mineral leases, and other purposes; suppressing 12,000 forest fires, which burned 219,000 acres; planting 51,000 acres of forest land; reseeding 56,000 acres of range land; building 460 miles of roads; and maintaining 200,000 miles of existing roads and trails.

Following are some of the major policy actions of the past year.

1. Several administrative policy changes have been made or proposed with respect to grazing on the national forests. There has been progress toward legislation that would help livestock producers and, at the same time, safeguard the interests of all other national-forest users. These grazing policies and problems are discussed subsequently in more detail.

2. Consideration was given by the Congress to the possible need for revision of the mining laws as they affect the national forests. The Forest Service believes that discovery and utilization of the mineral resources underlying the national forests should be encouraged in every proper way; but it also believes some revision of present laws is needed to prevent unnecessary impairment of surface resources. Two congressional committees are currently studying the problem.

3. In timber management, a new policy has been developed for Federal sustained-yield units; timber-sale contract forms are undergoing important revisions, and methods of timber appraisal are under intensive study and review.



4. Positive and aggressive action is under way to minimize serious timber losses from insect epidemics in the Pacific Northwest and the Inland Empire.

5. The entire matter of Federal ownership of land has received much attention. New criteria have been adopted with respect to land exchanges and purchases. The Forest Service is intensively studying national-forest boundaries and purchase units, with a view to possible revisions.

6. An arrangement has been agreed upon between the Departments of Agriculture and the Interior which would settle the long-standing controversy over administration of certain national-forest timber lands in Oregon. In the meantime, disbursement to the State for the benefit of the concerned counties of 1.4 million dollars which has been held in escrow pending settlement of the controversy has been recommended to the Comptroller General. Upon final settlement, the counties will receive a substantial additional sum.

7. Organizationally, decision has been reached and progress made toward consolidation of 14 national forests and 2 regional forest and range experiment stations. Forest Service activities in Puerto Rico have been reorganized. The Insular forests, which for many years have been managed by the Forest Service, have been turned over to the Insular Government for administration, and an Insular Forester has been appointed. Forest Service participation in upstream flood-control surveys, flood-control action programs, and comprehensive river-basin studies has been reorganized and consolidated.

8. In research, a nationwide Forest Research Advisory Committee has been organized; coordination of Forest Service research with the Agricultural Research Administration has been improved; the research of the forest products laboratory and the regional forest experiment stations has been more closely integrated; and procedures have been developed which have greatly strengthened cooperative research with State agricultural experiment stations, forestry schools, and forest industry.

### GRAZING ON THE NATIONAL FORESTS

Possibly no other phase of national-forest administration has been as difficult as grazing. A small but important segment of grazing permittees has been dissatisfied. Difficult problems of resource management have confronted our rangers and supervisors, and there appears to be considerable misunderstanding of departmental policy and facts of administration.

Periodically the administration of Federal grazing lands—both national forests and those under the administration of the Department of the Interior—has erupted into national issues which have required the attention of the Congress and Department heads. Because this situation prevails in 1953, I wish to report to you in some detail on national-forest grazing matters. I have not heretofore made a public statement on the grazing policies of the Forest Service nor the actions taken during the past year in an attempt to solve some of the major problems of range administration. It is my hope that this statement will clear up some misunderstandings and correct some false impressions.

As necessary background, I shall describe briefly the character and importance of national-forest range resources and the bare essentials of range administration and management. Emphasis will be on the major problems of range administration and the events of the past year pointing toward the solution of those problems.

### RANGE RESOURCES

There are 104 national forests in the West comprising 138 million acres. Of this area, 44 percent, or about 61 million acres, is grazed by livestock. Most of the range is forested, much of it commercial timberland. All national-forest grazing lands, whether forested or open range, have important watershed values.

Types of vegetation differ widely because of extreme variations in elevation, climate, and soil. There are high-mountain subalpine grasslands and mountain meadows. Somewhat lower are the open-forest ranges of ponderosa pine and aspen. Still lower are the woodland ranges with a tree growth of pinyon pine, juniper, and oak. At still lower elevations are the open ranges of sagebrush-grass, the short-grass types, and the semidesert grasslands. The more dense timber stands of white pine, spruce, lodgepole pine, and Douglas-fir are relatively unimportant for grazing.

Western national forests have been grazed by domestic livestock ever since their establishment early in the 20th century. The same ranges were grazed for many years before the national forests were proclaimed.

Most western ranges became fully stocked in the late 1880's and early 1890's, a few in the 1870's—many years before the national forests were created. When placed in the national forests, many of the ranges were in deteriorated condition, not only as a result of past excessive grazing but also because of uncontrolled fires and other factors. Some of the range was plowed and cultivated to meet requirements of the homestead laws and later abandoned when found unsuited to farming. Demand for use of the range was great. To attempt to conserve forage was an invitation for others to come and get it. The memory of range wars between cattlemen and sheepmen was fresh. The destruction of range vegetation that already had occurred seriously reduced grazing capacity and watershed values.

Although progress had been made toward bringing grazing capacities and livestock numbers into balance on national-forest ranges, this progress was lost during World War I when livestock numbers in the West reached an all-time high.

Owing to the patriotic urge to produce as much meat and wool as possible, livestock increased on nearly all ranges. On national forests permitted cattle and horses increased 38 percent, from 1.6 million in 1914 to 2.2 million in 1918; and sheep and goats 12 percent, from 7.6 million to 8.5 million. Similar or even greater increases occurred on other public and private ranges.

Lower postwar prices for livestock, high costs of production, hard winters, and efforts to bring livestock numbers into balance with the forage supply brought about material reductions in both sheep and cattle on the national forests. Despite aggressive efforts to improve and manage the range, subsequent reductions in either livestock num-



bers or season of use have been necessary. The problem of bringing about a proper balance between livestock numbers and the forage supply constitutes a serious present-day problem in many parts of the West. This problem has been further accentuated in many areas by an increase in big game and accelerated demands for water and other national-forest resources.

About 1.1 million cattle and 3 million sheep graze western national forests, usually during the summer months under paid permit (table 1). These livestock are owned by some 20,000 permittees, who in fiscal year 1953 paid fees totaling 4.4 million dollars. In addition, over 52,000 head of livestock, primarily milk cows and work horses, were grazed without charge under regulations allowing free grazing to local settlers. Thus the grazing business on the national forests is a large one. It is one of the important uses of the national forests.

TABLE 1.—*Use of western national forests by domestic livestock and big-game grazing animals, stated years, 1908-52*

Calendar year	Domestic livestock			Big-game animal-unit-months <sup>2</sup>
	Cattle and horses	Sheep and goats	Animal-unit-months <sup>1</sup>	
	Thousand	Thousand	Thousand	Thousand
1908-----	1,382	7,087	13,952	-----
1913-----	1,554	7,868	15,612	-----
1918-----	2,230	8,511	20,365	-----
1923-----	1,852	6,711	17,179	-----
1928-----	1,436	6,416	12,672	1,170
1933-----	1,456	6,169	12,943	1,590
1938-----	1,301	5,310	11,062	2,230
1943-----	1,244	4,542	9,842	2,850
1945-----	1,245	3,893	9,136	3,410
1947-----	1,178	3,405	8,149	3,620
1949-----	1,140	3,096	7,645	3,740
1951-----	1,097	3,016	7,338	3,970
1952-----	1,105	3,005	7,332	4,430

<sup>1</sup> Estimated 1908 to 1923, since animal-unit-months not reported prior to 1926.

<sup>2</sup> Big-game population estimates not available until 1921.

The number of national-forest grazing permittees is about 3½ percent of the total number of livestock growers in the West. Of the total beef cattle population in the Western States about 11 percent graze on national forests a part of the year. Of the total stock sheep, approximately 22 percent graze on national forests. The forage furnished by the national forests is about 7 percent of the total feed requirements of western livestock.

Although the numbers involved are relatively small, and the forage furnished is not great compared with total needs, national-forest grazing is very important to the stockmen permittees. This is especially so because the high-mountain national-forest summer ranges form an essential link in the chain of grazing use with the lower elevation spring, fall, and winter ranges and improved ranch property, which

provide feed during the remainder of the year. These lower ranges are usually Federal grazing districts, State lands, or privately owned. Thus the seasonal national-forest summer ranges hold a key position in the yearlong operations of many producers.

The agricultural economy of the West, which is based largely on irrigation and livestock production, is inseparably linked to national-forest ranges. This is true, not only because of the grazing use of these ranges, but also because they are primary water-yielding lands. In general, western agriculture depends on a pattern of land relationships wherein comparatively small areas of water-consuming lands are directly dependent on extensive tracts of water-yielding forest and range lands. The national forests of the West embrace the headwaters which furnish most of the flow of major western rivers and streams used for irrigation, waterpower, and domestic purposes. The future of the West depends on how well these water-yielding lands are managed.

Grazing on national forests of the East and South is of growing importance to the local agricultural economy, but the national forests of the East are too small in number and size for the grazing use ever to be of major importance in livestock production. About one-fourth of the 22 million acres of eastern national forests is grazed by domestic livestock. In 1952 about 2,800 permittees grazed 36,000 cattle, 1,400 sheep, and 800 hogs, mostly in the South and Southeast. There are problems of conflicts between grazing and timber production in these areas which are being studied but which have not yet been generally resolved.

The policy problems of the Forest Service with respect to grazing come almost entirely from the West; and this statement is directed exclusively to western conditions and problems.

#### RANGE ADMINISTRATION AND MANAGEMENT

By the Act of 1897 the Congress specified that the purposes of the national forests were to secure favorable conditions of waterflow and to furnish a continuous supply of timber. It also instructed the Secretary to regulate their "occupancy and use." Under this broad authority, production of water and timber are the two major purposes of the national forests, but grazing by livestock has always been recognized as an important use. Thus in 1905, at the time the Forest Service was created, the Secretary of Agriculture, James Wilson, wrote the Chief of the Forest Service:

You will see to it that the water, wood, and forage of the reserves are conserved and wisely used for the benefit of the home-builder first of all; upon whom depends the best permanent use of lands and resources alike. The continued prosperity of the agricultural, lumbering, mining and live-stock interests is directly dependent upon a permanent and accessible supply of water, wood, and forage, as well as upon the present and future use of these resources under businesslike regulations, enforced with promptness, effectiveness, and common sense.

The grazing regulations of the Department, the history of the administration of the national forests, Supreme Court decisions, and the various Appropriations Acts all provide a broad legislative and administrative base for recognition of grazing by livestock as a proper use of the national forests. This base was further strengthened by



the Granger-Thye Act of 1950. However, such grazing use must be integrated and coordinated with the multiple-use policy of management which recognizes water and timber production as paramount uses with equitable consideration for the interests of stockmen, recreationists, hunters and fishermen, and the general public.

The Department has traditionally fostered two policies in its administration of the grazing resources of the national forests:

(1) Proper stocking and improvement of the range resource to achieve desirable watershed conditions and sustained high-level production of forage. Over many years the Department has attempted to bring livestock numbers into balance with available forage. This is being done by building up forage production through reseeding, other range-improvement measures, and by better management. Where this is not sufficient, necessary adjustments to grazing capacity have been made in either numbers of permitted livestock or season of use.

(2) Equitable distribution of the grazing privileges to favor the medium and small rancher dependent on national-forest range; but with due consideration to the larger permittees.

#### Grazing Allotments and Permits

National-forest range lands are divided by the Forest Service into "allotments" or use units, which are simply areas of land specifically designated for grazing use by specified numbers of livestock. The size of allotments is based primarily on the number of livestock to be grazed but is affected also by accessibility, topography, availability of forage, stock water, and related factors. Nearly 10,000 allotments have been designated on western national forests. Most of these are grazed by only one kind of livestock, either cattle or sheep, although some are grazed by both. Allotments may be designated to be grazed by the livestock of a single permittee or in common with animals owned by other people in the community.

The privilege of grazing a certain number of livestock for a definite length of time is allocated by the Forest Service through issuance of grazing permits to qualified applicants. In order to qualify, a rancher has had to meet certain requirements prescribed under departmental regulations. First of all, he has to own ranch property. He also has to own his livestock. He has to need national-forest range to round out his yearlong feed supplies.

The demand for grazing on the national forests has always exceeded the supply. Therefore it has been necessary to establish rules to determine which stockmen would be given permits. When the national forests were established, the prior users were given preference in the issuance of permits. After that local settlers and ranchers living in and near the forests were next in line of priority. After several years of continuous use the permittees established what have become known as "preferences." Thus the general pattern of grazing use has been fairly well crystallized for a long period of time and has resulted in establishing a group of preferred applicants for use of national-forest range. In order to provide a reasonable degree of flexibility in business transactions between permittees, it has been customary for the Government to transfer preferences from a per-

mittee to a purchaser of his ranch property or permitted livestock. This has been the principal way in which new permittees have obtained grazing privileges on the national forests since the original allocation of permits to prior users.

However, where surplus range is available, the practice has been to allocate it first to existing small permittees and secondly to qualified new applicants. There has also been provision for reducing the number of livestock in larger permits to take care of the needs of small permittees and needy new applicants. This is known as "distribution," and has been one of the controversial issues for many years.

In order to avoid concentration of an undue share of the range in a few permits, so-called "upper limits" have been established above which existing permits ordinarily are not allowed to increase.

A rancher who wishes to obtain a grazing permit applies to the forest supervisor or ranger having supervision over the national forest where the rancher wishes to graze animals. If the applicant meets the necessary requirements and if range is available, he will be given a permit for a definite number and kind of livestock for a definite number of months upon payment of specified fees. Most permits run for 10 years. There also is provision for issuance of temporary permits.

The average grazing period is a little over 5 months each year for cattle and somewhat less than 3 months for sheep. Most of the permits are seasonal (mostly summer); but some, particularly in the Southwest, are yearlong.

#### Range Management

Forage is a renewable resource and responds to management, whether good or bad. On national forests, forage is recognized as a resource available for the production of livestock and big game. In management, the plan of action is to restore forage production on ranges which may be deteriorating and to maintain it on a sustained-yield basis both on those ranges and others already in satisfactory condition.

Four major interdependent phases are involved in the Forest Service range-management program. If properly harmonized with the findings of research and practical experience, the trend will be toward soil stabilization, sustained yield of the most valuable forage species, stabilized livestock operations, and maximum yields of meat and animal products. The four phases are:

(1) Inventory, survey, or allotment analysis. This is an assembly of facts and information on soil, forage production, condition and current trend of soil and forage, developments and improvements needed, relation of range use to other uses, and best season of use. The survey may indicate the need for additional study of any one of these items, but its main purpose is to provide information for management of the allotment.

(2) The management plan and its application. The management plan for an allotment is a product of the inventory and seasonal-use study, worked into a practical, usable system of grazing use. It is a guide to proper management, and its successful application



depends upon close cooperation between the stockman and forest officer. The plan sets up season of use, grazing capacity, and how livestock should be distributed. It may include a plan for alternate or rotational use of subunits within the allotment, a listing of existing and needed range improvements, and additional details.

(3) Field inspection and utilization determination. This also is a cooperative on-the-ground followup by the stockman and forest officer on the application of the plan and careful consideration of possible need for its revision as to ways and means of obtaining better distribution of livestock; rotation systems to insure greater value from forage; need for maintenance of improvements or additional installations; what can be done to correct sore spots on the range either through management or reseeding; and checks for degree of utilization.

(4) Condition and trend studies. These are needed as a followup to determine what is happening and will probably happen in the way of improvement or deterioration if the plan of management, inclusive of present rates of stocking and seasons of use, is continued. Forest Service range technicians have for years relied upon time-proven earmarks of improvement or deterioration which have been developed by research or experience. In order to check more closely and to provide for a more methodical record of what was happening on the range, especially in doubtful cases, the Forest Service in 1948 developed what is known as the "three-step method" for determining trend in condition. This is now being widely applied on western national-forest ranges and consists of (1) periodic collection of data at permanent benchmarks on representative parts of the ranges; (2) classification of condition and estimation of trend on the range unit; and (3) establishment of permanent photo-points.

The Forest Service depends on Department of Agriculture research for improved aids and guides to range management, revegetation, and noxious-weed control. Research findings are always subjected to pilot testing prior to wide-scale application to determine their practicability. Much research information developed by the Forest Service is being used by other land-administering agencies as well as by stockmen on private ranges.

#### MAJOR PROBLEMS OF RANGE ADMINISTRATION

The major grazing problems over the years between the Forest Service and grazing permittees may be grouped into six items: (1) Numbers of livestock and seasons of use; (2) distribution of grazing privileges; (3) transfer adjustments; (4) advisory boards and appeal procedures; (5) grazing fees; and (6) competition between big game and livestock.

#### Numbers of Livestock and Seasons of Use

The question of how many livestock should be allowed to graze the range always has been a major issue between permittees and the Forest Service. Reductions in numbers of livestock and seasons of use have always been and still are strongly resisted. Many ranges were being overgrazed when the national forests were established.

They were further damaged during the first World War, when the Government encouraged livestock production and the number permitted on the national forests reached an all-time high. Since then, and despite reseeding, other range improvements, and better management, substantial reductions have been necessary in order to conserve the range resource. On many national-forest ranges, numbers are now in balance with feed supplies. On others, grazing capacity and livestock use are not yet in balance.

The Forest Service does not rely on reductions in numbers of livestock as the only means of bringing grazing capacity and numbers of livestock into balance. Despite some feeling to the contrary, the Forest Service has aggressively pushed a range reseeding and improvement program. The Government has invested about \$3.5 million in reseeding national-forest ranges and another \$16.9 million in fence building, development of water places, stock driveways, and other range improvements. These are direct expenditures only and do not include costs of overhead or supervision. A complete range-development program for western national forests would cost approximately \$100 million. The history of appropriation requests shows that more funds have been requested repeatedly for this work than have been made available.

In addition, grazing permittees are encouraged to spend their own funds in developing national-forest range lands. During the past 10 years, some \$2.3 million of private funds has been spent in construction of range improvements and in revegetation. Additional private contributions worth about \$650,000 annually have been made in the form of material and labor (table 2).

TABLE 2.—Construction of range improvements on western national forests, 1943-52

Fiscal year	Kind of improvement				Cost all improvements		
	Range fences	Stock driveways	Water	Revegetation	Federal expenditures	Private (cooperative) expenditures	Total expenditures
	Miles	Miles	Number	Acres	Dollars	Dollars	Dollars
1943-----	230	15	350	8,099	11,424	185,938	197,362
1944-----	257	36	364	11,329	67,803	206,138	273,941
1945-----	308	14	336	7,291	54,203	214,139	268,342
1946-----	242	39	189	30,126	100,593	234,047	334,640
1947-----	449	40	348	33,837	447,242	192,179	639,421
1948-----	326	18	317	51,388	504,295	263,226	767,521
1949-----	442	26	322	67,144	797,417	367,145	1,164,562
1950-----	584	48	556	62,457	775,991	477,600	1,253,591
1951-----	319	16	240	55,033	836,532	111,699	948,231
1952-----	245	6	157	55,453	847,403	50,188	897,591
10-year total---	3,400	258	3,179	382,153	4,442,903	1,230,299	6,745,202

<sup>1</sup> In addition to the private cooperative expenditures shown, permittees on western national forests in recent years have made contributions in labor, materials, etc., toward both construction and maintenance of range improvements, averaging about \$650,000 annually.



Where grazing capacities of the national forests are thus increased by expenditure of private funds, the permittees making the investment are given reasonable assurance that the benefits from such expenditure will accrue to them. A revised policy recently adopted is designed to give added assurance.

#### Distribution of Grazing Privileges

Range forage on the national forests is a public resource. The Department has a responsibility for the development of equitable rules and regulations and for their fair application in deciding who will get the use of this public resource. Because national forests are public property, the Government must retain the right of decision as to who is privileged to use that property.

Even though the Government's right of "distribution" is seldom exercised, it is a basic matter of principle that the Government retain this right. Some stockmen have felt that, because of the demand for national-forest grazing privileges, the Government should be prohibited from awarding future privileges to any but present grazing permittees, or persons of their selection. This has been a major issue—not of practice, but of principle.

In the past, distribution rights have been exercised occasionally by the Government to award grazing privileges to new settlers and to applicants who have had insufficient range to support a small ranch. As the West has become more settled and stabilized, there has been less and less need for distribution. This is recognized in a recently announced proposal to modify policies covering distribution.

During the 13-year period 1927–39 detailed records of distribution adjustments were kept. In each of these years, with one exception, only a fraction of 1 percent of grazing permits and permitted livestock were affected by distribution (table 3). Since 1939 there have been practically no such adjustments.

TABLE 3.—*Grazing permits and livestock affected by reductions for distribution on western national forests, 1927–39*

Calendar year	Cattle and horses				Sheep and goats			
	Permits affected		Livestock affected		Permits affected		Livestock affected	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1927-----	5	0.02	80	0.01	1	0.02	1,388	0.02
1928-----	20	.10	1,050	.07	4	.06	816	.01
1929-----	11	.06	874	.06	22	.34	19,034	.28
1930-----	137	.69	3,835	.28	6	.09	5,930	.09
1931-----	59	.30	1,008	.07	4	.06	2,555	.04
1932-----	89	.44	985	.07	4	.07	2,910	.05
1933-----	38	.19	881	.06	15	.25	9,180	.15
1934-----	36	.18	1,279	.09	522	8.69	100,423	1.75
1935-----	1,086	5.31	15,500	1.15	11	.19	5,063	.09
1936-----	45	.22	715	.05	9	.16	3,404	.06
1937-----	15	.08	551	.04	5	.09	2,675	.05
1938-----	17	.09	472	.04				
1939-----	1	.01	22	.002				

Detailed records not kept on distribution reductions before 1927 or after 1939. Practically no distribution reductions have been made since 1939.

Associated with the question of distribution of the grazing privilege is that of stability of tenure once the privilege is granted. Statements have been made implying insecurity of tenure and consequent economic risk to the permittee.

The rarity of distribution adjustments is one evidence of stability. The substantially higher premium paid for ranches or permitted livestock with national-forest grazing privileges is evidence of both (1) the low risk of distribution and (2) the high degree of stability of a national-forest permit.

Of all grazing permits on western national forests, about 40 percent have been held by the same family for more than 30 years; over half for more than 20 years; nearly three-fourths for more than 10 years; and about one-fourth for 10 years or less (table 4).

TABLE 4.—*Permits existing on western national forests as of 1952 which had been in same family for varying periods of years*

Permit period	Cattle permits		Sheep permits		Total permits	
	Number	Percent	Number	Percent	Number	Percent
All permits-----	15,334	100	2,444	100	17,778	100
Period in same family:						
10 years or less-----	4,397	28.7	675	27.6	5,072	28.5
More than 10 years-----	10,937	71.3	1,769	72.4	12,706	71.5
More than 20 years-----	8,395	54.7	1,251	51.2	9,646	54.3
More than 30 years-----	6,139	40.0	862	35.3	7,001	39.4

<sup>1</sup> Does not include packer permits and small special-use pasture permits.

Furthermore, most permits in the 10-year-or-less category are so classified because of recent sales of ranch property. Actually, most such permits have been in effect for the same ranch or permitted livestock for considerably more than 10 years.

#### Transfer Adjustments

Transfer adjustments mean reductions in numbers of permitted livestock or length of grazing season at the time of transfer of grazing preference from one party to another, usually at the time of sale of the base ranch property or permitted livestock. Transfer adjustments may be made for either conservation of the range or for further distribution of the grazing privilege.

Some grazing permittees and others have felt that the Forest Service automatically reduces the number of permitted livestock whenever a transfer of preference occurs. The facts are that in the past 5 years, 1948–52, about 6 percent of the 19,000-odd paid permits annually were involved in transfer cases. Reductions were made in 44 percent of these transfer cases or an average of 467 each year (table 5). Of the transfer reductions, only 3 were for distribution and only 28 cattle were involved. All the rest were for range protection or conservation. In terms of livestock less than 1 percent of permitted numbers were affected during the 5-year period.

Some of these reductions at time of transfer have been strongly protested and are the source of the impression that reductions are auto-



matic at time of transfer of preference. A revised policy, tentatively approved and now under consideration by the livestock industry, would help to prevent further misunderstandings on this point by providing that reductions would be made as and when needed without relation to transfer of grazing privileges.

TABLE 5.—*Transfer cases and reductions in numbers of livestock incident to transfer occurring on western national forests, 1948-52*

Year	Paid permits	Transfer cases	Ratio of transfer cases to paid permits	Transfer cases in which reductions were made	Ratio of transfer cases involving reductions to all transfer cases	Reductions in numbers of livestock incident to transfer cases	
						Cattle and horses	Sheep and goats
	Number	Number	Percent	Number	Percent	Number	Number
1948-----	20, 177	1, 196	6	661	55	6, 851	33, 892
1949-----	19, 634	1, 029	5	434	42	5, 951	22, 009
1950-----	18, 481	1, 092	6	461	42	5, 878	26, 532
1951-----	18, 390	1, 184	6	460	39	5, 946	21, 642
1952-----	19, 550	822	4	321	39	5, 041	4, 516
Total-----	96, 232	5, 323	6	2, 337	44	29, 667	108, 591
5-year average-----	19, 246	1, 065	6	467	44	5, 933	21, 718

Reductions at time of transfer are sometimes strongly protested because it may be to the substantial financial advantage of the permit holder not to have any reduction made in the preference at the time he sells his base property or permitted livestock. The purchaser, and prospective transferee of the grazing preference, customarily pays an extra premium to the permit holder in the expectation of having the latter's national-forest preference transferred to him. Since this premium may amount to several hundred dollars per head for cattle, the seller naturally opposes any reduction in the preference.

#### Advisory Boards and Appeal Procedures

The Forest Service has always encouraged the formation of local grazing associations and advisory boards through which permittees could express collectively their views and recommendations regarding management policies. Over the years more than 800 such boards and associations have been organized. These boards are actively functioning today. The Granger-Thye Act of 1950 gave statutory recognition to grazing advisory boards, established the procedures by which the boards shall be constituted and elected, and specified their functions.

When a grazing permittee is dissatisfied regarding an administrative decision affecting him, he can appeal to the immediate superior of the officer by whom the decision was rendered. Thus he can appeal from the decision of the forest ranger to the forest supervisor, thence to the regional forester, to the Chief of the Forest Service, and to the Secretary of Agriculture.

In lieu of this procedure the permittee may, if he desires, request to have his case heard by the appropriate grazing advisory board. If he is not satisfied with the board's recommendations to the forest

supervisor, or the latter's action on the board's recommendation, he may then appeal through regular channels to higher levels.

There is also a National Forest Advisory Board of Appeals made up of qualified Department employees outside the Forest Service to advise the Secretary on appeals from decisions of the Chief of the Forest Service. Upon request of the appellant, and prior to decision by the Secretary, the appeal is referred to this board, which considers the case on its merits and then makes its recommendations.

This administrative appeal process appears to be functioning satisfactorily. Every appeal is given the most careful consideration. Informal hearings and field examinations are common.

In the 33 years, 1920-52, there were 1,195 appeals from ranger to forest supervisor, of which 271 were wholly or partly reversed (table 6). Appeals to higher levels of administration were progressively fewer. Reversals decreased from about 22 to 8 percent. There were 973 appeals from forest supervisor to regional forester of which 250 were reversed; 303 from regional forester to the Chief with 37 of these reversed; and 83 from Chief to the Secretary of Agriculture with 7 reversals.

Because most appeals deal with numbers of livestock or seasons of use, it is significant that during the same 33-year period when there were about 1,200 appeals to forest supervisors, some 84,000 administrative decisions on these matters were made without appeal.

Under the present appeals process, decisions of the Secretary of Agriculture are final, unless the appellant wishes to appeal to the courts on the basis of violation of law or arbitrary or capricious action. This recourse has always been open to him.

TABLE 6.—*Formal grazing appeals on western national forests, 1920-52*

Calendar year	Number of decisions not appealed <sup>1</sup>	Ranger to Supervisor		Supervisor to Regional Forester		Regional Forester to Chief, Forest Service		Chief, Forest Service to Secretary of Agriculture	
		Number of appeals	Number appeals reversed in whole or part	Number of appeals	Number appeals reversed in whole or part	Number of appeals	Number appeals reversed in whole or part	Number of appeals	Number appeals reversed in whole or part
1920-----	2, 384	16	6	30	16	10	2	0	0
1921-25----	14, 361	98	18	78	34	50	6	17	2
1926-30----	11, 517	112	17	120	26	40	2	14	0
1931-35----	13, 324	197	31	164	48	44	3	8	0
1936-40----	12, 063	196	59	164	26	32	3	7	1
1941-45----	12, 766	198	53	130	21	43	5	4	0
1946-50----	13, 046	293	60	220	49	67	8	31	3
1951-----	2, 285	51	16	26	2	13	6	1	1
1952-----	2, 304	34	11	41	28	4	2	1	0
Total-----	84, 050	1, 195	271	973	250	303	37	83	7

<sup>1</sup> Confined to decisions made by ranger or supervisor relating to numbers of livestock and seasons of use.

#### Grazing Fees

The privilege of grazing on the national forests is allocated by the Forest Service to qualified applicants. Forage is not sold to the high-



est bidder, as is timber. In that fact alone lies part of the reason for permittee resistance with respect to necessary reductions in permitted livestock and grazing fees. The historical reason for allocation rather than sale to the highest bidder stems from the early land policy of the Congress to encourage the settler and small rancher, as part of western development.

National-forest grazing fees are derived from a base fee which was put into effect in 1931. This base fee was determined after lengthy study by stockmen and Department officials, comparing the value of national-forest range with values of comparable leased private, State, and other Federal range. By administrative decision and after conferences with representatives of the livestock industry, the base fee was set considerably lower than amounts paid for comparable private range. Grazing fees for each year are determined by adjusting the base fee according to annual fluctuations in the market price of beef cattle and lambs, as reported by the Bureau of Agricultural Economics.

For 1953 the average monthly fee per head is 54 cents for cattle and 11¾ cents for sheep (table 7). This is substantially lower than the rate paid for comparable private range, but substantially higher than that for Bureau of Land Management range and most State-leased land.

TABLE 7.—Grazing fees and receipts from grazing on national forests, 1933-53

Calendar year	Average monthly fee per head		Total grazing receipts (fiscal year)
	Cattle	Sheep	
	Cents	Cents	Dollars
1933	9.05	2.05	1,498,209
1934	7.51	2.385	1,358,688
1935	8.04	2.71	1,151,153
1936	13.05	3.36	1,441,493
1937	12.55	3.66	1,580,345
1938	14.98	4.24	1,696,457
1939	13.4	3.3	1,573,912
1940	14.89	3.68	1,463,127
1941	15.97	3.85	1,429,091
1942	18.9	4.6	1,595,126
1943	23.0	5.5	1,973,233
1944	26.0	6.25	2,458,946
1945	24.8	6.03	2,158,626
1946	27.0	6.25	2,059,676
1947	31.0	7.5	2,293,773
1948	40.0	10.0	2,898,037
1949	49.0	11.0	3,275,964
1950	42.0	10.75	3,385,004
1951	51.0	12.25	4,165,573
1952	64.0	15.25	5,022,654
1953	54.0	11.75	4,415,862

Total grazing receipts reached an all-time high of over \$5,000,000 in 1952, but were still less than 10 percent of revenues from timber sales.

It is frequently pointed out by stockmen who are not permittees, as well as by members of Congress, that the lowness of national-forest grazing fees constitutes a substantial Federal subsidy to the permittees. This is one reason why ranches which have grazing privileges on the national forests command a premium when sold. If national-forest fees were equal to going commercial rates, the premiums purchasers would be willing to pay would disappear or be greatly reduced, and revenues to the Government would substantially increase.

Different principles are now followed in the establishment of grazing fees on the national forests and on the Federal grazing districts administered by the Department of the Interior. On the national forests, fees are geared to both the value of the forage and annual market fluctuations in livestock prices. On the Federal grazing districts fees are geared primarily to the cost of range administration and are not adjusted annually. On lands administered by the Bureau of Indian Affairs, the usual practice is to award grazing privileges on a competitive bid basis.

Grazing fees have been in controversy in the past and doubtless will be again. But at present they are not a major issue.

#### Competition Between Big Game and Livestock

Big-game grazing use has about doubled on the national forests in the past 20 years (table 1). Feeding habits of these animals differ from domestic livestock, and they tend to frequent rougher country and more timbered ranges which are less favored by domestic livestock. Nevertheless, there is competition in some areas between big-game grazing animals and domestic livestock for national-forest forage. This is true, especially where both use the same range and where numbers are out of balance with the forage supply.

When big-game populations were at low ebb during the early 1920's, positive steps were taken by the States to build up big-game numbers. These were so successful that in many places overpopulation of game animals resulted. But public opinion was slow to accept this, and State authorities have frequently been delayed in getting the necessary authority to apply control measures. There is close cooperation between the States and the Forest Service, and progress is being made in reducing problem herds.

Big game is an important national-forest resource, and sportsmen are an important group of national-forest users. Competition between the big game and domestic livestock cannot be entirely eliminated. Where such conflicting interests are involved, the best solution lies in application of the long-standing multiple-use management principle of the national forests. This principle recognizes that each use is proper, and strives to maintain as desirable a balance as possible between the two.



## SUMMARY OF EVENTS OF PAST YEAR

## Changes in Administrative Policy

1. *Increased grazing capacity, resulting from range improvement work financed by the permittee.*—The purpose of this policy change is to give permittees greater assurance that they will receive the benefit from range improvements on national forests which they themselves finance. The new policy was reviewed in its formative stages by the livestock industry and other interested groups, and was formally adopted on April 14, 1953.

Under the new policy, increased grazing capacity resulting from reseeding or other range-improvement work at the permittee's expense will be available for use by the permittee or permittees making the investment, provided the improvements (1) are approved in advance under either a special-use permit or cooperative agreement; (2) do not conflict with other uses of the national forests; (3) are beneficial to the range; and (4) continue to be effective.

The policy also provides that use of the increased grazing capacity may consist of (1) increased forage for existing permitted numbers of animals where the present supply is inadequate, or (2) increase in permitted animals or animal-months after range conservation needs are fully met. Where an increase in permitted numbers is allowed, such increase will be recognized as being of the same status and subject to the same policies that apply to other grazing preferences.

2. *Distribution of grazing privileges.*—Department policies have long provided for so-called "distribution" adjustments in large permits, in order to provide increases in small permits or to admit new and needy small applicants.

Since 1939 practically no adjustments for distribution have been made. Probably few, if any, such adjustments will be made in the foreseeable future. For these reasons, a change in Departmental regulations is under consideration to delete specific provision for distribution adjustments. This would require corresponding adjustments in the Forest Service Grazing Manual.

However, the broad, general legal authority to make such adjustments would still exist both in Departmental regulations and in law. The legal authority is based on the Act of June 4, 1897, which permits grazing on the national forests and authorizes the refusal of applications for renewal of grazing permits in whole or in part if in the public interest to do so. This law also authorizes the prescribing of conditions and requirements under which permits will be issued or terminated.

Under the proposed policy, existing permittees will feel that there is less likelihood of distribution adjustments, and a corresponding increase in the stability of national-forest grazing permits. In accordance with past practice and the provisions of the Granger-Thye Act in 1950, this proposed policy change has been submitted to the livestock industry, grazing advisory boards, and other interested groups for their review and suggestions.

3. *Transfer adjustments.*—Reductions in numbers of permitted livestock at the time a permit is being transferred from one permittee to a new permittee have been a source of much friction. When such

reductions are made, it is usually for purposes of range conservation or protection, and but rarely for distribution. It is sometimes felt that the Forest Service automatically reduces numbers of permitted livestock when a permit is transferred, regardless of the need.

Department policies on this matter have changed from time to time. Prior to 1949, a maximum reduction of 20 percent could be made for either range conservation or distribution when a preference was transferred in connection with purchase of either ranch property or livestock. But where the transfer involved purchase of both ranch property and livestock, the maximum permissible reduction was 10 percent. In 1949 the percentage provisions were eliminated with respect to range conservation adjustments, but a maximum of 20 percent still applied to distribution adjustments. The 1949 policy, under which the Forest Service has been operating, provides that no grazing preference is to be transferred for numbers greater than the estimated grazing capacity of the range.

A new policy has been tentatively approved, which would provide that necessary reductions in numbers of permitted livestock in order to conserve the range would be made as and when planned without relation to any transfer of the grazing preference. As in the case of the revised distribution policy, this change has been submitted to the livestock industry, grazing advisory boards, and other groups for their review and suggestions.

Under the policy, scheduled reductions which happen to coincide with transfers would be made as scheduled. Protection reductions would not be planned to coincide with transfer of permits, but neither would needed reductions at such time be prohibited. The Forest Service would continue its past policy of giving both prospective seller and purchaser of base property or permitted livestock the fullest possible information concerning estimated grazing capacity, condition of the range, and probable status of the preference after transfer. This policy will remove any question of automatic reductions at time of transfer.

## Legislative Events

The first session of the 83d Congress gave much attention to grazing on the national forests. Six bills, three in the Senate and three in the House, would affect national-forest grazing in important ways. These are: (1) Identical bills, S. 1491, by Senator Butler for himself and Senator Barrett, and H. R. 4023, by Congressman D'Ewart; (2) companion bills, S. 1509, by Senator Aiken, and H. R. 4268, by Congressman Hope; and (3) identical bills, S. 2548, by Senator Aiken, and H. R. 6787, by Congressman Hope.

The Butler-Barrett-D'Ewart bills were prepared by a Stockmen's Grazing Committee after much consideration, and hearings were held on them by both the House and Senate Interior and Insular Affairs Committees. The Department did not testify and took no position on them. Although the congressional committees did not report the bills, the press gave national publicity to them and to the hearings. This served to focus nationwide attention on national-forest grazing matters.

The first two bills by Senator Aiken and Mr. Hope—S. 1509 and H. R. 4268—would have enacted some Departmental policies into law,



and would have provided for multiple-use advisory councils. The bills received little attention in the Congress; hearings were not held; and the Department took no position on them.

Both before and after the hearings on the Butler-Barrett-D'Ewart bills, representatives of stockmen and other groups were in consultation with both the Forest Service and the Secretary's office. Subsequent to the hearings on these bills, Senators Aiken and Barrett and Congressman Hope and D'Ewart, under Senator Aiken's leadership, endeavored to develop legislation which would be mutually acceptable to the various interested groups and in the public interest. The Department participated in these endeavors as technical adviser.

On July 31, 1953, the President submitted to the Congress a message relative to "A Program Designed To Conserve and Improve the Nation's Natural Resources." The message made specific reference to the grazing resources of the national forests, and stated: "The Federal Government has a responsibility to manage wisely those public lands and forests under its jurisdiction necessary in the interest of the public as a whole. . . . Public lands should be made available for their best use under conditions that promote stability for communities and individuals and encourage full development of the resources involved." On the following day, Senator Aiken and Mr. Hope introduced S. 2548 and H. R. 6787, identical bills, which would implement the President's message and which were introduced at the request of the President.

These bills deal with construction of range improvements by permittees, transfer of grazing privileges, base property standards, an economic study to help develop a method for determining grazing fees, boards of appeal with respect to grazing uses, formal hearings, and appeals to the courts. The bills also spell out certain exceptions to their provisions, and recognize the importance of all resources and uses of the national forests. The Department has recommended their enactment.

It is evident from the preceding statement and summary that much attention has been devoted to grazing on the national forests during the past year, not only in the Forest Service but also in the Secretary's Office and the Congress. This is because of the importance of grazing on the national forests and the tension surrounding some of the problems of range administration. Progress toward better understanding and partial resolution of some of the most difficult problems has been made. There has been no arbitrary action by the Forest Service. Interests of all groups have been considered, and the problems have been discussed with all groups of users. There is better understanding of Departmental policies and procedures by grazing permittees, other user groups, and members of Congress.

There will always be some conflict of interests between various users, between water production and grazing, between sportsmen and stockmen, between big game and domestic livestock, and even to some extent between timber and grazing. But the Forest Service will make every effort to keep such conflicts to a minimum through good administration and management. There is every reason to believe that the great majority of grazing permittees on the national forests are reasonably well satisfied with Forest Service administration.

## THE YEAR'S WORK

### NATIONAL-FOREST ADMINISTRATION

The year's work in various phases of national-forest administration is reviewed in the following pages. Range management on the national forests is discussed in the preceding section, so is omitted here.

#### Receipts Exceed Expenditures

Again in fiscal year 1953, the cash receipts from national-forest operations reached a new all-time high. The national forests took in receipts amounting to \$76,463,746 for the year. This total did not include some \$1,500,000 collected by the Department of the Interior for oil and gas leases on national-forest lands. The 1953 receipts were well above the previous record of \$71,402,511 for fiscal year 1952.

Last year's expenditures from regular appropriations for the national forests, including both the current operating and capital expenditures, amounted to \$64,540,364. The receipts thus exceeded expenditures by nearly \$12,000,000.

In addition to the increase in cash receipts, there was an estimated increase last year of more than \$70,000,000 in the value of capital assets of the national forests. This estimate is based on increases in stumpage values and annual timber growth.

The greatest public values of the national forests, of course, are those that cannot be readily expressed in monetary terms. The value of such benefits as reduction of floods, assurance of dependable water supplies, contributions to community stability, and outdoor recreation for millions of people, is indeed beyond reckoning. Yet the substantial cash income of the national forests more than covers the cost of obtaining these benefits.

#### Financial returns to the States

Congress has provided that an amount equal to 25 percent of the gross receipts from the national forests be paid each year by the United States Treasury to the States for distribution to counties containing national-forest lands. These payments, which totaled \$18,649,794 for fiscal year 1953, are for the county school and road funds.

Some counties where national forests are doing a big timber-sale business are getting very large annual payments. For counties which have only a small amount of national-forest land or where the values on much of the land are noncommercial, the payments are small. Where deforested lands have been acquired for national-forest purposes, the yearly payments will be low during the period of forest restoration, but may be expected to increase in later years.

In addition to these direct cash payments to the States, Congress has provided that 10 percent of the national-forest receipts be made available each year for expenditures on forest roads and trails in the States of origin. Direct appropriations also are made for forest highway and road construction and maintenance. The forest highways built with these appropriations are important links in the States' main highway system.



Besides the expenditures for road construction and maintenance, there are many other contributions-in-kind to the States and local communities. These include maintenance of organized fire-control forces, reforestation and other development work that greatly benefits the States, and the costs of which otherwise would have been borne by the States and local governments alone.

In the aggregate, these payments-in-kind plus the 25-percent payments greatly exceed the total of taxes that the State and local governments might derive from the national forests if they were subject to taxation. On the average, the value of the contributions-in-kind alone more than equals the estimated total tax potential of the national-forest lands.

#### Watershed Management

Because the national forests occupy many of the water-yielding areas at high elevations, a substantial part of the Nation's water supply originates within their boundaries. The yield of water from western national forests is particularly significant. In the 11 Western States the national forests yield about 53 percent of the total runoff although they occupy only 21 percent of the area. In addition to this measurable streamflow, large amounts of water sink into the ground in the national forests to help recharge underground water basins which furnish a substantial portion of the total water supply.

The national forests are a major source of water for some 1,800 cities and towns. Hundreds of other communities and thousands of residents of rural areas also receive all or part of their water supply from these public forest watersheds, often located many miles away in another State. Much of the irrigation agriculture in the Western States depends on water from national-forest watersheds. These forests are the source of water for more than 600 hydroelectric power developments, and for thousands of industrial plants. It is therefore a prime purpose in protecting and managing the national forests to assure a regulated waterflow of good quality for the communities, farms, and industries dependent on that water supply.

Soil classification is being undertaken in California and the Pacific Northwest as a basis for attaining better watershed and other management practices. Washington State College is cooperating with the Forest Service on soil classification work now well along on the Gifford Pinchot National Forest. In the same region a special study of drainage and erosion control on roads and trails has been under way during the past 2 years. In California a vegetative-soil survey in the Mendocino National Forest is being conducted with the cooperation of the University of California, the Bureau of Plant Industry, Soils, and Agricultural Engineering, and the Soil Conservation Service. Over 400,000 acres have been covered. This survey is furnishing information of great value for correlating land-management activities for better watershed management.

The Forest Service is continuing its efforts to improve the usefulness of the water resource through studies of upstream water requirements and to arrange for suitable water releases from large upstream reservoirs to preserve fish life and enhance recreational values. A recent development in this field is a cooperative investigation in connection with power projects on the Feather River in California. Co-

operating with the Forest Service are the Pacific Gas and Electric Company, the California State Department of Fish and Game, and the United States Fish and Wildlife Service.

Another cooperative project in California including Federal, State, and private groups and individuals resulted in a joint report entitled "A Coordinated Land and Water Conservation Program on the Pit (Pilot) Soil Conservation District," completed in March 1953. Participants included the Pit Soil Conservation District, the Soil Conservation Service, Bureau of Land Management, California State Division of Water Resources, State Department of Fish and Game, the Shasta Forests Company, and the Forest Service.

A striking watershed management demonstration can be seen in the Jefferson National Forest in Virginia. Here the water supply of the town of Narrows has been transformed from a state of high turbidity following storms to one of very satisfactory clear flow. This change was brought about by checking the erosion on logging roads left by an operator of timber reserved for cutting by the owner when the land was sold to the Federal Government. As a result of the effectiveness of the treatment the town has cooperated with the Forest Service in planting 10,000 trees and has plans for planting an additional 10,000 in the watershed.

#### Power developments

Action on several hundred power cases during the year indicates continued peak activity in that field. The power transmission lines on national-forest land operating under Federal Power Commission license or Forest Service permit now total more than 1,000 miles. This includes cooperative lines of the Rural Electrification Administration.

#### Water storage

Fifteen new dams were approved for construction on national-forest land during the past year, bringing the total number of artificial reservoirs to over 1,700.

The development of water resources by reservoir construction within national forests sometimes has profound effects on the management and utilization of other national-forest resources. The submerging of main avenues of access to the upstream watersheds may disrupt sustained-yield timber working circles and fire-control systems. In some cases whole valleys of productive timberland may be inundated, fishing streams and recreational and other facilities eliminated. Two such reservoir projects, Libby Reservoir, planned by the Corps of Engineers in Montana, and Oroville Reservoir, by the State of California, are being given cooperative study to reduce their potential adverse effects on national-forest resources. Each agency is contributing funds to the Forest Service for conducting investigations and developing plans to aid in coordinating the interests of the Forest Service with those of the dam-building agency.

#### Timber Management

Timber harvested from the national forests in fiscal year 1953 amounted to 5,160 million board-feet, the highest annual cut in the history of the Forest Service. It was an increase of 742 million feet



over the 1952 cut. Receipts from sale of timber in 1953 were \$70,616,025, again setting a new record.

The total cut included harvest of mature timber and cuttings made to improve growing conditions in crowded stands. Substantial quantities of Christmas trees, naval stores, and other forest products not expressible in board-feet, also were harvested.

A total of 22,020 timber sales were made during the year. Most of these were small sales, involving small timber operators. Of the total, 19,891 were for less than \$1,000 each; 1,087 between \$1,000 and \$5,000; and 1,042 over \$5,000. There were 2,309 sales of miscellaneous forest products.

#### *Access roads needed to attain full sustained yield*

The national forests of the United States contain some 73 million acres of commercial forest land. On the basis of current growing stocks, existing markets, and utilization standards, the sustained-yield capacity of these national-forest timberlands is estimated to be at least 6.9 billion board-feet. This estimated capacity will increase as the basic growing stocks are further built up and as utilization practices further improve.

Although the 1953 timber cut was the largest volume ever harvested from the national forests in any single year, it still was 1,740 million feet below present sustained-yield capacity. The full yield capacity of the national forests cannot be harvested mainly because many of the timber stands cannot yet be reached. Lack of access roads is principally a problem of the national forests of the West. These western national forests contain almost one-third of the total volume of saw-timber remaining in the United States. Here lies much of the potential for increase in national-forest timber yield.

Three types of timber access roads are needed: (1) Mainline roads, providing primary access to major drainages or large timbered areas; (2) lateral roads, that feed into the primary system and serve smaller drainages and blocks of timber; and (3) logging spurs, the low-standard roads which penetrate to all parts of areas being logged. Mainline roads and most laterals should be permanent roads that will be available for hauling the timber crop as harvested. Lateral roads usually receive intermittent use because they give access to smaller timber volumes. Logging spurs are constructed by the timber purchasers and are usually temporary roads serving small areas.

Mainline and lateral roads may be constructed either by the Government or, as a timber-sale requirement, by the timber purchaser. Whether the public or a timber purchaser builds the road the cost is borne by the United States. If the timber purchaser builds it, the anticipated cost is deducted from the price he can be expected to pay for the timber. If the Government provides the road, a correspondingly higher price for stumpage can be obtained.

At present very few national-forest working circles are wholly accessible for timber harvesting. For many of the partially developed working circles some new construction and reconstruction will be needed to maintain even the current rate of timber harvesting. Additional new construction will be needed to increase the cut to full sustained-yield capacity. The cost of additional access roads within the next few years will be more than offset by the income from increased timber sales.

#### *First pulp mill in Alaska*

The Forest Service in July 1951, accepted a bid from the Ketchikan Pulp Company to purchase 1½ billion cubic feet of timber in the Ketchikan pulp-timber unit of the Tongass National Forest in Alaska. In accordance with the terms of the timber-sale contract, this firm is now constructing a pulp plant of around 350 tons daily capacity at Ward Cove near Ketchikan. This, the first major pulp plant in Alaska, is scheduled to go into full operation on July 1, 1954.

The opening of this operation will mark the fruition of 30 years of effort by the Forest Service to bring about the development of a pulp and paper industry in Alaska. Year-round industrial activity is badly needed to expand and develop southeastern Alaska. Pulp and paper manufacture offers one of the best prospects for building up this section of the Territory.

#### *Insect control*

An epidemic of southern pine bark beetles appeared on and near the Homochitto National Forest in Mississippi late in the spring of 1952. Previously an ice storm had damaged many trees in the area, providing favorable host material for a rapid insect buildup. Drought conditions over a period of a year or more also had weakened many trees so that they were easy prey for the beetles. The Forest Service, the State Forester for Mississippi, and private land owners in the area immediately started a cooperative control project. The Bureau of Entomology and Plant Quarantine provided overall technical advice. Control work consisted of logging several million board-feet of infested trees, supplemented by chemical treatment of trees and parts of trees which could not be logged. Fast, concerted effort by all cooperators has brought the epidemic under control and saved a resource worth many millions of dollars.

An outbreak of Engelmann spruce beetles started in the summer of 1952 in western Montana and northern Idaho. The epidemic was the result of violent windstorms of 1949 that knocked down a tremendous number of trees, resulting in ideal conditions for a buildup of the beetles. Already many million board-feet of standing spruce timber of fine quality are infested and will die. Over 12 billion board-feet of spruce timber are ultimately threatened. As a result of prompt Federal, State, and private cooperation a plan of control has been developed, and operations started in the spring of 1953. A substantial program of access-road construction and logging of infested trees is planned. This will be supplemented by chemical treatment. Seventy-eight percent of the spruce timber is on national-forest lands.

The Engelmann spruce bark beetle control project carried on in Colorado for the past 3 years has resulted in successful control of this epidemic.

#### *Reforestation*

During fiscal year 1953, 51,249 acres of national-forest land were planted or seeded to trees. Successful plantings now total 1,496,915 acres. A substantial amount (28,058 acres) of the past year's seeding and planting was done on areas recently cut over, with funds deposited by timber purchasers under terms of the Knutson-Vandenberg Act of 1930. This Act authorizes the Forest Service to require, in addition to the charges made for timber sold, deposits of funds to be used for



reforestation and stand improvement of timber-sale areas to keep such lands growing high-quality timber. On other national-forest areas, 23,191 acres were planted and seeded with funds appropriated by Congress. Some 4 million acres of national-forest land need reforestation to put them to work producing timber for an expanding population.

Costly planting is avoided whenever measures can be taken to facilitate the establishment of natural regeneration on burned and cutover areas. Where seed-bearing trees still stand, timely control of seed-eating rodents and scarification of the soil surface often help a new crop of seedling trees to become established. During the year 21,464 acres received such treatment.

#### Timber stand improvement

Funds collected in connection with timber sales, under authority of the Knutson-Vandenberg Act, make possible some timber stand improvement work each year looking to the establishment of natural tree growth and protecting it through the critical period of early growth. This work also helps to obtain stocking of trees of desirable species, form, and quality. Timber stand improvement in promising young growth not associated with timber-sale cuttings is done with funds directly appropriated by Congress. During the past year the following timber stand improvement work was done with "K-V" funds and appropriated funds:

	Acres
Plantation release.....	19, 438
Natural stand release, weeding, and thinning.....	264, 623
Pruning.....	103, 224
Animal control (hogs, etc.).....	245, 943
Rodent control.....	39, 308
Disease control.....	56, 954
Other.....	43, 078

#### Recreation

Public use of the national forests for recreation again reached an all-time high in 1952, with 33 million visits reported. This was a 10-percent increase over the previous year. It was 83 percent greater than in 1941, the year of highest prewar use.

Forty-two percent of the visitors used the camp and picnic-ground facilities. Fishing, hunting, skiing, hiking, and riding were other popular recreational activities. The national forests provide the most widely used public properties in the United States for those seeking these outdoor, forest-type recreation activities.

The policy of making a moderate charge for use of the camping, picnicking, and swimming facilities was continued at some 45 of the larger, better improved camp and picnic areas. Most of these were operated by concessioners, who could meet the costs of operation and current maintenance out of the money collected. (Funds collected at charge camps operated directly by the Forest Service go to the U. S. Treasury and are not available for maintenance and cleanup work.)

#### Facilities still overtaxed

As the use of national-forest recreation areas steadily increases, it is becoming more and more difficult, with the funds and manpower now available, to maintain the camp and picnic grounds in safe and

sanitary condition. Overcrowding and the steady deterioration of sanitary and fire prevention facilities present an acute problem. Several bills aimed at relieving this situation were introduced in the 83d Congress.

#### Winter sports

Within the past two decades, skiing has become a major recreational activity in the United States. The national forests, particularly in the West, afford some of the country's best and most heavily used ski terrain. To meet the growing demand, the Forest Service has developed some 200 winter sports areas. On some national forests skiing now ranks first as a recreation pursuit.

Four new ski lifts and warming-shelter buildings were completed under special-use permit during the year. They represent an investment of more than a million dollars of private capital. All ski lifts, tows, and shelter buildings on the national forests are operated on a concession basis under Forest Service permit.

The study of avalanche-hazard forecasting and control under way at Alta, Utah, Berthoud Pass, Colo., and Stevens Pass, Wash., is producing some worthwhile results. Degree of avalanche hazard can now be determined by evaluating 10 different snow and climatic factors which contribute to the occurrence of avalanches. An "Avalanche Handbook," the first of its kind in the United States, was published for field personnel and cooperators in 1953.

#### Wilderness areas

Conservation organizations are taking an increasingly active interest in the perpetuation and management of the 79 wilderness areas that have been set aside within the national forests. A meeting attended by members of the Natural Resources Council from many parts of the country was held in Washington early in the year to consider wilderness area policy and management.

One new area, the Linville Gorge Wild Area, within the Pisgah National Forest of North Carolina, has been added to the wilderness-area system. It comprises 7,610 acres of southern forest types, including extensive areas of rhododendron and laurel, bisected by the rugged Linville Gorge. It is the first wild area established in the East.

The Executive Order establishing an airspace reservation over the canoe wilderness area of the Superior National Forest in Minnesota has been upheld by the Federal District Court and the Circuit Court of Appeals. Frequent violations occurred at the outset, but these have ceased after some prosecutions in Federal court.

#### Wildlife

Wildlife is one of the major recreational resources of the national forests. Nearly 9 million visits were made to the forests for hunting and fishing last year. One reason the national forests are so popular with sportsmen is that these forests offer a public hunting and fishing ground of 180 million acres where the sportsmen are not restricted by "No Trespassing" signs. Moreover, the quality of the sport found on most areas is high.

Production of wildlife on the national forests is advanced under multiple-use management. Protection of the forests from uncon-



trolled fire, and sustained production of timber, forage, and water all contribute to the maintenance of a desirable environment for wildlife. Furthermore, wildlife needs are given specific consideration in all phases of resource management.

The Forest Service wildlife-management program involves two major approaches. These are (1) the protection and improvement of the habitat, and (2) the maintenance of close cooperative relationships with the State fish and game departments.

Favorable environment or habitat is a basic requirement for sustained production of fish and game animals. This is because every animal must have a place to live, a place where its requirements for water, food, and cover can be met. Very often the Forest Service can adjust uses of the forest to protect or even improve wildlife food and cover conditions.

The Forest Service seeks close cooperative relations with the State fish and game departments. State game laws apply on the national forests. Thus the State agencies are handling the protection and utilization of the wildlife resource. Since management of the land (the wildlife habitat) is a responsibility of the Forest Service, cooperation is mutually advantageous.

During the past year, the wildlife section of the Forest Service Manual of instructions for administrative officers was completely revised, in order to bring up-to-date and reemphasize major policies and objectives in this field. Prior to final approval, representatives of the States and other cooperators were asked to review the revised draft. Many valuable suggestions were received.

#### *Cooperative agreements*

In Indiana an agreement covering both national-forest and State-forest lands established objectives for a long-term program of intensive habitat improvement. A special area agreement covered part of the national forests in Texas and was designed to implement habitat improvement through a State Pittman-Robertson project. The existing cooperative agreement in West Virginia was revised in line with new State legislation providing for special State-collected fees for hunting and fishing on national-forest lands.

Cooperative habitat management on Virginia's national forests stressed development of wildlife openings by means of timber sales. In California a cooperative habitat-improvement project was the State-financed construction of flow-control dams on headwater streams to provide continuous water supplies for fish during the summer and fall periods. Other work in California included clearing and seeding of brush fields to provide openings for wildlife, and development of watering devices for quail.

In the national forests in Wisconsin, cutting of cedar in winter deer yards was restricted to the winter period so that tops and other slash would be available to supplement scanty food supplies. Location of sales was also designed to give maximum benefit to deer. In the national forests in Wisconsin and northern Michigan extensive areas of openings were left unplanted to provide sharptail grouse range. Special management plans were prepared for these areas. In North Carolina progress was made in developing timber-cutting methods which would provide sprouts for deer food and still retain an adequate growing stock of timber.

#### *Overpopulation problem*

Utah held its first statewide either-sex deer hunt in 1952, to help meet the problem of overpopulation. Wyoming and Colorado both set two-deer bag limits on several heavily populated areas where an increased kill was desirable. Michigan and Pennsylvania enacted new legislation permitting more liberal harvesting of problem deerherds. Indiana and Virginia anticipated critical problems from growing deerherds and held either-sex hunts. In Indiana this was the first deer hunt in more than 50 years.

#### *Special Land Uses and Mining*

##### *Special uses*

The use of national-forest land for a variety of purposes is authorized by special-use permit. Over 50,000 such permits, embracing some 2 million acres, were in force last year. They covered some 110 different types of uses, such as summer homes, resorts, telephone lines, television stations, pastures, military camps and maneuver grounds, etc.

With the advent of television and microwave transmission systems, national-forest lands have assumed a new importance for relay and transmitting stations. Since high locations for visible range are essential, many national-forest peaks have become very valuable for transmission and relay sites, particularly in California and other parts of the West. The authority of the Department of Agriculture to grant easements for telephone, telegraph, and transmission lines has now been broadened by action of Congress to include sites for radio and television purposes and to extend the width of rights-of-way for power and telephone lines. In order to protect the future interests of the United States the Forest Service reserves certain rights of joint use at sites suitable for television and relay stations.

##### *Mineral leases*

Lands in those national forests established under the Weeks Law may be leased for the utilization of minerals, under such provisions as may be necessary to safeguard other national-forest values in the public interest. In national forests reserved from the public domain, the Mineral Leasing Act of 1920 provides for the leasing of lands for development of certain specified minerals—coal, oil, gas, oil shale, sodium, sulfur (in Louisiana and New Mexico), phosphate, and potassium.

Mineral leasing, particularly for gas and oil, continues to be an important activity on the national forests. It requires careful supervision, however, to prevent damage to surface resources. The leases are issued by the Bureau of Land Management in the Department of the Interior. The Forest Service reviews each application and recommends to the Bureau of Land Management the stipulations which should be incorporated in the lease to protect surface values.

On western national forests an estimated 4 million acres of national-forest land is under lease for gas and oil development. There has been considerable interest during the past year in manganese deposits in the Appalachian area, and in the search for nickel, cobalt, copper, and related minerals in the Superior National Forest of Minnesota.



*Mining claims*

On the national forests reserved from the public domain, the General Mining Laws give any person the right to locate, enter, and patent national-forest land upon discovery of mineral values (except for the eight minerals covered by the Mineral Leasing Act).

Minerals are important resources of the national forests. Prospecting for and utilization of mineral resources is desirable forest use, in line with the policy for multiple-purpose administration of national-forest lands. Many minerals are critically needed, and the Forest Service wishes to encourage their discovery and development.

The large number of mining claims, however, has caused a serious problem in the western national forests. Of some 36,600 claims covering over 918,000 acres that have been patented within the national forests, it has been estimated that only about 15 percent have ever been commercially mined. In 1952 there were an estimated 84,000 unpatented claims, covering 2,163,000 acres of national-forest land and supporting timber worth more than \$100,000,000. But only an estimated 2 percent of these claims were being commercially mined.

Mining claims frequently interfere with the orderly harvesting of timber. Much of the problem is brought about not by bona fide miners but by those who may have no intention of doing any real mining and may be attempting to obtain title to valuable public timberland or summer home sites by using provisions of the mining laws. There is no limit to the number of claims a person may file on, and in rare instances a single claimant or group of claimants has located on thousands of acres of high-value public timber, watershed, and recreation land.

Several bills looking to the modification of the mining laws are pending in the 83d Congress. These include proposals to protect the surface values of lands within the national forests, and to remove deposits of sand, stone, gravel, pumice, and cinders from location under the General Mining Laws, and provide for their disposal on a permit basis.

Hearings were held during the year by the House Committees on Agriculture and on Interior and Insular Affairs. Later, a joint subcommittee of the two committees was appointed to study the mining claim problem with a view to reaching an agreement on corrective legislation.

At the request of the Secretary of Agriculture, the National Forest Advisory Council investigated the mining-claim problem, and reported to the Secretary describing the situation and recommending remedial legislation.

The Forest Service hopes that a solution to the mining-claims problem can be found which will encourage the development of national-forest mineral resources without unnecessary impairment of surface values.

*Fire Control*

In 1953, up to July 31, the Forest Service fought 4,360 fires in the national forests. This was well below the figure for the corresponding 7-month period of 1952, when 5,469 fires were reported. The acreage lost in 1953, however, was much greater—160,250 acres burned

in the first 7 months of 1953, compared with 52,894 acres in the corresponding period of 1952.

A big share of this acreage loss occurred in California. Early in the summer, dry weather and strong winds caused several fires to roar away to large size before control could be established. Some 67,000 acres were swept by fire in the national forests of California during the 7-month period.

In one of these fires, 15 fire fighters lost their lives. They were members of a crew fighting the Rattlesnake Fire on the Mendocino National Forest in northern California. The tragedy occurred on July 9, when a sudden change in the wind caused the fire to jump a road and overtake the men before they could get out of its path. The fire was of incendiary origin. It was brought under control on July 11, after burning over 1,100 acres. Regional investigators were in the field the day after the disaster, and 4 days later the Chief of the Forest Service appointed a Board of Review.

In August, dry lightning storms caused large numbers of fires in the national forests of the northern Rocky Mountain and Pacific Coast States. California had 197 lightning-caused fires on August 13 and 137 on August 14. Forest Service regional headquarters for Montana and North Idaho reported more than 1,100 lightning fires in the first 20 days of August. Smokejumpers made more than 800 parachute jumps, and half a million pounds of air freight was transported to fires burning in the inaccessible areas of this region.

*The 1952 fire year*

The Forest Service in 1952 experienced one of its longest and most hazardous fire seasons. Drought conditions during the fall months all over the country were the worst faced in 25 to 30 years. In the Western States the active fire season, which usually ends in September, extended an additional 60 days well into November. No major conflagrations developed in the national forests of the West, however, despite the critical fire conditions. Most of the larger fires on national-forest lands during the fall months occurred in the Southeast, where an unusually dry summer and fall was experienced. In this region more than 600 fires started in October and November, when few fires normally occur.

During 1952 the Forest Service controlled 11,965 fires in the national forests. Of these, 4,944 were caused by lightning. Man-caused fires totaled 7,021, many of which occurred during the late fall fire season.

During the year 219,590 acres of forest and watershed lands within the Forest Service protective boundaries were burned over, compared with 395,625 acres in 1951. This reduction in burned acreage was accomplished despite an increase of 1,580 in the number of fires.

*Mechanizing fire suppression*

Of some 2,500 miles of fireline built in 1952 to control the 11,965 forest fires in national forests, 820 miles were built with machinery. Most of the machine-built fireline was in the Southern Region, where the topography and timber types are especially suited to use of machinery in controlling forest fires. Specialized plow equipment for use in different fuel and soil types has been developed and successfully used there.



Small portable, self-propelled equipment for fireline construction is being developed and field tested in the western regions. Twenty-five flail-type, and three spiral fireline trenchers are now in use on an experimental basis. The flail-type trencher weighs 260 pounds and is designed for parachute delivery from an airplane for use on back-country fires by smokejumpers. A lightweight portable power brush and sapling cutter and a lightweight brush and grass mower have been demonstrated along with the trenchers.

Trucks with pumper-tanker apparatus were used on 2,189 fires last season. On 998 of these fires, the equipment was used for fast initial attack. During the past 3 years special slip-on fire-pumper-tanker units for 1/2- to 1-ton pickups and 1 1/2-ton trucks have been developed. These were adopted as standard for the Forest Service during 1952. About 200 of the new smaller sized units are now in field use with various protection agencies:

#### *Smokejumpers and aircraft use*

Smokejumper crews are stationed during the fire season at Missoula, Mont.; McCall, Idaho; Chelan, Wash.; and Cave Junction, Oreg. The smokejumpers attacked 267 fires in 1952. On these fires, 836 individual jumps were made and 1,375 man-days were worked. An estimated \$1,300,000 of the fire-suppression costs were saved by use of the smokejumpers on these back-country fires.

Airplanes were used in 1952 to transport more than 8,000 men and approximately 525,000 pounds of fire equipment and supplies, about 250,000 pounds of which were dropped to men fighting fire in inaccessible country. About 11,000 hours of flying were necessary. Use of helicopters dropped from 548 hours in 1951 to 76 hours in 1952, because of a lack of suitable commercially operated helicopters available to the Forest Service.

#### *Improvements and Facilities*

##### *Roads and trails*

A total of \$24,336,000 was available for construction and maintenance of national-forest roads and trails in fiscal year 1953. Of this total, \$11,000,000 was available from appropriations authorized by section 23 of the Federal Aid Highway Act of 1948, and \$6,963,892 from "10 percent funds" (10 percent of national-forest receipts for fiscal year 1952) allocated for roads and trails as provided by the act of March 4, 1913. The balance was from unobligated funds made available in fiscal year 1952.

These funds were programmed for:

- Maintenance of 80,341 miles of road, and 119,433 miles of trails.
- Replacement of 693 unsafe bridges.
- Construction of 41 new bridges.
- Reconstruction and surfacing of 264 miles of roads.
- Construction of 463 miles of road (including 326 miles for timber access).

Included in the construction figure was 27 miles of road on the Siuslaw and Umpqua National Forests in Oregon to facilitate the sale of dead and threatened timber in stands infested by the Douglas-fir bark beetle. Purchasers of the timber will build the additional branch roads needed for salvaging this timber.

In fiscal year 1953, 887 miles of permanent timber-access roads were built and 352 miles of existing roads were improved by purchasers of national-forest timber.

Congress provided a supplemental appropriation of \$5,000,000 for timber-access roads in Idaho and Montana where an infestation of bark beetles threatens to destroy extensive stands of Engelmann spruce. Access roads will aid the salvage of trees that are already dead or dying, as well as facilitate control measures. The infestation might have been avoided if an adequate system of timber-access roads had existed to make possible the prompt sale and removal of trees uprooted and weakened by severe windstorms in 1949 and 1950. These wind-damaged trees subsequently became a breeding ground for the bark beetles.

#### *National-forest transportation system*

The existing transportation system currently includes 20,269 miles of forest highways, 117,229 miles of forest development roads, 120,821 miles of trail, 86 landing fields for rigid-wing craft and 5 heliports suitable for rotary-wing craft. States and counties maintain 48,467 of the 137,498 miles of forest highways and roads. Purchasers of national-forest timber and other road users maintain 9,517 miles of national-forest development roads.

Forty-two percent of the roads in the national-forest transportation system are inadequate for the class of traffic that uses them. States and counties have assumed the maintenance obligation for a considerable mileage of the better national-forest roads in recent years. But the Forest Service maintains a large mileage of low-standard roads used heavily by forest recreation seekers and other public traffic. Upkeep of these roads drains a major portion of the total road funds available to the Service. A few of these roads are already used in excess of their safe capacity while many fail to provide the all-weather service sought by local residents.

#### *Mapping*

During the fiscal year 1953, the Forest Service completed control surveys and topographic maps for 922 square miles of national forests and adjoining lands in Arizona, California, and Idaho.

Planimetric maps were completed for 21,913 square miles of national forests and adjoining lands in Montana, Colorado, Arizona, New Mexico, Idaho, California, Oregon, Washington, and Pennsylvania.

Contracts for aerial photography for both national-forest mapping and resource-inventory purposes were awarded for a total of 6,266 square miles. Bids are pending for an additional 11,300 square miles.

#### *National Forest Properties*

On June 30, 1953, the net area of the 153 national forests and other lands administered by the Forest Service was 181,273,765 acres. This compares with 181,145,764 acres as of the same date in 1952. During the year, therefore, no major changes in national-forest areas occurred.

Lands may be given national-forest status or be removed from that status by executive or legislative action and by purchase, exchange, and donation. During the year, 196 exchange transactions involving national-forest lands or timber were approved pursuant to the several



exchange laws. In these transactions, the landowners offered to the Government 210,312 acres of lands within or adjoining national forests in exchange for 256,106 acres of national-forest land or land utilization project lands and about 81 million board-feet of national-forest timber. Thus there was a net relinquishment of about 46,000 acres in exchange transactions during the year.

A total of 7,969 acres were approved for purchase during the year, with an obligation of \$99,288. This small acreage is principally in the national forests established under the Weeks Law in the eastern United States, including the wilderness canoe area of the Superior National Forest in Minnesota. Eight donations, involving 3,245 acres of land were accepted during the year.

A number of changes involving administrative status of Federal lands were made. Transfers out of the national forests included 6,043 acres from the Olympic National Forest to the Olympic National Park in the State of Washington, and 2,745 acres from the Coronado National Forest to the Coronado National Monument in Arizona. Transfers of Federal land to national-forest status included 91,800 acres of rural rehabilitation lands in New Mexico, which has been administered by the Forest Service since 1947; about 5,100 acres of military reservation lands in Montana; and about 33,000 acres of public-domain lands in Montana.

During the past year, increasing attention has been directed by groups and individuals to questions of forest land ownership, and particularly Federal ownership. The Forest Service also is giving much study to this matter. A reexamination of national-forest boundaries and purchase units is under way.

#### COOPERATION IN STATE AND PRIVATE FORESTRY

The development of the national forests and advancement of State and private forestry work have gone forward together. Each complements the other.

The Weeks Law of 1911 provided both for the establishment of national forests in the headwaters of navigable streams and for Federal participation with the States in cooperative protection and management on non-Federal lands. The Clarke-McNary Act of 1924 and subsequent legislation broadened and strengthened the authorizations for these programs.

In many ways the national forests have been instrumental in encouraging the initiation and development of protection and management on State and privately owned forest lands. The cooperative programs for the protection of forests from fire and destructive pests, production and distribution of planting stock, and technical assistance to forest owners and the processors of forest products are designed to further encourage and facilitate good forestry practice on non-Federal lands.

The Secretary of Agriculture has been authorized to cooperate with the States in these programs, and he has delegated these authorities to the Forest Service. In addition, the Forest Service participates actively in developing the forestry practices to be included in the Agricultural Conservation Program, and for a number of years has been assigned directly the administration of the naval stores conserva-

tion phase of that program. The Forest Service also supplies subject-matter information for the farm forestry extension work conducted by the land-grant colleges and State extension services in cooperation with the Department of Agriculture's Extension Service.

#### Forest Management Assistance to Woodland Owners

Thirty-eight State forestry departments are cooperating with the Forest Service in providing on-the-ground technical assistance to owners of private forests and to small sawmill operators and other processors of primary forest products. The Cooperative Forest Management Act of 1950 is the basis for this cooperative program.

Under the Cooperative Forest Management Act, both farm and non-farm owners of small forests are advised and assisted in the management of their woodlands and in marketing the harvested products. The technically trained foresters who carry on this work are employed by the cooperating States. These men are called farm, service, or project foresters; sometimes they are referred to as county or local foresters. The Forest Service provides leadership and coordination for the program; it sets the standards for conducting the work and provides the necessary inspection; it apportions the Federal funds used in the program.

In fiscal year 1953 some 260 farm or project foresters were employed to handle this cooperative forest management work. These foresters assisted 32,474 woodland owners to establish better management practices on 2,827,700 acres of woodlands. Products harvested under their guidance amount to 527,419,000 board-feet of sawtimber and other forest products. In addition 192 barrels of naval stores and 160,140 gallons of maple syrup were collected. Christmas trees, holly, nuts, tree seed, pine cones, and other miscellaneous products valued at \$329,111 were harvested. The forest owners received a total of \$12,589,543 from the sale of all these products.

Owners are referred to private consulting foresters when the prospective operation warrants such special service. During the year the project foresters referred 671 woodland owners with 425,839 acres of woodland to private practicing foresters.

The project foresters advised 6,534 small sawmill operators and processors. Services to this small operator group are still very limited. Several of the States are planning to employ processor specialists. None are yet available.

At the end of the fiscal year, the project foresters had 4,909 unfilled requests for on-the-ground technical assistance from woodland owners. In many cases these foresters are unable to reach all woodland owners requesting service, since the project areas they serve are too large for efficient operation. In a number of States there are large areas where neither a project nor a private forester is available.

#### General forestry assistance

While the cooperative program gives primary emphasis to the small woodland owners and their needs, the progress of forestry on industrial and other large properties is not being overlooked. Usually working through the States, the Forest Service extends cooperation by making available a few highly specialized technicians for assist-



ance. The services of these specialists are also available to advise on the management of State and community forests and of forest lands in other Federal holdings such as those of the Army, Navy, and Air Force.

Because many large private landowners have their own foresters, either on a full-time or consulting basis, the Forest Service specialists usually serve as consultants to the privately employed foresters. A good example of work being done in this field is the contribution made by Forest Service specialists in the Lake States to the development and extension of a system for continuous inventory of forest stands.

#### Farm Forestry Extension

The Extension Service of the Department of Agriculture cooperates with 45 States and one Territory in conducting farm forestry extension work under section 5 of the Clark-McNary Act. The land-grant colleges and State extension services participate in this educational work. The Forest Service supplies subject-matter information for the program, and in other ways cooperates in the work to promote more efficient management and harvesting of the farm timber crop.

Through its system of county agents and forestry specialists, Extension turns its efforts to problems of individual owners and groups, develops "know-how" in forestry practices on the part of owners and creates a better general understanding of the importance of forestry. In at least 12 States the State forestry departments and extension services have definite agreements for carrying on correlated programs. These understandings provide for mutual cooperation to assure the farmer of better assistance in managing woodlands and marketing his forest products.

Increasing numbers of farmers are becoming interested in such phases of forestry as windbreak and shelterbelt establishment, woodland management, marketing and utilization of forest products, production of naval stores and maple products, preservative treatment of fence posts, and mechanization of farm forestry operations with the use of power saws, planting machines, maple tapping machines, explosive wedges, log loaders, and better sawmill equipment.

The 4-H Club forestry training camps and conservation camps have increased in enrollment. Forestry projects carried out in the home woodlands and demonstration of practices at county and district meetings have provided valuable experience to club members and have stimulated considerable local interest in forestry. During 1952, 181,847 4-H Club boys and girls received training in forestry, and 613,794 in fire and accident prevention.

#### Cooperative Distribution of Forest Planting Stock

Total production of trees for forest and shelterbelt planting by all nurseries—Federal, State, industrial, and commercial—was approximately 462 million in 1952. Of this total, 300 million were distributed under the cooperative program authorized and directed by section 4 of the Clarke-McNary Act. This was the greatest "C-M 4" production yet achieved. Early indications for the planting year 1953 were that the C-M 4 output would exceed the 1952 figure.

The Forest Service cooperates with the States in this program to encourage and facilitate tree planting on millions of acres where planting is needed for flood control, erosion prevention, and protection of water supplies and for restoration of deforested lands to productivity. Forty-three States, Hawaii, and Puerto Rico are participating in the work.

The trees are produced in nurseries in the cooperating States and made available to landowners at moderate cost. In a number of States the amount of forest planting stock available is insufficient to supply current demand.

Increasing attention is now being given in some States to the production of planting stock from locally grown seed. In a few cases, seed of selected trees of superior form and growth rate is being used to the extent that it is available. This is a most important consideration from the standpoint of ultimate yield. Regional committees for the improvement of forest trees through seed selection have been organized in the South, the Lake States, and the Northeast. The committees operate cooperatively with a membership made up of representatives of Federal and State agencies, colleges, and industries. There is need for greater attention to seed source, however, in many other areas.

#### Naval Stores Conservation Program

The naval stores conservation program, which in 1952 completed its 17th year, provides assistance to gum turpentine farmers who follow conservation practices in the Southeastern States of North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi. The program is authorized by the Soil Conservation and Domestic Allotment Act and is administered by the Forest Service for the Agricultural Conservation Program.

The program is designed to encourage producers to adopt and carry out good naval stores and forestry practices. The 1952-53 program provided payments at specified rates per face on tracts where trees were worked to a minimum diameter of 9, 10, or 11 inches. A payment was provided for selective cupping where tracts having a minimum of 50 trees per acre were cupped in a manner that would result in leaving as many trees in the stand uncupped as those which were cupped. A payment also was provided for restricted cupping. In addition to following the practices for which payments are made, a producer in order to receive any payment had to follow good timber-cutting practices and cooperate with the State fire prevention and suppression programs.

Within the active naval stores producing area, some 7,300 producers are working about 57 million longleaf and slash pine trees for the production of turpentine and rosin. The value of the 1952 naval stores crop was approximately \$40,000,000. Georgia has 75 percent of the producers and 75 percent of the timber worked. Florida has 6 percent of the producers and 17 percent of the timber; Alabama 5 percent of the producers and 4 percent of timber. The few score remaining producers are in Mississippi, North Carolina, and South Carolina.

In the 1952-53 season, 3,137 producers participated in the program with 45 million trees, and received a total of \$480,000 in conservation



payments. Comparable figures for the preceding year were 3,319 producers and 49 million trees, and payments of \$477,000.

The Soil Conservation and Domestic Allotment Act does not permit conservation payments for naval stores practices on Federally owned land. On the national forests, 350,000 trees were worked by 23 producers in 1952. These trees were worked under leases containing the same specifications as those in the naval stores conservation program.

The naval stores conservation program has resulted in the adoption of chemical stimulation by an increasing number of producers. This technique, developed by the Forest Service, stimulates and prolongs the flow of gum. It saves much labor; trees can be worked longer; and the loss that occurred from deeply scarred faces when the old wood-chipping system was used is reduced or eliminated. Only 5 percent of the producers used the chemical stimulation treatment on 6 percent of the faces in 1949. In 1952 30 percent of all gum turpentine producers in the naval stores belt used chemical stimulation on 40 percent of all faces.

#### Cooperative Fire Control on State and Private Forest Lands

For most of the States, 1952 proved to be an unusually severe fire year. For Kentucky, Virginia, West Virginia, Tennessee, Illinois, Mississippi, Louisiana, and Alabama especially, it was a year of very heavy losses.

Reported fires on State and private protected lands numbered 118,363, while an estimated 60,280 fires occurred on unprotected areas. The total of 178,643 fires was nearly 15 percent greater than that of the preceding year.

On protected State and private forest lands, fires burned 6,347,227 acres or 1.72 percent of the area. This was more than double the acreage loss of the preceding year (an increase of 108 percent). On unprotected lands, according to the best estimates available, 7,559,232 acres were burned, or 13.03 percent of the total lands unprotected, compared with 11.46 percent for the preceding year.

The bad fire danger conditions that prevailed were reflected in a substantial increase in the nationwide average of area burned per fire on protected areas. This average in 1952 was 53.6 acres, compared with a 1951 average of 31.4 acres.

#### 58 million acres still unprotected

The Forest Service cooperated last year with 43 States and Hawaii in the protection of non-Federal lands from fire, under authorization of the Clarke-McNary Act. The cooperative program, now in its 42d year, is given overall direction and leadership by the Forest Service, which allocates the Federal funds among the participating States, audits the expenditures made by the States under the program, coordinates the objectives and efforts of the States' protective organizations, inspects the adequacy of the work, compiles records, and facilitates exchange of information on fire-control equipment and techniques.

Cooperative protection was extended during the year to an additional 5,278,000 acres under this program. Of the 426,694,000 acres of State and private forest and watershed lands needing protection in

the United States, 368,692,000 acres are now under protection. But more than 58,000,000 acres remain without any systematic protection.

The protection forces in many of the organized areas are still not strong enough to cope successfully with a really serious or a prolonged fire season, such as occurred in 1952. The protection effort needs to be strengthened in manpower and equipment, and bolstered by more intensive preventive activities.

#### Expenditures

During the fiscal year 1952 (latest available figures) the States and private owners spent \$26,636,876 in the cooperative protection program. The Federal Government made available to the States \$8,960,230, making a total of \$35,597,106 expended in the program.

In addition to the expenditures in the cooperative program, local governments, private timber owners and operators during calendar year 1952 spent over \$16,000,000 for special fire-control equipment, improvements, and services.

#### Prevention of fire

For the past decade the Forest Service and the State forestry departments have jointly carried on a Cooperative Forest Fire Prevention program, with the very active cooperation of The Advertising Council, Inc. Under sponsorship of this Council, the advertising firm of Foote, Cone and Belding has given much time and effort to the program as a public service. The program, which features "Smokey," the fire-prevention bear, has served to publicize nationwide the need for forest-fire prevention. There remains a great deal that must be done in direct prevention effort with local groups, if man-caused forest fires are to be effectively reduced. A review of the reported causes of fires emphasizes this need.

Consistently over the past several years the major causes of forest fires have been incendiarism, debris burning, and smokers. Last year was no exception: 35 percent of the fires on protected lands were of incendiary origin; debris burning caused 22 percent, and smokers 20 percent of the total number of fires. Other causes were neglected campfires, lumbering and railroad operations, and miscellaneous. Lightning caused only 6¼ percent of the fires nationwide, although it caused a higher proportion of those occurring in the national forests of the Western States.

#### Cooperative Forest Pest Control on State and Private Lands

The Forest Pest Control Act of 1947 authorized a broad program for the control of destructive insects and diseases attacking the forests. The Secretary of Agriculture in 1952 asked individuals representative of the various phases of forestry to serve as consultants on questions arising in connection with the Department's activities under this act. The advisory group of six members met in May 1952 for the purpose of organizing, and again in December to review the present situation, to discuss policies, and suggest approaches to surveys, research, and control.

The Secretary of Agriculture is authorized by the Forest Pest Control Act to cooperate with the States and private landowners in insect and disease control on non-Federal lands. State Foresters are



taking an increasingly active part in the detection and control of forest pests. The Association of State Foresters at its meeting in 1952 created a Forest Pest Committee of five members to guide and advise on policies and action regarding forest insect and disease control, primarily on State and private lands.

Several States have enacted legislation which enables the State Forester to cooperate effectively in projects for control of insects and diseases. A few of the State forestry departments have been active in control work for several years. Many States are hampered, however, by lack of suitable authorization to do control work on private lands.

In some of the States, organized detection service has been set up in which the State Foresters' field organization, industrial foresters, and other field foresters participate. The cooperating field foresters provide good coverage through observations as they carry on their usual activities. There is need for additional training for these men, however, to help them spot infestations in their early stages.

The formation of local or statewide forest pest control committees has proved to be effective in developing coordinated forest pest control action, particularly where small private ownerships are involved.

#### Flood Prevention

The Secretary of Agriculture's Memorandum 1325 effected certain changes in assignment among agencies handling flood-prevention activities in the Department under authorization of the Flood Control Act of 1936 and its later amendments. The Forest Service's responsibilities include the making of preliminary examinations and surveys, the installation of works of improvement, and collaboration in river basin reports, on all national forests, on range areas adjacent to national forests, and on all other forest lands within a watershed or basin. The Forest Service cooperates and enters into agreements with and utilizes the services of State forestry agencies for these purposes, when State and private forest lands within a watershed or region are affected.

In 1953 Forest Service work on flood-prevention surveys in upstream watersheds was substantially curtailed. The personnel engaged in this work was reduced by 40 percent below that assigned to the work in 1952. Three upstream watershed flood-prevention surveys were completed, however, and reports submitted to the Secretary of Agriculture during the year. These covered the Santa Ana River-San Gabriel River and the Santa Clara River-Ventura River-Callegras Creek groups of watersheds in California, and the Virgin River watershed in Utah, Arizona, and Nevada. Field work was completed during the year on flood-prevention surveys for three additional groups of watersheds—the Salt River in Kentucky, the Merrimac in New Hampshire and Massachusetts, and the western-slope streams of San Diego County in California. In addition to these, work was in progress on 10 other flood-prevention surveys under Forest Service direction, and the Forest Service also collaborated with the Soil Conservation Service on forest-land phases of 20 flood-prevention surveys for which that agency was responsible.

#### River basin programs

The Forest Service continued its cooperation with other Department of Agriculture agencies and with the land-grant colleges in preparing a comprehensive program for the development of the agricultural and land resources of the Columbia River Basin.

Early in the year, House Document No. 530, "Supplemental Report, Missouri River Basin Agricultural Program," was released. This document included material contributed by the Forest Service working cooperatively with other Department agencies in the Missouri Basin.

In the Arkansas-White-Red River Basins and in the New England-New York States the Forest Service continued to work with other Federal agencies and with the States in developing comprehensive and integrated programs for flood prevention and the conservation and utilization of land, water, and related resources.

#### Progress on flood-prevention projects

Work continued in each of the six project areas in which the Forest Service is participating in flood-prevention work, as authorized in the 1944 Flood Control Act. In cooperation with the States concerned, fire-protection measures have been installed in the Coosa (Georgia) and Potomac (Virginia and West Virginia) River watersheds. A special plan to guide and expedite fire suppression was completed for the steep, hazardous brush areas in and adjacent to the Angeles National Forest, in the Angeles River watershed in California.

Installation of the fire-protection improvements authorized in the flood-prevention program is almost completed in the Santa Ynez River watershed in California. These improvements are located in the mountain area above the Cachuma Reservoir now nearing completion. The improvements are designed to afford increased protection to the reservoir from sedimentation, by maintaining an unburned, soil-stabilizing plant cover on the watershed.

Intensified fire-protection measures in the Los Angeles and Santa Ynez watersheds include the use of highly trained, fast-moving crews, which have quickly suppressed many fires before they could become major conflagrations.

In Mississippi organized fire protection has been extended through Federal-State cooperation to all but four counties in the Little Tallahatchie-Yazoo River watershed. In these four counties much work has been done to help the citizens obtain countywide fire protection. Flood Prevention Project foresters have cooperated directly with the State Forester in suppressing fires, and in training emergency fire crews to be available and effective during critical periods of fire danger. The rate of tree planting to reduce erosion in these watersheds is expanding to the limit of available planting stock. Nearly 25,000,000 trees were planted during the 1952-53 season. Most of this planting was done on privately owned lands with the cooperation of landowners and timber operators. Voluntary fire protection is improving as tree planting increases and landowners recognize the long-term values in their tree plantings. The application of good forest-management practices, guided by project foresters, is gradually



increasing, and the importance of this work to landowners and its relationship to flood prevention is being recognized more widely each year in the watershed area.

#### FOREST RESEARCH

Twenty-five years ago, recognizing the vital need for sound knowledge in meeting the forest, range, and watershed problems of the United States, Congress passed the McSweeney-McNary Forest Research Act of 1928. This act authorized and directed the Secretary of Agriculture

"... to conduct such investigations, experiments, and tests as he may deem necessary... 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 waterflow and the prevention of erosion, of protecting timber and other forest growth from fire, insects, disease, and other harmful agencies, of obtaining the fullest and most effective use of forest lands, and to determine and promulgate the economic considerations which should underlie the establishment of sound policies for the management of forest land and the utilization of forest products..."

This broad-gage directive has been the charter for the development of a nationwide forest and range research program that has continued to gain momentum during these 25 years. Under this program, the Forest Service now has in operation a national system of 11 regional forest and range experiment stations in the United States, a research center in Alaska and a tropical forest research center in Puerto Rico, and a national Forest Products Laboratory in Madison, Wis.

The McSweeney-McNary Act is also a charter for cooperation in the research program. As forestry has become a going, profitable business and the need for a scientific basis for sound forest, range, and watershed protection and management has been recognized, there has been more and more cooperative participation by State and local agencies and private organizations and companies in forest research projects.

Local and regional advisory committees utilized over the years, together with a recently established National Advisory Committee, are functioning to stimulate cooperation and to assure desirable balance and coordination in the research program. Advisory committees have emphasized the need for research to serve the various phases of multiple-use forest management.

#### Forest-Management Research

The forest-management research program of the Forest Service is aimed at improved forest production. First of all there is a search for new scientific facts related to the growing of trees and forests; and secondly, a testing of the practical application of these findings to the actual operation of forest properties. The examples of advancements made during the past year given in the following paragraphs illustrate the broad front over which this research program operates.

#### *Seed dissemination gives clue to desirable cutting methods*

First-year results of seed-dispersal studies on the Coram Experimental Forest in Montana showed that both larch and Douglas-fir seeds were scattered a maximum distance of 660 feet from the closest timber. However, dispersal was insignificant in quantity beyond 260 feet for Douglas-fir and 400 feet for western larch. These early results came from clear-cutting tests aimed at determining the maximum sized opening that will restock satisfactorily within a 5- to 10-year period.

In another study—this one in lodgepole pine, also in Montana—the dispersal of seed more than 250 feet beyond a timber edge was found to be very limited. Not more than 6 percent of the seed was dispersed farther than 70 feet from timber into clear-cut openings. Thus clear-cut strips which depend upon seeding from the sides must be narrow (probably not to exceed 130 feet) for adequate lodgepole pine seed dissemination.

The distance of effective seeding in the Douglas-fir region of Washington was determined by recording the reproduction obtained in small group cuttings as compared with a large clear cutting. Seedling counts made 5 years after logging point out that excellent regeneration resulted from the small group cuttings, but that for the large clear-cut tract, satisfactory seeding was confined to parts of the area within 500 feet of the timber edge. Hemlock was more widely distributed than Douglas-fir.

Seed-dissemination studies are also being carried out in Arkansas. Sweetgum seed does not travel as far from the parent tree as many people believe. The Arkansas findings have at least two practical applications. Where hardwood-control measures are being carried on to favor the pine component of pine-hardwood stands, all seed-bearing sweetgum should be eliminated from the stand and in a border zone of 600 feet. On the other hand, where a harvest cutting of sweetgum is being made to reproduce the forest on soils well adapted to that species, sweetgum seed trees should be spaced not much farther apart than 100 feet.

#### *Reducing windfall losses*

Severe storms of the past few years have demonstrated in no uncertain terms that windfall can be a major cause of mortality in forest stands. On the Oregon Coast Range alone, one storm in December 1951 blew down 3.7 billion board feet of merchantable timber.

During 1952, a preliminary study of the pattern of windfall was carried out at the Cascade Head Experimental Forest and at other locations in the Oregon Coast Range to explore management methods that will minimize windfall losses. The findings provide good evidence that wind damage associated with clear cutting can be greatly reduced in the Coast Range by using a modified "progressive strip cutting" system, by minimizing or eliminating exposed north and east cutting boundaries, and by carefully selecting windfirm cutting lines.

A study of different methods of logging spruce-fir stands on the Fraser Experimental Forest in Colorado has shown that windfall, the greatest source of damage to cutover timber, can be reduced by as much as 100 board feet per acre per year. Removing groups of trees rather than cutting by a uniform individual-tree-selection system—the



method commonly used in the past—not only leaves timber more wind-firm but is followed by a greater quantity of natural regrowth.

#### *Forest tree improvement*

Increasing competition for high-quality timber brings into sharp focus the need for full productivity of forest land. As a result, reforestation of idle land proceeds at an increased tempo. The demand for planting stock can only be satisfied with correspondingly large quantities of seed which, quite naturally, are usually obtained where most abundant and cheapest. Cones are often collected only from the prolific seed-producing trees that are easiest to climb, without regard to vigor, quality, or disease resistance of the parent trees. This practice, plus the "high-grading" of natural stands for the best trees, leads to degeneration of the crop. Thus landowners while stimulating reforestation efforts at present may be penalized in the future by the slow growth of inferior stands.

The genetic quality of the present forests can be maintained and those in the future improved by (1) establishing new stands by planting with seed from the best trees in the best stands adapted to a given locality, (2) making tests, with seed or grafted material of the best trees, stands, and races, to determine the best types and (3) starting a program of tree breeding to create new types.

Several years ago the Southern Forest Experiment Station demonstrated that serious losses in potential growth rate of planted loblolly pines resulted from using seed too far from its point of origin. For example, seed collected several hundred miles away and planted at Bogalusa, La., gave plantations that yielded only 40 percent as much wood as plantations from local seed. A knowledge of the correct geographic races to plant in different areas may bring very large rewards in timber yields. In order to determine the safe limits, a cooperative seed-source study was started in 1950 and carried through to field planting in 1952 with longleaf, slash, loblolly, and shortleaf pine from all parts of the South and Southeast. This study, carried out under the sponsorship of the Southern Forest Tree Improvement Committee and supervised by the Southern Forest Experiment Station, involves a total of some 300 private, State, and Federal co-operators, 16 Southern States, 19 nurseries, and 57 outplanting locations. This is perhaps the largest seed-source study ever undertaken in the world.

The attempt to obtain better strains of slash, longleaf, loblolly, and shortleaf pine through individual tree selection is being carried out in cooperation with the Ida Cason Callaway Foundation in Georgia. Progeny of some outstanding mother trees, even though the male parent is unknown, are as much as 50 percent taller at the end of one growing season in the nursery than those from other trees from seed of commercial source. Likewise 1-year-old western white pine progenies of known parentage have been found to reflect inherent vigor of their parents. The latter tree-breeding studies, aimed at improving disease resistance, growth, and form, are being conducted at the Northern Rocky Mountain Forest and Range Experiment Station by the Forest Service in cooperation with the Bureau of Entomology and Plant Quarantine and the Bureau of Plant Industry, Soils, and Agricultural Engineering.

At Lake City, Fla., evidence just obtained shows conclusively that the yield capability of oleoresin, the source of naval stores products, is an inherited character in longleaf pine. This study, begun in 1935, indicates the long-term nature of some phases of forest genetics work and emphasizes the need for an early attack on fundamental problems.

At the Institute of Forest Genetics of the California Forest and Range Experiment Station, the breeding program has produced more than 70 different hybrid combinations. In its work of exploring and exploiting the genetic variability of the different pine species, new crossings are attempted each year. Last year some 49 different species combinations were attempted, including 30 first generation crosses, 4 backcrosses, 7 three-species crosses and 2 four-species crosses. Thus almost one-third of the new crossings used hybrids as one of the parents. As more and more hybrids come into flower bearing, the percentage of such crossings will increase.

#### *Converting poor hardwood stands to pine*

It has long been recognized in agriculture that maximum farm income can be obtained by growing crops best suited to the soil and climatic conditions present. Certain crops do best on light sandy soils, others do best on heavy soils. When a variety of growing conditions occur on a farm the wise farmer plans his crops to make the most of his land.

The wisdom of such practice has also become apparent in forestry. In the widespread Central Hardwood Region of the United States, the oak-hickory forests occupy many different kinds of soils. On some they do well and produce valuable stands. On others, especially the more sandy soils, the ridge tops, and drier situations, they yield little although they occur there naturally. Moreover, low-grade hardwoods are abundant but softwoods are in short supply; hence there is an urgent need to find suitable softwoods that can be grown on the land. Studies by the Central States Forest Experiment Station are showing that pines can be planted and will make good growth on soils where the hardwoods do poorly. The problem is to find the right species and strain for a locality, a tree that is hardy and disease resistant. Progress has been made in introducing pines from adjacent areas. Such introductions have not always been free from insect and disease attacks and, as recent results in Arkansas show, it is highly desirable to get seed from comparable climatic zones. All this suggests the need for studies of genetics and tree breeding in order to develop thoroughly satisfactory strains for this region.

#### *Research in Forest Fire Control*

Improving the protection of wild-land values from fire through use of modern technology is the purpose of the Forest Service's program of forest-fire research. The rapid increase in commercial values of productive timberlands and the vital importance of forests for watershed protection call for more intensive methods in protecting these valuable properties. Federal, State, and private protection agencies are in great need of more technical information for use in improving the effectiveness of their services.

During the past year a number of investigations were under way to help fire-control officials anticipate the size of the fire-fighting



job at all times. Statistical studies were continued, designed to bring out the lessons to be learned from past experience with various methods, policies, and systems of fire control. Other investigations included studies of fire damage to permit better appraisal of losses; experiments in maintaining firebreaks by use of chemicals, and development of methods for systematically testing the efficiency of fire equipment in different combinations.

Some highly technical studies were made on the thermal and other physical qualities of common forest fuels, to establish exact relationships and to bring about a better understanding of just when and how they become extremely susceptible to fire.

Progress in various phases of these activities was reported in 14 reports or publications issued during the year.

#### *New cooperative studies*

A new project undertaken in cooperation with the State universities, State foresters, and private forest-protection associations in Idaho, Montana, and Washington looks to the development of better methods of reducing fire hazards from logging slash, and other measures to provide better protection for cutover lands in the Northwest.

A cooperative project also has been started with the Munitalp Foundation, Inc., to study the nature and development of fire-setting lightning storms in northern Idaho. The Weather Bureau is cooperating in investigations on the effects of unstable atmospheric conditions on the spread of fire. During the year new evidence was found that the condition of the atmosphere in the vicinity of a fire can have a pronounced effect on how fast the fire spreads. The investigations under way give promise that dangerous atmospheric conditions eventually can be predicted in advance, once their makeup and effect have been fully established.

#### *Forest and Range Influences*

The influences-research program of the Forest Service includes both basic and applied research. Basic research is primarily concerned with discovering the physical and biological processes that affect the interrelations of soil, plants, and water. Applied research involves studies to determine answers to such questions as the specific effects of land-use practices on the behavior of watersheds and the best methods of stabilizing damaged areas. It also includes the design and testing of improved cutting, logging, grazing, roadbuilding, and other practices to reduce harmful erosion, flood flows, and debris movements, and to increase the yield and quality of water supplies.

#### *Runoff and streamflow reflect watershed recovery*

Significant changes in streamflow have occurred over the past 15 years on two small watersheds in Utah's Wasatch Mountains. During the disastrous mud-rock floods in 1930, Parrish Creek, which leaves the mountains near the valley town of Centerville, was scoured to bedrock. From 1936 to 1942 it yielded about 1 inch more annual flow than adjacent Centerville Creek. Since then, however, its flow has decreased to about 1 inch below that of Centerville Creek. Scientists attribute the change in relative flows to the increasing use of water by the vegetation which has come back along the previously scoured channel of Parrish Creek.

#### *Well-stocked forests favor more snow and slower melt*

In the Northeast, where snowfall is often heavy, well-stocked forests appear most effective in promoting favorable water yields and reduced flooding. The greatest amount of snow accumulates in well-stocked hardwood stands. Second greatest is on abandoned lands and former clear-cut areas containing a dense cover of small trees or brush; third, in spruce, balsam, or pine stands; fourth, on hay and pasture lands; and the least amount on bare, cultivated fields. The rates of snow melt, however, appear lowest under conifers, next under hardwoods, and highest on open fields. The soils of ungrazed, lightly cut hardwood forests also are comparatively free of types of frost that prevent melting snow from percolating readily into the ground. On the other hand, the "concrete" frost that usually occurs in open fields obstructs percolation, causing rapid surface runoff of melting snow and spring rains.

#### *More light on watershed logging*

Timber operations in California have often caused serious surface runoff and erosion hazards due to the logging roads, equipment, and skidding practices employed. Research workers are cooperating with national-forest officers in preparing a guidebook showing how to recognize potential hazards in advance so that less damaging methods can be applied. This guidebook will be based partly on detailed observations of logging operations, and partly on the results of basic investigations into the effects of land-use activities on soil and water relations.

#### *Special cutting practices aid fishing*

That partial removal of streambank forest growth may actually improve the habitat for fish is indicated by experiments now under way in cooperation with the State Fish and Game Department of North Carolina. After the felling of trees in one case and only the undergrowth in another case, water temperatures remained within optimum limits for fish life. On minor watercourses that are too small to support fish, the increased temperatures and sunlight that result from the partial removal of vegetation may stimulate the growth of aquatic organisms. These organisms are washed down to the larger streams and furnish increased food for trout.

Facilities at the experimental areas where forest influence studies are conducted are especially suited to cooperative projects with State fish and game departments. Such projects are welcomed by the Forest Service because they lead to a more practical understanding of the multiple-use possibilities of forest and range management.

#### *Denuded lands successfully revegetated*

Years ago, fumes from copper smelting killed all the plant growth on large areas of once-forested steep slopes above the Bureau of Reclamation's Shasta Reservoir in northern California. The resulting sedimentation has threatened the usefulness of this giant storage reservoir. During the 1930's ponderosa pine and other trees were planted in an effort to stabilize the shifting granitic soils. Later, small brush dams were placed in the gullies. Recent examinations show that the soil within the tree plantations has largely been stabilized beneath a matted litter of pine needles. But on adjacent unplanted sites the



natural growth of manzanita and other native shrubs has not been sufficient to protect the soil and consequently many gully bottoms are filled with eroded materials and the sides of the gullies remain exposed to further soil losses.

Tree planting has thus proved its worth for reclaiming the 32,000 acres that still remain unprotected.

#### *New method improves flood predictions from treated watersheds*

The effects of watershed-improvement measures on floods can now be predicted more accurately by a method devised by Forest Service hydrologists and foresters in the Northeast. Starting with records of previous rainfall and flood discharges, the amount of rainwater that actually enters the ground and passes through the several layers of the soil is determined by soil-moisture sampling. The comparisons of treated and untreated areas consider such factors as the amount of soil moisture already present before precipitation, the losses of water by evaporation and plant use during given storm periods, and the variations among the different soil layers in their ability to store and pass excess water downward into the streams. The difference between the amount of rain that reaches the ground and the net amount that enters and passes through the soil represents the volume of flood-contributing surface runoff. This runoff is then related to the rise in streamflow as recorded by the stream gage. The method has now been adopted by the New England-New York Inter-Agency River Basin Committee as a standard technique for evaluating the flood-reduction effects of watershed-improvement programs.

#### *Cooperative relations*

At the request of the Conservation Foundation, the Forest Service loaned a research specialist to that organization to prepare a semi-technical book bringing together the knowledge on the basic relations of vegetation and water yield for each major climatic and soil region of the United States. This book is scheduled for publication early next year.

Hydroelectric power companies, municipalities, and industries continue to request technical advice on the management of their watershed lands to better attain regulated flows and high-quality supplies. Requests for assistance by the Department of the Interior's land-managing agencies are being met to the extent that funds permit. The soil-moisture investigations conducted at several localities in cooperation with the Army Corps of Engineers continue to provide information of fundamental value.

#### *Range Research*

##### *Cooperative approach to California brush problem*

Cooperative research of the Forest Service, the University of California, and the State of California has combined specialized training along several different lines towards developing better methods of converting low-value brush fields to grass. The program is aimed at improving forage production while also maintaining a protective vegetation on watersheds to prevent serious soil erosion.

Research to date shows that soils typically associated with woodland-grass vegetation can be improved by burning with ample provi-

sion for revegetation. Soils associated with chamise-chaparral vegetation, especially shallow soils on steep south slopes, do not respond as well to such treatment for revegetation. "Area ignition" and "brush mashing" techniques have been developed, making it possible to obtain clean, orderly burns in periods of low fire hazard. Species and methods have been found for quickly restoring a cover of vegetation that will give a high forage yield, give ample soil protection, and control brush seedlings.

#### *Big game and livestock*

Cooperative studies of forage use by big game are providing information necessary to integrate the management of deer and elk herds with management of livestock and other uses of the land. The urgent need for such information is shown by studies of 58 deer herd ranges in Utah. It was found that 38 of these had problem areas where important deer forage had been depleted by overgrazing, either by deer, by livestock, or by both kinds of animals.

The Utah studies showed that the deer compete with both cattle and sheep for forage. Here grass, mostly bluegrass, a valuable forage for livestock, was found to make up 90 percent of the spring diet of mule deer. Forbs and browse were the main summer diet, the forbs being most important in early summer while they are still succulent. After midsummer, browse use exceeded forb use. During fall and winter, browse was the main diet, more than 80 percent of it being composed of sagebrush, cliffrose, and bitterbrush.

In Oregon a 7-year study gave tentative levels for the proper winter use of several important browse species on big-game ranges. The results suggest how much of the current growth of snowbrush, ceanothus, curleaf mountain-mahogany, antelope bitterbrush, and other browse plants can be utilized on good sites and on poor sites without depleting the browse forage.

In California the State Department of Fish and Game and the Forest Service have started cooperative studies to develop methods of restoring browse species on ranges where they have been depleted. Methods of seeding bitterbrush are also being tested cooperatively by the Forest Service and the Idaho Fish and Game Department.

#### *Improvement of salt desert-shrub ranges*

Eighteen years of grazing-management research at the Desert Experimental Range in Utah have developed management methods that can greatly improve forage production and double the net income from sheep that graze salt desert-shrub ranges. The better stand of vegetation resulting from proper management makes possible greater wool production, higher lamb crops, and lower death losses, all of which contribute to greater income for the sheep operator. The better vegetation also resists the invasion of undesirable plants such as Russian-thistle and small rabbitbrush. The research results apply in varying degrees to 42 million acres of salt desert-shrub ranges in the West, which provide 6 months of winter grazing each year for 4 to 5 million sheep. The recent widespread invasion of these ranges by halogeton, a plant poisonous to both cattle and sheep, has focused attention on the importance of these lands and the need for their improvement.



*Reseeding rangelands in the Southwest*

Guides to the use of crested wheatgrass for seeding rangelands in the Southwest have been published in Farmers' Bulletin No. 2056. Crested wheatgrass has had wide use in cooler sections of the West but only limited use in the Southwest. It has been found adapted, however, and is recommended for seeding depleted areas throughout the ponderosa pine range area. It may also be successfully seeded on better sites in the pinyon-juniper and big sagebrush range types. Grass yields range from 520 pounds of air-dry herbage per acre on poor sites to over 1,000 pounds per acre on the better sites. Grazing studies on ranges reseeded to crested wheatgrass in New Mexico show that a degree of grazing that removes about 35 to 55 percent of the current herbage growth results in average daily gains for the cattle of nearly 2 pounds per head, while preserving the stand of grass. This is considerably more beef than can be obtained on unseeded depleted range in the same area.

*Control of undesirable range plants*

Results of past research on the mesquite problem in the Southwest have been summarized and published as Department of Agriculture Circular No. 908. Mesquite occurs on some 70 million acres of rangeland in the Southwest. It is estimated that over half the rangeland now occupied by mesquite has been invaded since 1850. Also, the original stands have become thicker. Mesquite advance is attributed to a combination of influences, including cessation of range fires, heavy grazing, drought, and dissemination and planting of seed by livestock, birds, game animals, and rodents. Mesquite control offers good possibilities as a range-improvement measure. On a range with moderate precipitation and a good stand of perennial grasses, killing velvet mesquite was found to double the yield of the grasses within 3 years. Mesquite can be economically controlled through grubbing or hand application of sodium arsenite or petroleum oils. Herbicides such as 2,4-D and 2,4,5-T show promise, but further studies are needed to determine more selective chemicals and techniques of application.

**Forest Economics***The Forest Survey*

Timber-production plans and programs of the Forest Service, and those of other public agencies and private timber owners and operators, require basic facts on timber supplies, timber growth and mortality, timber cut for lumber and other products, and prospective needs for timber. Such information is obtained by the Forest Survey.

Since the Survey was started in 1930 a total of 450 million acres, or more than two-thirds of the estimated 622 million acres of forest land in the United States, has been initially covered in the field for detailed forest-resource information. Since 1946, 167 million acres of forest land also has been covered by resurveys to bring older surveys up to date in the most actively logged areas, such as the South and Pacific Northwest. These resurveys have shown varying trends in the timber-supply situation in different States.

During fiscal year 1953, initial surveys covered about 26 million acres of forest land in California, Idaho, Indiana, Ohio, New York,

Pennsylvania, West Virginia, and Maryland. Resurveys covered about 36 million acres in Oregon, Washington, Minnesota, Wisconsin, Michigan, Alabama, Louisiana, Texas, Georgia, and North Carolina. Cooperating public and private agencies in eleven of these States gave substantial financial or other assistance in speeding up and intensifying the Forest Survey. State analytical or statistical reports were issued for Arkansas, Indiana, Kentucky, West Virginia, Tennessee, and Vermont.

*Special economic studies*

A study concerning the feasibility of establishing pulp mills in eastern Montana indicated that there is sufficient timber in the national forests of this area and suitable water supplies east of the Continental Divide to support the permanent operation of several pulp mills. Development of pulpwood resources in this area, however, would require intensification of forest management, the construction of many miles of timber access roads, and measures to guard against water pollution.

A study of financial maturity of shortleaf and loblolly pine in Arkansas and Louisiana indicated the gross and net values of trees of different classes, timber-production costs, and rates of value increase for trees of different vigor classes utilized for sawlogs. From these data simplified marking rules for use in the woods have been established. The study showed that trees that are improving in grade or log length usually are not financially mature until the growth rate declines to a very low point or trees reach at least 25 inches in diameter.

In the Southeast, a study was begun to determine the economic feasibility of marketing logging waste and sawmill residues for pulpwood, including determination of the most efficient methods for utilizing and transporting such material. In an area in South Carolina selected for study, 50 thousand cords of mill waste suitable for chipping and 36 thousand cords of logging waste were produced annually through the operations of 147 sawmills. Logging waste ranged from 0.3 to 3.2 cords per acre. An analysis to determine minimum operable volumes is now under way.

In order to help the small timber owner and those who advise him on tax problems, the Forest Service published Agriculture Handbook No. 52, "The Small Timber Owner and His Federal Income Tax." In nontechnical language, this handbook describes the ordinary-income and capital-gains methods of reporting receipts from sales of timber and forest products, tax treatment of timber losses from fire or other casualty, and the treatment of the costs of forest ownership and operation.

**Forest Products**

The forest-products research program of the Forest Service, centered at the Forest Products Laboratory in Madison, Wis., seeks to develop new products, to lower the costs and improve the serviceability of existing forest products, to find ways to reduce the amount of unused residues in forest and mills and find useful outlets for unavoidable residue, and to aid in the solution of national, regional,



and local forest products problems of all types. Some examples of the past year's activities follow.

#### *Fundamental approach to semichemical pulping factors*

A fundamental approach has been made to the problem of classifying various woods with respect to their semichemical pulping behavior. In this study pulping data on a number of woods were classified and analyzed. The main variables—the properties of the wood itself, and its pulping characteristics and pulp yield—were used to develop a “pulping index.” Further development of the index will make it possible to predict the semichemical pulping behavior of any wood without actually making lengthy and costly pulping tests.

#### *Heating veneer logs electrically*

Hardwood veneer logs must usually be heated before they are cut into veneer. This heating is costly and time consuming, requiring 1 to 2 days or more in steam or water. Softwood logs are usually cut without heating, in the interest of economy, but here too, the improved quality of the veneer obtained from heated bolts makes heating desirable whenever it can be justified economically. A promising new method of heating veneer bolts quickly and economically has been developed. A high-voltage electric current is passed through the green bolts, which are heated because of the resistance to the passage of the current. Bolts requiring 2 days of heating in steam or water have been heated throughout in 2 to 4 hours by the new method. The cost of electrical heating is low—another advantage.

#### *Strength of wood at low temperatures*

Assertions have frequently been made that wood becomes weak and brittle when continuously exposed to very low temperatures. Recent Laboratory investigations at temperatures as low as  $-300^{\circ}$  F. disprove this. In fact, some important strength properties of wood are increased, compared with those at room temperature. Increases range from 40 to 150 percent depending on the property and the species involved. Fundamental knowledge of the behavior of wood at very low temperatures is applicable to the use of wood for construction, containers, and shelters in the arctic regions, and for such nonmilitary uses as wood supporting members and insulation for tanks carrying liquefied gases at  $-275^{\circ}$  F.

#### *Preservation of wood in glued products*

Glued wood products in the form of plywood, laminations, and other built-up products are being used more and more under adverse conditions of exposure. This has created the need for information both on the preservative treating of glued material and on the gluing of treated wood. The Forest Products Laboratory tested products glued with several common synthetic-resin adhesives and subsequently treated. Seven different commercial wood preservatives and one fire retardant, applied by pressure, had no harmful effects on the strength and durability of the glue bonds. The glue joints were evaluated shortly after treating and again after 2 and 6 years of aging.

Progress has also been made in developing techniques for gluing wood that has first been treated with preservative. The Laboratory

demonstrated that treated wood can be successfully glued, and devised a practical method of producing thoroughly treated glued-up members for service under conditions of high decay and insect hazard.

#### *Fire hazards in houses*

Fire hazard to human life is closely associated with the rate at which flames spread through a burning building. A method of testing the rate of spread of flame over the surface of combustible materials is being developed at the Laboratory. The results of these studies will have a very practical bearing on building-code specifications of materials and the fabrication of construction materials less hazardous to human life. They are particularly important in connection with the Nation's housing program.

#### *Simplified house paint maintenance*

A house paint maintenance study on representative exterior paints and painting systems that was started in 1936 has reached a significant stage. The results reveal that painting too frequently or too generously produces paint films of excessive thickness. Excessive film thickness, in turn, causes such excessive checking, scaling, and peeling that complete and expensive removal of the old paint is necessary. These findings are of importance in two respects. They indicate repainting schedules that should result in decreased painting cost and improved paint service to the householder. They also indicate means of evaluating paint service in shorter periods than the 16 years required for this study.

#### *Double-diffusion treatment of cooling towers*

The cooling tower is an important link in many industrial operations. In some cases repair and replacement of cooling tower parts has been necessitated by early decay as well as by chemical deterioration. Where decay is the cause of deterioration, the double-diffusion method of preservative treatment seems to be a logical method, if not the only practical method, whereby cooling towers may be effectively treated in place. During the past year the Forest Products Laboratory cooperated with a manufacturer and two users of cooling towers in experimental double-diffusion treatments in which first one chemical and then another was flowed over the wood in water solution to react and form a water-insoluble preservative compound. Samples of the treated wood removed and analyzed for preservative retention showed fair penetrations in new unweathered pieces and good penetration in older pieces that had been in service for a number of years. From time to time additional samples will be removed to determine the permanence of the treatment under normal cooling tower service conditions.

The entire cost of the double-diffusion treatment was about 7 percent of the replacement cost of the cooling tower. Replacement cost may run as high as a quarter of a million dollars. Service life varies from 4 years under severe conditions up to 20 years; failure after about 7 years of service is common. With a service life in this range only a very moderate extension of life would make treating profitable.

The double-diffusion treatment developed by the Forest Products Laboratory was originally intended for use on green fence posts.



## ADMINISTRATIVE MANAGEMENT AND FISCAL CONTROL

*Organizational changes*

An organizational study resulted in decision to combine 14 national forests and consolidate offices, in order to obtain greater economies in administration and more effective utilization of improved transportation and communication facilities. Steps already have been taken to effect these combinations. Three of them were well along toward completion as this report was prepared: the supervisors' offices of the Pisgah and Nantahala National Forests in North Carolina to be consolidated; the Minidoka National Forest to be combined with the Sawtooth National Forest in Idaho; and the Crook National Forest to be eliminated and its lands added to the Coronado, Tonto, and Gila National Forests in Arizona and New Mexico.

It was also decided to combine the Southwestern Forest and Range Experiment Station, which had headquarters at Tucson, Ariz., with the Rocky Mountain Forest and Range Experiment Station with headquarters at Fort Collins, Colo. An important research center will be maintained at Tucson.

In two of the Forest Service regional offices, combinations of divisions have been made for greater economy. Further savings should result from many other smaller organizational changes.

## Fiscal Service

The Forest Service at the beginning of the year embarked on an intensive program to improve its fiscal management. Forest Service members worked closely with the Secretary's Office, the General Accounting Office, Treasury Department, and others. Studies in accounting operations, methods, and procedures are resulting in more efficient administration at less cost. Internal audit and controls have been strengthened. These studies will be conducted on a continuing basis in all fields of fiscal and accounting work and further improvement in efficiency is expected.

## Statement of Receipts and Expenditures

*National forests*

Receipts from the national forests deposited to the forest reserve fund in fiscal 1953 amounted to \$74,732,468. In addition there was collected \$1,524,009 from national-forest lands that were within the former indemnity limits of the grants to the Oregon and California Railroad Co., and \$207,269 from Tongass National Forest in Alaska, both of which were deposited in suspense pending proper disposition. Including these amounts, total receipts were \$76,463,746. Of the forest reserve fund receipts, \$69,252,124 was from timber; \$4,415,862 from grazing; and \$1,064,482 from special land uses, waterpower, etc. Of the amount credited initially to the forest reserve fund, \$122,755 is returned to Arizona and New Mexico on account of State school lands within national forests and \$10,537 is derived from designated lands in the Superior National Forest for which special payment is made to the State in lieu of the usual 25 percent payment. Of the remaining \$74,599,176, 25 percent, or \$18,649,794, is paid to States for benefit of public schools and public roads of the counties in which

national forests are situated; also, 10 percent of the same base amount and of the \$10,537, or \$7,460,971 in all, is appropriated to the Forest Service for roads and trails within national forests. From the remaining balance there is appropriated \$45,332 for payment to Minnesota on account of the designated area in the Superior National Forest and \$531,000 from grazing receipts of various national forests for range improvements on such forests.

Expenditures for national-forest operation, protection, and management were \$39,885,879. Additional expenditures from appropriations for forest roads and trails amounted to \$24,532,516 and for acquisition of national-forest land \$121,969.

*Aid to States*

Forest Service expenditures for cooperation with States and private agencies in fire control, planting, and assistance in forest practice were \$10,667,198.

*Research and miscellaneous*

Expenditures for research were \$5,415,908 and for flood control \$1,307,562.

A total of \$8,594,947 was also expended for fire control, slash disposal, improvement work, timber-stand improvement, and other work financed by outside agencies and from receipts authorized to be expended for specified purposes.

Services for other Government agencies from funds advanced or transferred by such agencies amounted to \$2,533,134, including \$173,673 for the Department of the Interior, \$1,365,508 for the Army, \$354,154 for the Air Force, \$240,366 for the Navy, \$176,453 for the Department of Commerce, \$131,660 for the Production and Marketing Administration (Agriculture) and \$91,320 for other agencies.

Total net expenditures were \$93,059,113. In addition, expenditures for which appropriations were reimbursed amounted to \$6,517,989. Expenditures were accounted for by objective and functional classifications under 88 separate appropriation titles.

The Forest Service handled the naval stores conservation program, involving payment to farmers of \$532,522 from funds of the Production and Marketing Administration.