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NATIONAL FORESTRY PROGRAMS SUMMARIZED AS TO COSTS, FINANCING AND NEEDED LEGISLATION

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FROM
"A NATIONAL PLAN FOR AMERICAN FORESTRY"

A Report Prepared by the Forest Service, U. S. Department of Agriculture
in Response to S. Res. 175 (72d Congress)

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THE PROGRAMS SUMMARIZED AS TO RESPONSIBILITY: COSTS, FINANCING, AND NEEDED LEGISLATION

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INTRODUCTION

During the last century, the forests of the United States have supported industries whose products were valued at close to \$100,000,000,000. Forest products have been indispensable in the development of our mines and the construction and operation of our railroads and shipping. They have contributed many billions toward maintaining a favorable balance of international trade. They have housed a large part of the Nation. Forest industries have afforded a livelihood to millions of individuals and have sustained many thousands of communities. Streams from forest-covered watersheds have given value to millions of acres of irrigated farms and to numerous hydroelectric plants. They have supplied the water for drinking, for sanitation, and for fire protection, without which most of our cities and villages could not exist. In short, our natural forest

resources have contributed very largely to our national development and national prosperity.

Nevertheless, we have never taken adequate steps to insure that these resources will be perpetuated. Forest destruction has proceeded almost without restriction. It is still going on. Our forest capital is already so depleted that it seems impossible to continue production at the rate of recent years. Scores of millions of acres that once produced good timber lie idle and nonproductive. Numerous regions, although they have large areas of idle but potentially productive forest land, are dependent upon distant regions for much of the timber that they use. The destruction of forest cover has caused incalculable losses through erosion and silting, and has necessitated the expenditure of hundreds of millions of dollars for dredging channels, constructing levees, and repairing flood damages.

If we are content to do without forests in the future, or to let them degenerate into relatively worthless scrub such as already covers much of the cut-over land, they will leave a void in our national economic structure which it will be impossible to fill. On the other hand, by restoring and maintaining these resources, we can insure that they will contribute largely in the future, as in the past, to the material and spiritual welfare of the Nation.

To do this is one of the major problems before the American people. There is no evidence nor any reason to suppose that it will be done through individual private initiative alone. There is abundant reason to believe that private initiative cannot and will not solve the problem. Only coordinated effort on a national scale, with the backing and leadership of Government, can adequately meet the issue.

Such a plan is here proposed. Compared with programs that have been suggested in the past, it will require large public expenditures. Forest destruction has gone so far that it is too late for hit-or-miss, half-way measures. Such measures would cost far more in the long run, and would accomplish far less, than a broadly conceived plan which coordinates all efforts and which provides for action on a scale commensurate with the magnitude of the task.

Although large expenditures will be required, it should be recognized that a large part represents a nonrecurring capital investment, which will steadily increase in value. The remainder of the costs should be balanced at a relatively early date by direct money income from the forests or through elimination of expenditures which would be necessary if forest destruction should continue. The capital expenditures also can eventually be liquidated through direct and indirect income from the forests. Forest land, no more than farm land or a factory site, cannot be kept productive without adequate investment of capital. The timber capital which was already present in the virgin forests has largely been liquidated or destroyed. If the American people want to have the benefits of forests in the future, they will have to replace a reasonable amount of this capital.

Comparable or, in some instances, much larger public expenditures have been made or are contemplated for other projects. Examples are the reclamation program, the Colorado River development (Hoover Dam), the Panama Canal, the St. Lawrence development, Mississippi flood control, inland and coastal waterways, and subsidies to shipping. Some of these are of much more limited scope and far less national significance than a forestry program. The success of

some of them, such as the Mississippi project, will depend to a considerable degree upon the conservation of the forests.

Now is a particularly opportune time for undertaking the forestry program that is outlined. It may even be desirable in the immediate future to go farther than the plan proposes along such lines as construction of improvements and betterment of forest stands. This would give opportunity for a large amount of employment, widely diffused over the country. It would increase consuming power without immediately increasing the output of consumable goods, and would thus help to dispose of existing surpluses. Suitable forest land can be acquired much more easily now than would have been possible in the past, or than may be possible later. Costs of land, materials, and labor are relatively low. As a large part of the expenditures will represent long-time capital investment, and as the major benefits of the program will be realized many years in the future, it would seem that a considerable portion of the cost could appropriately be financed through long-term bonds.

It is important that the program be adopted without delay and carried to a conclusion as rapidly as possible. Nothing is to be gained by procrastination. On the contrary, postponement will mean further forest destruction and consequently will only add to the difficulty of the task and increase the costs. Prompt action will save large areas of forest from destruction, and thus will render unnecessary the costly rehabilitation of these areas. The earlier the work is commenced, the sooner can current losses be stopped, the sooner will returns be received, and the sooner will our forest lands play their proper part in contributing toward the material welfare and the health and happiness of the American people.

THE RESPONSIBILITY FOR FORESTRY

NATIONAL LAND-USE POLICIES AND THEIR RELATION TO FOREST DEPLETION

The depletion of America's forest resources, discussed in previous sections of this report, may be largely attributed to the national conception of the rights of the private citizen and to the policies set up to protect those rights even at the expense of public welfare. That such a situation has developed is readily understandable when we consider the traditional heritage of the Nation.

For 3 centuries America has been regarded as a land of freedom and opportunity. To the New World came millions of settlers who sought to free themselves from political or religious persecution, or from the restraint imposed by economic and social conditions in the Old World. America was the land of golden opportunity for those who had the initiative and the strength to take what they wanted. Rugged individualism was the common characteristic of the men who settled this country. This background explains how the ideals of freedom and unrestricted rights of citizenship became embodied in the American philosophy of government and in American laws and policies.

The country's vastness of area and wealth of resources contributed to similar ideals and policies in trade, business, and industry. The American frontier was extended steadily westward; the early explorers were followed by fur traders and trappers, and these in turn by

pioneers seeking fertile virgin lands to clear and cultivate. The development of communities provided opportunities for trade and business. The discovery of mineral wealth and the need for drawing upon new timber resources as those of the settled East became depleted, resulted in the extension of these industries, and, with them, of necessary transportation systems.

This entire movement and development, if the resulting exploitation may properly be called development, has been characterized by a national policy of bestowing extremely liberal property rights on those who appropriated lands and land resources. Since 1785, Congress has donated over 200 million acres of the public domain to the States, and approximately 94 million acres to the railroads, to enable them to raise funds for their development. Little limitation was imposed upon the disposal of these lands, which were for the most part sold indiscriminately to individuals who proceeded to reap a rich harvest. At the same time the Government has given or sold vast areas of mineral, forest, and farm lands to private owners, until approximately nine tenths of the 1,441 million acres of original public domain have been disposed of. Any thought of responsibility for the future, any disposition to conserve a part of these resources was largely submerged by the policies of an enthusiastic young Nation in the process of growing up.

These policies and methods of encouraging settlement and development of new areas and of stimulating the conversion of apparently inexhaustible resources are not matters for unqualified condemnation. They have been justified, in part at least, by results. Never before in history has a nation grown so rapidly in size, in wealth, and in power. It might even be asserted with some justice that the United States of today owes its position in world affairs largely to the result of these same policies. Yet to those who look beyond the present and plan for the future, it is disturbing to note that much of our present wealth is tied up in costly superstructures dependent upon basic resources that have been extensively sacrificed for their development. We have built large cities, powerful institutions, enormous industries, extensive systems of transportation. Our expansion in agriculture has been tremendous. American standards of living are high. But for this we have paid with the exploitation of a large part of our forest and land resources, and in so doing we have definitely mortgaged our national future.

The story of forest and wild-life depletion, extensive land devastation, uncontrolled streams and wasted water resources, eroded and abandoned farm lands, declining forest industries, decadent communities, alarming tax delinquency with virtual bankruptcy of local government in many regions, has all been told in previous sections of this report. It is, of course, obvious that this situation cannot continue if the Nation is to thrive. It is equally obvious that most of these serious ills have been caused directly by the national policy of allowing the private owner of land to exploit its resources at will for his own immediate gain, with few restrictions in the interests of public welfare. Our American assumption has always been that private initiative, through self-interest, would find ways of keeping land productive. We now discover that this same self-interest, together with lack of concern for the public or the future, has caused the ruin of land by the millions of acres. Many owners have dis-

avowed any further responsibility by abandoning their lands to the public as a liability. The Nation is faced with a situation that demands realization and acceptance of responsibility for remedial action.

A NEW ERA BEGINS

While America was still in the expansion stage of development, with abundant resources at every hand, the dangers into which its land policies were leading were obscured by national optimism. We were a free people, with plenty for all. It was easier, and apparently better economy, to cultivate new soils after the fertility of the used areas became exhausted than to maintain soil productivity by more conservative and somewhat costly methods of cultivation. Apparently there was no need to worry about a second crop of timber from cut-over lands, with a cheap and presumably inexhaustible supply of virgin timber at hand. The extensive measures of expansion had nothing in common with the intensive measures of conservation.

Gradually, toward the end of the nineteenth century, a perception of the inevitable outcome of these policies began to develop. In some regions the depletion or exhaustion of resources caused certain individuals to think of the future, and the idea of conservation was born. With the twentieth-century development of transportation and communication, world trade as well as increased local consumption of products speeded up the processes of exploitation, and at the same time better opportunities were provided for observing and appreciating the extent to which these processes had been carried. As a result the demand for conservation became stronger and constructive action began. The creation of national forests, by withdrawals from the public domain, and the establishment of Federal and State forestry organizations were among the first steps taken. Other conservation agencies came into being and gradually extended their influence. However, the progress made by the pioneer foresters was accomplished against difficult odds, and despite public indifference or even antipathy.

Experiences of the World War period and the years immediately following emphasized the national importance of basic resources, and the necessity for conserving and restoring them. As a result forestry programs were strengthened, although during the years of inflated prosperity which followed the war the average citizen was too much engrossed with making and spending money to give much attention to public-welfare enterprises such as conservation. The progress that was made can be credited chiefly to organized minorities of conservationists.

Within our Nation, astonishing contrasts of organization and disorganization have always existed; splendid technical proficiency in some incredible skyscraper is found side by side with distressing backwardness in some equally incredible city slum, a marvelous bridge spans a river of uncontrolled waters, and a modern concrete highway leads through the desolate ruins of a once-productive forest. That such contrasts exist is evidence of the precarious status of our national development.

In 1929 came the depression. Faced with its serious consequences, we have started with characteristic energy to determine the social

and economic facts contributing to the situation, and the possibilities for remedial action. The depression has emphasized the necessity for a national inventory of resources such as that of the forest resources which is under way, and the need for a change of policy in their management. This report is a contribution toward facing the facts of the forest situation in this country and its relation to land use and other problems.

THE ACCEPTANCE OF RESPONSIBILITY

In the previous sections of this report the discussions of forest devastation, land deterioration, and related problems have clearly pointed out the failure of individuals or agencies, until comparatively recently and with few exceptions even yet, to assume responsibility for stopping harmful forest practices, or for establishing conservative forestry measures. The inadequacy and ineffectiveness of most of the restorative projects now under way have also been emphasized, together with definite recommendations for new or extended measures considered essential to the solution of these problems. In view of the past policies regarding forest and land use, the exaggerated conceptions of the property rights of the individual, and the general lack of concern over problems of public welfare, it becomes highly desirable to define the responsibility for the measures needed.

Responsibility is the state of being accountable, as for a trust or obligation. It implies dependability. Obviously fulfillment of responsibility cannot exist until one has accepted his obligation. Acceptance may consist of actual agreement, or it may be implied and enforced by legislation. A certain degree of responsibility may be enforced by public opinion, morally if not legally. Responsibility must always be accompanied by authority since one cannot be held accountable for circumstances over which he has no control. When responsibility is assumed, there must be at least reasonable expectation of accomplishment: no one can assume responsibility for the impossible. Recognition of these underlying principles of acceptance, authority, and expectation of fulfillment is necessary to an understanding of the responsibilities of various agencies, public and private, in the national forestry program.

Responsibility, and the authority it carries, may be shifted with changing conditions. In the old horse-and-wagon days, traffic conditions required little or no regulation. Responsibility rested almost entirely upon the drivers of the vehicles. But with the advent of the automobile and the complicated problems of modern traffic, it became necessary from the standpoint of public welfare to enact legislation regulating highway use. The public thereby assumed the responsibility for controlling traffic to the greatest extent legally possible; it could not, however, assume the obligation of preventing all accidents, because of the human factor of carelessness beyond its control. Therefore the responsibility of the individual was also increased, in the assumed compliance with the regulations set up. This is but one of many examples that might be cited to show how new conditions have developed the need for new policies. In many instances the individual must waive his former unrestricted rights for the public good, and at the same time his own responsibilities may increase.

In the management and protection of forests and forest lands, changing conditions have brought new responsibilities. Economic changes involve shifts in responsibility. Growing realization of conditions not formerly recognized in their true significance necessitates entirely new emphasis on responsibilities hitherto unassumed. For many of the recommendations made in this report legal authority definitely fixing responsibility already exists; in other instances we must depend upon the moral force of awakened public opinion in lieu of legislation, or until legislation is enacted.

THE DIVISION OF RESPONSIBILITY

THE PRIVATE CITIZEN

The responsibility of the private citizen in regard to forestry is in part included in those more or less intangible obligations inherent in good citizenship. A good citizen is one who concerns himself with the affairs of his community, his State, and his Nation, and who works in the interest of their permanent stability and well-being. With the complications of modern civilization he cannot give personal attention to all these affairs, so he joins with his fellow citizens in electing competent men to represent him in government. What he and his neighbors think about various matters constitutes public opinion, which dictates the policies of government. In the last analysis, the private citizen is responsible for the control of the country, and the manner in which its resources are managed. If he neglects to take an intelligent personal interest in affairs of outstanding importance, or if he fails to choose able representatives, he cannot expect good government. The extent to which conservation policies are followed in the management of the Nation's forest resources depends directly upon public opinion.

THE PRIVATE LANDOWNER

The forest owner has the responsibility of good citizenship as well as the obligations which accompany ownership. The owner is actually a custodian of the land; to him his ownership may seem permanent, but after all it lasts only for a very brief period of time as reckoned in the life of the Nation. During his custodianship he has no moral right to destroy the land's permanent productivity; future generations must depend upon it for a livelihood, and the prosperity of the Nation is based upon the perpetuation of its resources.

Ownership is an important factor in the determination of responsibility for forestry, because ownership carries with it certain definite obligations, usually involves at least partial acceptance of responsibility through self-interest, and provides some degree of authority for control. Responsibility for forestry measures by no means rests upon ownership alone, however, especially under the present conditions of maladjustment due to past land policies. In many instances the owner lacks the authority to perform certain acts necessary to safeguard and develop his property. He may lack any incentive to do so, and there may exist neither legislative authority compelling him to accept legal responsibility, nor public opinion compelling him to accept moral responsibility. Or, if he has the incentive, he may lack the financial means to assume obligations with any expectancy of accomplishment. Furthermore, the owner may be entirely unable to benefit from certain values that his property holds for others, or

for the public in general, in which case the other beneficiaries may reasonably be expected to share the responsibilities, or perhaps to relieve him altogether of some of them. This situation is frequently encountered in the case of private forests having great importance for watershed protection. Regardless of extenuating circumstances, however, ownership of forest land carries with it definite obligations for productive use.

THE PUBLIC

When private owners of forest land cannot accept, or can successfully evade, the responsibility for certain measures essential to public welfare, it is self-evident that the public must assume it. Public responsibility is governed by the same principles and subject to the same limitations that control the acceptance of responsibility by private owners. Although decentralization of government and dependence as far as possible upon local self-government is a well-established American policy, in many instances local government has neither the authority, the incentive, nor the means to assume new obligations. In spite of tradition, changing economic trends are compelling us to form new conceptions of the organization and functions of local government. In instances where responsibility for essential forestry measures cannot be assumed locally, it must of necessity be passed on to larger governmental units. Thus responsibility for certain measures is taken over by the States, or, when circumstances prevent their functioning, by the Federal Government. Ample justification for this sharing of responsibility is found in the fact that these measures are essential to public welfare and national prosperity. Critical conditions demand the utmost participation by every agency capable of contributing aid.

There are two ways in which responsibility may be fulfilled, both of which are recognized and well established by precedent in most important enterprises of national scope. In some instances a certain agency—the private owner, or the local, State, or Federal government, as the case may be—assumes complete responsibility for certain activities which it alone is best able to carry out. Examples are the Postal Service of the Federal Government, and the police and fire protection of municipalities. In other instances, where the interests of many agencies are involved, cooperative sharing of responsibility may best be accomplished through assumption of authority by a single agency, with financial or other support from all interested parties. Precedent for this is found in the cooperative financing of highway construction, to which local, State, and Federal Government contribute, more or less in proportion to the extent of the local or general public interests involved.

Both these modes of sharing responsibility are embodied in the forestry programs now being carried on in this country, the expansion of which is proposed in this report.

THE PRIVATE OWNER'S PART

RESPONSIBILITIES

About 80 percent of the commercial forest land and 59 percent of the saw timber is now in private hands. Of the private land 32 percent, and of the stumpage 12½ percent is owned by farmers, the remainder is chiefly in industrial ownership.

For many years the Federal and many State governments have tried to make it possible for private owners to retain their forest lands and to keep them in productive condition. The public has extended financial and other aid in many forms and in fairly large amounts to the private forest landowner. It has refrained from asserting in any sweeping manner, its presumable legal power to regulate the use of private property so as to prevent injury to the public interest. It has assisted both by what has and has not been done, and has generally left the private owner a free hand in the management of his property.

This program has failed to halt destructive treatment of private forest lands. Whatever the reasons for continuing depletion, both the public interest in productive lands, and the private interest in the perpetuation of natural resources as a source for private business have suffered markedly. The program has even failed to keep all forest land in private ownership, as the continuing abandonment through tax delinquency testifies. This report estimates that perhaps 162 million acres of private commercial forest land will eventually be transferred out of private and into public ownership, much of it because it has deteriorated to the point of lack of opportunity in timber growing.

This report proposes that public agencies continue aid to private forest landowners on an increased scale. It proposes that the lands unattractive to private ownership be acquired and managed as public forests. It proposes no immediate country-wide attempt to regulate the use of private forest land. It proposes the extension of Federal credit at low interest as a means to stabilize individual forest business. It proposes to take over the overloads of private stumpage which are forcing overrapid liquidation and cut-throat competition. Back of all these and other proposals, is frank recognition of the fact that forestry on private lands must have a chance to yield profits comparable to those to be made on other classes of investments involving similar risks.

The report proposes, in short, to leave to private ownership some of the best of the opportunities to practice industrial forestry, unencumbered by regulatory costs or by poor or depreciated forest lands. The report proposes that the public interest in all but a part of the better private lands be protected through public ownership, with complete assumption of costs.

These proposals aim to get at the real basis of many of the immediate ills of the forest-products industries, and to leave to private ownership the opportunity to perpetuate itself and redeem the public interest through:

- (1) Rational treatment of forest land.
- (2) Planned and orderly utilization of forest products.

The report thus assumes that as public action leaves to private ownership a genuine industrial opportunity, intelligent self-interest will lead to acceptance of it. A transition period will necessarily be required for final stabilization of ownership everywhere. But when the suggested realignment of ownership is completed, private ownership is counted on to produce 50 percent of the timber required to balance the national timber budget.

The program for private owners assumes that approximately 261 million acres of commercial forest lands and 32 million acres of

abandoned agricultural lands will be owned and managed by the public; and 234 million acres of commercial forest lands and 23 million acres of abandoned agricultural lands by private owners.

ACTION REQUIRED

In the assumption of responsibilities, the owner of private forest lands must follow certain essential lines of action:

(a) He should concentrate his holdings on a productive acreage. The use of marginal lands invites failure; the use of submarginal land assures it.

(b) He should use all of his land, but must not abuse it.

(c) He must protect his forest property from fire and the ravages of insects and disease. This is largely his responsibility, although the public, because among other things of its stake in his enterprise, will carry a part of the cost. He is expected to carry 25 percent of the total cost of adequate fire protection, except as States finance the non-Federal share; building up to an eventual annual total private expenditure of \$5,000,000.

(d) He must reduce to the minimum the avoidable waste of his resource in harvesting the cut and in the primary manufacture of the products.

(e) He must build up and maintain a sufficient growing stock on his property and must so regulate his harvesting as to remove the accumulated growth with no depletion of his forest capital. Any other line of action will lead inevitably through impoverishment to eventual devastation. The acceptance by all owners of this responsibility would include planting 5,755,000 acres in the next 20 years, and would add to the intensively managed forest area at the rate of 1,500,000 acres a year.

(f) He must carry on such local or special research as may be required to develop his property and its business most profitably.

(g) He must, through organized effort in the form of trade associations or otherwise, develop markets for his products, perfect methods of distribution, and extend and strengthen his financial structure and credit facilities.

Private owners of forest land are numbered in the millions, are distributed throughout all forest regions, are highly individualistic in thought and action and their problems of forest technique, of utilization, of marketing, and of financing are many, varied, and complex. In general, private forest owners do not today play their part in the national effort as organized groups. It must be expected that great differences in responsiveness to such a program will be found as between individuals and regions.

To carry out acceptably their part in the national program, it is highly desirable that private owners develop greater industrial solidarity, and organize for greater strength both within and for the group as a whole. The growers of wood today are as highly individualized as any industry in the country and have suffered greatly in consequence. Their customers, their competitors, their financiers, and their distributors are, in the main, well organized to protect and advance their own interests. United action will be necessary to provide for extension of uses, in markets and in facilities. Adequate protection from fire will require cooperative effort. The American

industry that operates like a confused scattering of feudal barons, each man for himself, is fighting against tremendous odds.

COSTS AND RETURNS

It is estimated, to bring the Nation's forest production power up where it can satisfy the 16½ billion cubic feet of possible normal requirements, that 40 million acres of privately owned forests must be put under intensive management and 150 million acres under extensive management. The cost of handling forests under intensive measures of protection, timber culture, and regulation, including taxes but not interest on investment, will vary from as little as 37 cents per acre per annum in the southern pine region to as much as \$1.13 per acre annually in the Northeast. Extensive management will cost less.

The possible gross returns from intensive management, including timber commodities only, will range from \$1 per acre per annum in the southern Rocky Mountain forests to as high as \$3 per acre per annum in the South. The returns from extensive forest management may vary from about 37 cents per acre per annum in the southern Rocky Mountain region to \$1.20 in the South.

When the program is completed to the extent that 40 million acres of privately owned forests are under intensive management and 150 million acres are being given extensive management, the gross value on a stumpage basis of the production may approximate \$440,000,000 per annum, for timber products alone. The cost of taxes and cultural and protective operations is not likely to exceed \$100,000,000 annually, thus leaving private owners \$340,000,000 annually as a margin for interest on their investments.

FINANCING THE PRIVATE OWNER

If and when the program has been developed to the point shown above there will be no question as to the ability of the private forest owner to finance his operations. It is during this period of development that the subject of financing needs examination.

So far as the industrial forest operator is concerned, the enterprise is and will continue to be a strictly business one, subject to well established laws of accounting and financing. The farm woodlot owner will manage his forest in conjunction with his agricultural operations wherein the woodlot becomes one of several diversified crops. With him the question of financing is more than likely to be absorbed in the larger field of agricultural finance.

In the section "Federal Aid in Organizing Forest Credit Facilities," it is brought out that the present probable total borrowed capital in forest industries approaches \$1,000,000,000 but that this borrowing has been for manufacturing purposes rather than for care and perpetuation of forest productivity, and that the latter purpose is not adequately provided for in the present scheme of things. The problem ahead for industrial forest owners is to gain access to sufficient capital at interest rates and at terms suitable for their purposes. Capital will be needed for the measures designed to improve the productivity of original forest units, including timber cultural and stand reinforcement operations; to assist in the orderly marketing of timber already mature; to allow the purchase and assembly of tracts for organized forestry units; to construct necessary transportation facilities; and to construct required manufacturing plants.

It is difficult to gauge just how much borrowed capital will be needed, but it is certain that the amount will be so large and the requirements as to favorable terms and rates so out of the ordinary as to raise serious doubts as to the possibility of obtaining it from the usual sources of commercial credit. The development of the business of growing continuous crops of timber expected under such a program as is set out here will in time create sources of borrowed money at favorable terms, but until such a basis is established it appears that Federal aid in organizing forest credit facilities will be necessary. The section referred to suggests a thorough study of a plan to meet this need by the establishment of organized institutions to provide forest credit under the Farm Loan Board.

With the various forms of public aid proposed, and with acceptance of the genuine opportunities on the better private land, private owners should be able to carry the timber growing program that is left to them.

THE PART OF QUASI-PUBLIC INSTITUTIONS IN FORESTRY

Occupying a position in the field of forestry which may not properly be classified as either private or public are a number of agencies represented in part by the privately endowed universities and scientific institutions engaged, usually as only a part of their activities, in forestry education or research in forestry and related subjects. These institutions, although independent of governmental control and of legislative financial support, have certain public aspects which distinguish them from private endeavor in the usual conception of the term. They are more public than private in the sense that they are not operated for profit and that the services which they render are directed at the advancement of the public welfare and are generally available to everyone. Such institutions are in a position to render a distinctive service in the national forestry program, especially in working for the solution of basic technical and economic problems in which action should be unhampered by pressure for either profit or immediate results. The forest research activities of the principal educational and research institutions which come under this heading have been discussed in the section "Privately Supported and Quasi-Public Forest Research."

The principal responsibility of the forest schools and other departments of colleges and universities referred to in this section is, of course, education—first, the professional training of men to carry on the national forestry program and second, general education related to forestry which will broaden public understanding and appreciation of the significance of forestry in the national economy. These educational institutions have a further responsibility which is inherent in their opportunity to assist in the molding of public sentiment toward forestry and in the framing of public forest policies. In this as well as in their strictly educational functions, these agencies can make a very substantial contribution through the development and management of demonstration forests, such as those maintained by Harvard, Yale, and Duke Universities. Because of their neutral position, free from the profit motive on the one hand and from political incentives on the other, these endowed educational institutions

may well continue to assume aggressive leadership in suggesting and working for desirable State and National legislation dealing with forestry.

Finally, these institutions have an important responsibility and opportunity for service in the field of forest research. In this field the forest schools and universities are joined by the independent endowed research institutions and arboreta, such as the Carnegie Institute of Washington, the Boyce Thompson Institute for Plant Research, Inc., the Mellon Institute of Industrial Research, Institute of Forest Genetics, the Arnold Arboretum, the Missouri Botanical Gardens, the New York Botanical Gardens, etc. All these agencies are in an especially advantageous position because they are free to undertake the study of any phase of technical forestry or the basic sciences which underlie it. Their efforts may well be directed at fundamental problems of tree growth, tree breeding, or basic economic problems which for one reason or another may be neglected in the programs of other agencies.

In the national programs the activities of institutions of this sort should be given every possible encouragement. Their work might well be supplemented by a separate institute endowed specifically for forest research as suggested in the section "A Program for Forest Research." No specific financial program can be set up for these institutions, beyond an estimate that the establishment of the proposed forest research institute might require an annual income of \$1,000,000.

Aside from the educational and research institutions a forest credit agency such as that suggested in the section "Federal Aid in Organizing Forest Credit Facilities," if established, would constitute a quasi-public institution which might play an important part in stimulating private forest management on a large scale. Although it is contemplated that it is a Federal responsibility to organize and provide the initial capital, it is believed that such an agency, once started, should function as an independent self-supporting institution operating under a broad legislative charter but not under direct political control in any way. No specific financial program for such an institution is suggested as the scope and characteristics of the undertaking should first be given additional study.

In the category of quasi-public institutions are also the forestry and conservation associations which have had such a large part in the formulation of public opinion, in the passage of desirable legislation, and in defeating undesirable legislation. The opportunity for the representation of groups of public-spirited citizens in constructive action will be as great in the future as it has been in the past.

THE PART OF THE STATE AND LOCAL GOVERNMENTS

It is undesirable to attempt, in this report, to propose a definite forestry program for each individual State, since that is properly the function and privilege of State authorities. In order to develop a coordinated program for the Federal, State, and private agencies, however, it is necessary to estimate the combined responsibilities of all State and local governments.

It is difficult and perhaps unnecessary to distinguish sharply between the efforts of State government and those of local government.

Both have certain responsibilities, arising from local public needs. It is assumed that local government should accept its obligations to the full extent of its legal authority and financial ability, but that usually a large degree of responsibility for the local forestry program will rest upon State government. Unless specifically explained otherwise, therefore, the term "State" as used here will refer to the combined public agencies within the State.

RESPONSIBILITY OF THE STATE

The forestry responsibility of the State is divided into three major fields:

(1) State-aid activities to promote and encourage private forestry; (2) research in forestry and related problems; (3) acquisition and administration of forest lands.

State-aid activities consist of participation in the protection of privately owned forests; production and distribution of trees for forest planting; projects of forestry extension and education; enactment and enforcement of legislation; and general advisory services.

State research in forestry and related problems includes coordinated investigations calculated to supply much of the information needed as a basis for local forestry measures. Research contributes to State-aid activities as well as to State forest management.

When a State adopts a program of forest ownership it assumes financial responsibility for forest-land acquisition and administration, and responsibility for permanently managing its lands in the best interests of the public. Such management includes intensive silvicultural practice for sustained timber production; protection against forest fire and other injury; reforestation, where necessary; and satisfactory measures to safeguard watershed, wild-life, recreational, and other forest values.

In setting up the State forestry program which follows, allowance has been made for the greatest expansion of private forestry that can reasonably be expected. Due consideration has been given to the economic requirements and limitations of the local forest situation, and to State ability to accept further financial or other obligations. Federal participation has been assumed to the extent that the private and State programs leave forestry obligations unprovided for. Therefore this program outlines the greatest participation that can be expected from the States, and at the same time the least responsibility that can be considered their share.

This section summarizes conclusions stated in greater detail in the program sections of the report.

THE STATE FORESTRY PROGRAM

THE ORGANIZATION NECESSARY

In 42 States legal provision has been made for forestry activities of one kind or another, yet in relatively few has progress been commensurate with the forestry problems. Failure in achievement has been caused either by inadequate funds, insufficient authority, unstable policy or organization, or political restrictions or by a combination of these circumstances, all of which reflect lack of intelligent interest on the part of the public.

To meet its responsibilities, a State forestry organization must have permanence, stability, authority, and freedom from political interference. Its policy must be sound and comprehensive; its financial support must be adequate and sustained. Its staff must be composed largely of technically trained men of high ability and sincerity of purpose. Lacking any of these essentials, it will inevitably fail to achieve the objectives for which it should strive.

Some few States now approach these requirements for forestry organization, and are making satisfactory progress consistent with their past conception of their problems; but if they accept the responsibilities of the forestry program now conceived to be necessary, they will have to increase their efforts very considerably. Other States fall far short of meeting the desired standards of forestry organization, in many particulars. The only remedy lies in further legislation, sponsored by awakened public opinion. No State can hope to fulfill its forestry responsibilities without a strong organization.

THE PROGRAM FOR STATE AID IN FORESTRY

The program for State aid in forestry differs in the various States, just as forest problems vary in importance between regions. However, uniformity of attack by the individual States has been greatly increased through Federal cooperation in State-aid activities. The magnitude of the forest problem necessitates a very considerable expansion of the State-aid program.

PROTECTION OF FORESTS FROM FIRE

State responsibility for protection of forests from fire is generally recognized, yet the States are providing organized protection for only 227.6 million acres, or 54 percent, of the 420 million acres of State and private forest lands estimated to require it. It is estimated that the annual cost of adequate fire protection for State and private forest lands will ultimately amount to \$20,000,000. State fire-protection activities should be expanded in the immediate future, with financial aid from the Federal Government and in cooperation with private landowners, to cover the entire area of State and private forest lands requiring organized fire protection. For this reason early increases are programmed in State fire-protection expenditures, including needed capital investments.

This (10-year) program contemplates an increase in State funds for fire protection to \$6,342,000 by 1944, with annual appropriations averaging \$4,391,000 for the 5 years 1935-39 and \$5,762,000 for the five years 1940-44. In 1932 all State expenditures for fire protection amounted to only about \$3,565,000.

PROTECTION OF FOREST FROM INSECTS AND DISEASES

The States should take a leading part in the control of injurious forest insects and forest diseases, through cooperation with Federal agencies in detecting infestations and epidemics, in inspecting nurseries, and in enforcing necessary quarantines and other regulations.

During 1932, approximately \$1,320,000 was expended by the States in forest-insect control. It is predicted that some increase in that sum may be necessary within the next 5 years; unless extreme emergencies occur, however, it is not anticipated that the total State contribution needed in any one year will be in excess of \$1,500,000.

During 1932 State and local governments spent approximately \$246,000 in the control of forest diseases, the major expenditures being for control of the white pine blister rust, which attacks all the 5-needled pines. In order to cope fully with the disease problems that now exist, it is estimated that State appropriations should be increased to \$695,000 by 1939. Undue delay in the application of disease-control measures may result in severe losses of valuable timber.

PRODUCTION OF PLANTING STOCK

The production of nursery stock for private tree planters is an important State-aid project. In the program of forest planting presented in this report it is recommended that at least 5.7 million acres of privately owned lands be planted with forest trees within the next 20 years, at the rate of 285,000 acres per year. This represents practically twice the present rate of planting by private and public effort combined.

The planting of 285,000 acres annually, at the rate of 1,000 trees per acre, requires an average annual State nursery production of 285 million trees. It is estimated that for the first 10 years the total cost of producing the nursery stock required will amount to \$1,100,000 annually. With the purchase of trees by private planters at half the cost of production, and with a Federal-aid contribution of 25 percent of the expense, the net expenditure by the States during the first 10 years would amount to \$275,000 annually. A considerable additional State nursery production would be required to grow the trees needed for planting State forest lands. Since the development of adequate planting stock is essential to carrying out the proposed planting program, planting-stock production should be greatly expanded in the immediate future.

FORESTRY EXTENSION

The dissemination of forestry information to forest-land owners and to the general public is one of the most effective means of bringing desirable forestry practices into application upon the widely scattered private forest-land holdings, and is a highly important cooperative project of Federal and State government. The contribution of the States to forestry extension is notoriously inadequate as compared with other forms of State aid; in 1932 the expenditures of all the States for this purpose totaled \$108,000. The forestry extension services of the States are for the most part limited to farm forestry. Together with the need for greater forestry extension service for farmers, there exists a great need for more extension among other classes of forest owners. It is estimated that State funds available for these activities should be increased to not less than \$400,000 a year.

FORESTRY EDUCATION

The States have assumed the major responsibility for forestry education. Nineteen State universities and colleges are now conferring degrees in forestry, and many others are giving limited forestry training to agricultural and other students. It is estimated that approximately \$967,000 is now expended annually by the States for forestry education. Some institutions give comprehensive profes-

sional forestry training, while others lack sufficient personnel and facilities to do this. The general need is for better rather than more professional forest schools. All institutions of agricultural education should provide at least general and elementary courses in forestry, especially for students training to become teachers or extension leaders in agriculture.

The recent forestry education inquiry conducted under the auspices of the Society of American Foresters led to the conclusion that the minimum annual budget of a satisfactory forest school is between \$35,000 and \$45,000. It is estimated, therefore, that an annual expenditure of at least \$1,200,000 by State educational institutions will be needed to bring about the increased and improved forestry instruction here proposed.

FOREST RESEARCH

The greatly enlarged program of direct State forest-land management and administration and of State aid to private forest-land owners which this report recommends calls for a very great expansion of State forest research. This expansion should be effected in the immediate future.

The field of State research in forestry includes local problems of forest establishment, regeneration, protection, management, and utilization, and also some of the more fundamental problems affecting forest-land resources. Studies may be conducted independently or in cooperation with Federal agencies. There is special need for State research to obtain more accurate information concerning forest resources and forest-land use, and for State studies of forest taxation.

At the present time the States are not conducting forest research on a scale at all comparable with that of the Federal Government; in 1932, State agencies expended altogether approximately \$429,000 for research in forestry and related activities. This includes the expenditures of the State forestry departments, the State forest schools and agricultural experiment stations, and local public agencies. Within the next 10 years the funds provided for forest research by these agencies should be increased to at least \$2,500,000 a year.

PROGRAM FOR STATE OWNED FORESTS

PRESENT AREA AND ADMINISTRATION

Some 16 million acres of forest lands are owned or being acquired by State and local government at the present time (1932). This area includes 405 State forest units under administration in 30 States, with a total area of 4,395,549 acres, and 2,231,636 acres in the process of acquisition as State forests. It includes 2,682,509 acres of State parks composing 323 units in 28 States, nearly 1,000,000 acres of county and municipal forests, and approximately 6,000,000 acres of State-owned forest lands not under administration. In addition, tax-reverting forest lands for which State or local governments have not yet recognized responsibility are estimated to total from 20 million to 30 million acres in three important forest regions alone. Obviously, one of the first requirements of State forestry is to place these public forest lands under permanent management.

ADMINISTRATIVE PROVISIONS NEEDED

The 6 million acres of State-owned forest lands not under administration are scattered through all parts of the country, but the major areas are located in the West. These consist largely of Federal grants of forest land which the States have not placed under administration, or for which present State policies of administration fail to insure satisfactory permanent forest management. In many instances the unadministered State lands consist of scattered sections which should be blocked together by land exchange, or built up into sizable administrative units by further acquisition. The determination of logical administrative units and the blocking of State-owned forest land, as far as practicable, into such units, is of immediate importance in obtaining effective State-forest management and administration.

In addition to the estimated 20 to 30 million acres of tax-delinquent and abandoned private forest lands already reverting to the public, there is little doubt that involuntary public ownership is pending for a much larger forest area. In some States title to tax-reverted land is vested in the county or local government; in others, in the State itself. In all instances, solution of the forest problem represented by these lands requires a recognition of public ownership responsibility, and legislative authority for placing the lands suitable for public management under permanent administration by the most appropriate public agency. Provision should be made for returning to private ownership those lands better suited to private than to public ownership and administration.

The classification "State-owned forest lands" includes State forests, parks, game refuges and other wild-life areas, county and municipal forests and parks, and institutional forest lands. Many departments of State and local government participate in the administration and cooperate in the management of these lands. Certain of these areas have chiefly local values; others provide widespread benefits. The interest of public efficiency and economy is best served when all efforts connected with administering State-owned forest lands is closely coordinated under the leadership of a State forestry or conservation department.

STATE ACQUISITION OF FOREST LANDS

State forests have been defined as areas specifically set aside or established by legislation contemplating their permanent retention and administration by the State for forest purposes and organized in definite administrative units. Under multiple-use management State forests may provide a variety of local benefits and uses, and at the same time contribute very greatly to the forestry needs of the State and Nation. To meet the requirements of a satisfactory national forestry program, it has been estimated that the States should acquire 90 million acres of land for State forests. Of this total, 70 million acres should be acquired by the States east of the Great Plains, and 20 million acres should be acquired by the Western States. The area proposed for acquisition is approximately nine times the area of the State-owned forest lands now under administration.

A considerable portion of this total area will undoubtedly come into State ownership through tax delinquency, as sizable areas have already done in some regions. The total expense of this State acquisition program is estimated at \$224,000,000 in the East and \$32,000,000

in the West, on the basis of the assumption that the costs per acre will average \$3.23 and \$1.60 in the two regions, respectively.

Approximately 10 million acres of State forest lands are now under administration, and the acquisition program here suggested contemplates a total of 100 million acres at the end of 20 years. An average rate of 5 percent of the total program per year is recommended, as in the case of Federal acquisition, with equal progress in the East and in the West. This would add 4.5 million acres per year to the State forests, at an expense of \$12,800,000 divided among the States participating in the program.

In some instances the present condition of State finances may prevent immediate initiation of an acquisition program of this size; in many States the immediate requirement is legislative authority for permanent public ownership and administration of the millions of acres of abandoned and tax-reverting forest lands, and of the State-owned forest lands not under administration at present. The use of public funds for the constructive development of forest resources is recognized as a productive undertaking that may contribute greatly to unemployment relief during the present emergency.

ADMINISTRATION AND MANAGEMENT OF STATE FORESTS

The purposes, uses, and benefits of public forests, as well as their management, have been thoroughly discussed in other sections of this report. Here it is sufficient to state that the costs of acquiring and administering such forests may be partly balanced, and in some instances exceeded, by the ultimate cash returns from their management, not to mention the great although more or less intangible values that accrue to the public in watershed protection, stream flow and erosion control, wild-life perpetuation, recreation, and community development.

Cost data pertaining specifically to State forests are not available. Experience in administering the national forests has shown that public forests may require a capital investment of \$2 per acre for administrative improvements such as buildings and transportation systems and for cultural measures of silvicultural management and reforestation. An additional charge of about 10 cents per acre per year is required for protection and current management expenses. On this basis, for the 4.5 million acres of State forests to be acquired annually the average capital investment would amount to about \$9,000,000 and the current administration expenses to about \$450,000.

Although much of the land to be acquired for State forests is now tax delinquent, in establishing State forests it is often necessary to provide some financial return to the local tax unit for lands withdrawn permanently from taxation. This is taken care of in part by relieving local government of certain improvement or maintenance costs, as for roads. In some States a fixed sum is paid annually to the local unit in lieu of taxes; in others a certain portion of the annual income from the forest is paid, as is done in the case of the national forests. In many instances an equitable arrangement may consist of a plan combining all these methods.

REFORESTATION ON STATE FORESTS

The reforestation program suggested in this report calls for planting some 13 million acres of State-owned forest land within the next 20 years. This estimate is based chiefly on the proposed State acquisition of lands upon which erosion control and watershed protection are highly important. Planting cannot proceed at a satisfactory rate until the supplies of planting stock annually available are greatly enlarged. This phase of the work should be carried forward rapidly in the immediate future.

To plant 13 million acres in 20 years means annual planting of 650,000 acres. This would require approximately 650 million trees yearly.

It is estimated that the expense of growing the trees and planting them on State forest lands will average \$7.60 per acre. The expense of planting 10 percent of the total area of State forests to be acquired, or approximately 10 million acres, is carried in the \$2 per acre capital investment. To plant the remaining 3 million acres estimated to require planting will necessitate an expenditure of \$1,140,000 annually throughout the 20-year period.

NEEDED LEGISLATION

The development of the State forestry recommended in this program is dependent to a great extent upon legislative action. Specifically, legislation is needed for the following purposes:

1. To provide for the establishment of a strong, efficient forestry organization in each State, with ample provision for permanence, stability of policy, adequate financial support, necessary authority, and freedom from political interference. Where such an organization does not now exist, its establishment is the first essential of the State's forestry program.

2. To provide authority and funds for the proposed State land-acquisition program.

3. To provide authority for permanent State or local ownership of tax-reverted forest and submarginal agricultural lands suitable for State or local management and administration for forestry purposes.

4. To provide authority for consolidation, management, and administration of State-owned forest land, such as grant and tax-reverted land, suitable for these purposes.

5. To provide authority for land exchange to facilitate consolidation and administration of State-owned forest land.

6. To provide the authority and funds necessary for State organization and direction of State-wide forest-fire control, including reasonable safeguards for the legitimate use of fire in the woods and provisions for the punishment of carelessness, neglect, or arson.

7. To provide the authority for organization, the funds, and the regulations necessary for the protection of forests against damage from insects, diseases, acts of trespass, and other injury. In some instances public interest may require the regulation of certain phases of the management of private forest lands.

8. To provide the authority and funds necessary for the expansion of other State-aid functions herein discussed, including forestry extension services and the distribution of forest planting stock to forest-land owners other than farmers, and for the expansion of forest research.

9. To provide for equitable taxation of forest lands as rapidly as sound tax systems can be devised.

10. To authorize the establishment of national forests, where such legislation does not now exist, in States where Federal participation in forest ownership is desirable or necessary to meet the requirements of the national forestry program.

ESTIMATE OF STATE EXPENDITURES REQUIRED

STATE AID AND FOREST RESEARCH

In table 1 is given an estimate of the expenditures by State and local government agencies needed to carry out the State-aid and forest-research programs. For many items the State funds may be supplemented by Federal and private financial contributions under the cooperative arrangements previously described. Approximate expenditures for 1932 are given by way of comparison. Expenditures are given for 5-year periods beginning with the fiscal year 1935, since it is estimated that the immediate program cannot get under way before that year.

TABLE 1.—*State and local government approximate expenditures involved in the State-aid and forest-research programs*

Project	Expenditures in 1932	Average annual expenditures in the 5 years 1935-39	Expenditures in 1940	Average annual expenditures in the 5 years 1940-44	Expenditures in 1945	Average annual expenditures in the 5 years 1945-49	Average annual expenditures in the 5 years 1950-54
	Thousands of dollars	Thousands of dollars	Thousands of dollars	Thousands of dollars	Thousands of dollars	Thousands of dollars	Thousands of dollars
Fire protection.....	3,565	4,391	5,182	5,762	6,342	6,594	7,518
Insect protection ¹	1,320	1,410	1,500				
Disease protection ¹	246	600	695				
Planting-stock production ²		175	200	237	275	300	335
Extension.....	108	250	390	395	400	400	400
Education.....	967	1,034	1,100	1,150	1,200	1,200	1,200
Forest research.....	429	945	1,465	1,980	2,500	2,500	2,500

¹ Expenditures not estimated beyond 5-year period.

² Estimates of expenditure for planting-stock production do not include any expense involved in production on the present basis, since in general the planting stock now distributed from State nurseries is sold by the States at cost. Nursery expense for State forest planting is, of course, not included in this table.

STATE FORESTS

In table 2 is given an estimate of the expense to State and local government agencies under the program of forest acquisition and administration. The table includes the entire program, estimated to be completed in 20 years.

TABLE 2.—*Estimated areas, and State and local government expenditures, involved in 20-year program of State forest acquisition and administration*

	First year	Second year	Third year	Fourth year	Fifth year	Tenth year	Fifteenth year	Twentieth year
Areas, ¹ in millions of acres:								
Acreage to be acquired each year	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Acreage to be acquired by end of year	² 14.5	19.0	23.5	28.0	32.5	55.0	77.5	100.0
Expenditures, in millions of dollars:								
Capital investment for improvements and cultural measures ³	1.80	5.40	7.20	10.80	14.40	18.00	1.00	1.00
Additional capital investment required for planting	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Current expenses for protection and management, at 10 cents per acre	1.45	1.90	2.35	2.80	3.25	5.50	7.75	10.00
Total improvement, cultural, protection, and management expenditures, capital and current	4.39	8.44	10.69	14.74	18.79	24.64	9.89	12.14
Annual expenditures for acquisition ⁴	12.80	12.80	12.80	12.80	12.80	12.80	12.80	12.80
Total expenditures for acquisition at end of each year ⁴	12.80	25.60	38.40	51.20	64.00	128.00	192.00	256.02

¹ The areas covered by the acquisition program total about 90 million acres.

² Includes 10 million acres of State forests now under administration.

³ The program calls for a major capital investment for improvements and cultural measures amounting to \$2 per acre of the total area to be acquired. The portion of this investment to be made annually increases to 10 percent in the seventh year and continues at that level through the thirteenth year. Additional capital investment of \$1,000,000 for these purposes is allowed for annually thereafter.

⁴ Since areas acquired in the first few years may consist largely of tax-reverted lands, the actual expenditures for this period may be less than those shown here.

Expenditures for acquisition have been based upon estimated average costs of \$3.23 per acre for 70 million acres in the East and \$1.60 per acre for 20 million acres in the West, these rates allowing for gifts, for purchase at nominal prices, and for the low cost of acquiring tax-reverted lands.

The estimates of a capital investment of \$2 per acre for improvements and cultural measures and a current expenditure of 10 cents per acre for protection and management were based upon national-forest experience, the necessary data not being available for State forests. It is expected that the major capital investment for administrative improvements and cultural measures will start more slowly than acquisition but will eventually outdistance it as purchase areas are blocked out and will come to an end in the thirteenth year. Through the remainder of the 20-year program the expenditure for these purposes is estimated at \$1,000,000 annually. Since the State program calls for reforestation of 13 million acres and there are 3 million acres of State land, the reforestation of which is not covered by the \$2 per acre capital investment, an additional capital investment of \$1,140,000 annually is required. The capital investment for the 10 million acres of State forests now under administration is assumed to be complete.

SUMMARY OF STATE EXPENDITURES

Table 3 summarizes the estimated average annual expenditures for a 20-year program of State forestry, by current expenses and capital investment separated into four 5-year periods.

The State and local government expenditures here proposed for forestry shrink in significance when it is realized that the total

forestry expenditures proposed for the next 10 years constitute only 5 percent of the sum which the State and local governments spent on their improved-highway programs during a recent past decade. When it is realized that the \$25,000,000 annual forestry expense of the future may ultimately be returned many fold through income from properly managed State forests alone, not to mention less tangible values or the great increase in the productivity of private forests through State aid, the expenditures proposed appear as investments rather than as expenses.

TABLE 3.—*Summary of estimated average annual expenditures by State and local governments involved in 20-year program*

Type of expenditure	First 5-year period 1935-39		Second 5-year period 1940-44		Third 5-year period 1945-49		Fourth 5-year period 1950-54	
	Current expense	Capital investment	Current expense	Capital investment	Current expense	Capital investment	Current expense	Capital investment
	<i>Thousands of dollars</i>	<i>Thousands of dollars</i>	<i>Thousands of dollars</i>	<i>Thousands of dollars</i>	<i>Thousands of dollars</i>	<i>Thousands of dollars</i>	<i>Thousands of dollars</i>	<i>Thousands of dollars</i>
Cooperative State aid.....	7,800	-----	10,000	-----	11,000	-----	12,000	-----
Forest research.....	945	-----	1,980	-----	2,500	-----	2,500	-----
State-forest acquisition.....	-----	12,800	-----	12,800	-----	12,800	-----	12,800
State-forest administration, protection, and management.....	2,350	9,040	4,380	18,420	6,620	12,340	8,870	2,140
Total.....	11,095	21,840	16,360	31,220	20,120	25,140	23,370	14,940

THE PART OF THE FEDERAL GOVERNMENT

THE FEDERAL GOVERNMENT'S RESPONSIBILITY

This report has developed the view that responsibility for maintaining and developing the productivity and values of forest lands is an attribute of all classes of ownership. As an owner of forest land the Federal Government necessarily has this responsibility, which in the main has been accepted.

But, because it is the central Government, it has additional responsibilities not contingent upon ownership. Preservation or restoration of forest-land values is a national necessity in order to maintain and develop the national basic wealth represented by forest lands which gives opportunity for the productive use of capital, and thereby serves as a source of employment for labor. It is a form of national defense.

The Federal responsibilities do not necessarily represent the size of the Federal Government's participation in the job, which is dependent very largely on the ability of the States and private owners of forest land to do the full job that needs to be done. Active Federal participation varies in ratio to the degree that the national interest in forest land values is protected under the ownership of other agencies.

Because of widespread depreciation of public values on private forest lands, and because the States have been unable to halt destructive practices or to restore values on the large accumulated area which is definitely unattractive to private ownership, the active Federal participation must increase if the full job is accomplished.

Criteria which have been used in this report to mark the need for a Federal program of action far greater than previously envisaged, include the following:

1. The serious depletion of usable supplies of timber, and the inadequacy of growing stock needed eventually to balance consumptive needs.

2. The widespread deterioration of watersheds through misuse of the forest cover.

3. The failure to maintain and develop essential recreational and wild-life values of forest lands.

4. The widespread breakdown of private ownership of forest land, and the threat of an accelerating rate of abandonment.

5. The rapid increase in the area of abandoned agricultural land, which, if used productively, must now be put back to the original forested condition.

6. The ineffectiveness of public aid alone to make private forestry feasible, or in many cases, even to keep forest lands in private ownership.

7. The financial inability of most of the States and local units of government to take over the forest management job where private ownership has failed.

8. The apparent barriers of tradition and failure to appreciate public forest-land values, which to some degree hold back effective private forestry even where genuine financial opportunity and ability exist.

The Federal Government has two primary methods through which it can participate in the national forestry enterprise. The first method is one of systematic aid and encouragement to the States and private owners. A primary purpose of such aid in every form is to make it possible for others to own and manage forest lands, and thereby make it unnecessary for the Federal Government to do so. The established forms of Federal aid and assistance, of which this report recommends the continuation and expansion, include:

1. Direct grants of money, as for fire, insect and disease control, extension, and planting stock.

2. Returns of money to the local government, on account of Federal land ownership, such as the 25 percent of national-forest receipts.

3. Expenditure on account of land ownership for such projects as forest highways, which are integral parts of local road systems, and would otherwise be constructed by local government.

4. Carrying on of research programs, the results of which are available to all.

5. Management of Federal lands without cost to local governments, as the national forests and parks.

The second method of participating in the national forestry enterprise is by direct Federal management of Federally owned or controlled forest lands, when this proves necessary to care for the values at stake. This report recommends national expansion in this direction, leaving to private ownership the forest lands on which there is a real chance for profitable business enterprise, and to the States the amount that their financial ability will enable them to own and manage.

Many Federal agencies have a part in carrying out the forestry program of the Federal Government. The following proposed program covers specifically the work of each of these agencies which to-

gether make up the complete Federal program. The program contemplates a period of 20 years of constructive forestry effort. It contemplates the intensification and expansion of resource management. While the major program covers a period of 20 years, some of the more essential betterment measures, involving immediate protection of existing resource values, are scheduled for shorter periods.

BUREAU OF FISHERIES (DEPARTMENT OF COMMERCE)

Fish constitute an important forest resource. Research is essential in solving the many problems of fishery management on forest areas, involving (1) surveys of forested areas to determine water resources, fish populations, and the normal demand made by fishermen upon the natural supply of fish; (2) a determination of the need for additional production and a check on the method of increasing yields, and (3) studies of ecological requirements of fish and improvements in hatchery technique. The estimated cost of fishery investigative work is \$25,000 per year, for the first 5-year period.

An adequate program of fishery management on Federal lands, it is estimated, would require \$75,000 per year for fish cultural operations for the first 5 years. It is estimated that \$150,000 will be needed each year for fish cultural operations and investigations in connection therewith, for a second 5-year period, and that \$75,000 will be needed each year thereafter.

Appropriation of additional funds is needed to carry out these proposed investigative and management measures. Legislation already formulated in a bill (S. 263, 72d Cong., 1st sess.) to promote the conservation of wild life, fish, and game; and a bill (S. 5813, 71st Cong., 2d sess.) to provide for the consideration of wild-life conservation with the construction of public works or improvement projects should be enacted.

THE NATIONAL PARK SERVICE (DEPARTMENT OF THE INTERIOR)

Adequate protection of the forest lands within the national parks and monuments, under the control of the National Park Service, is needed to prevent destruction of great scenic, recreation, and watershed values, and to safeguard adjoining forest areas. This will necessitate: (1) completion of an adequate system of fire protection, and (2) adequate protection of park forests from attacks of insects and disease.

The following estimates of needed expenditures cover only forest-protection measures for park forests. The annual expenditures for fire protection for the period 1927-31 averaged \$95,324. It is estimated that \$482,100 is required in the next 5 years of capital expenditures for additional permanent structures and other improvements needed for fire protection; \$63,200 is needed annually for fire prevention services and maintenance. These requirements will necessitate an annual expenditure for the next 5 years of \$159,620, with a continuing annual expenditure after that period of approximately \$63,200 for current expenses and a capital expenditure allowance of \$10,000 for maintenance and replacements.

Greater disease-control effort than at present is needed; the \$30,000 present (1933) allotment should be increased to \$100,000 at once, and should continue in that amount.

Adequate insect control would involve increases from the present allotment of \$50,000 to \$75,000, which after 5 years might need to be increased to \$150,000 annually.

INDIAN SERVICE (DEPARTMENT OF THE INTERIOR)

The program for adequate administration of Indian reservation forest lands contemplates (1) completion of an adequate system of fire protection, including needed capital expenditures for improvements: (2) better protection of forests from insects and disease; (3) completion of an adequate system of roads and trails for protection, administration, and management of Indian forest lands; and (4) increased funds for a larger personnel, increased supervision, and a more intensive management of all forest work in the Indian Service.

The legislative program for the Indian reservation forest lands should provide (1) for discontinuing the present practice of allotting forest and range lands to individual Indians: (2) for the creation by law of Indian forests on the several reservations having large areas of tribal land; and (3) for increased appropriations for all forestry work.

Estimated annual expenditures for the first 5 years of this program, covering administration and management of Indian forests, are given in table 4.

TABLE 4.—*Estimated expenditures in a 5-year program on Indian reservation forests*

	Current ex- penditures	Capital in- vestment	Total ex- penditures
Fire protection.....	\$250,000	\$200,000	\$450,000
Insects and disease.....	20,000	—	20,000
Forest roads and trails.....	125,000	350,000	475,000
Administration (including grazing).....	300,000	23,000	323,000
Total.....	695,000	573,000	1,268,000

BIOLOGICAL SURVEY (DEPARTMENT OF AGRICULTURE)

In order to carry out adequately the needed experiments and investigations for determining the life histories and habits of forest animals, birds, and wild life, as authorized by the McSweeney-McNary Act, the current appropriation of \$20,000 for the fiscal year 1933, should be increased up to the amounts authorized in the act, reaching a maximum of \$150,000 in 1938. Thereafter, funds should be provided as needed.

Range-destroying rodents which live on herbaceous and shrubby vegetation are causing excessive losses in range-forage values over large areas within the national forests. It is estimated that there are about 8 million acres now infested with these pests, requiring application of control measures. Other rodents cause severe damage to tree growth. Porcupines are preventing the establishment of new forest growth over large areas, particularly in the ponderosa pine type. The Biological Survey estimates that, in order to obtain adequate rodent control in the national forests, annual expenditures should be increased from the present amount of \$50,000 to \$116,000 for about 5 years, that for a second 5-year period annual expenditures of ap-

proximately \$92,000 will be needed, for the next 10 years about \$62,000 will be needed annually for follow-up work, to prevent reinfestations and to maintain controlled conditions. The estimate for porcupine work included in the above total is based on present known conditions in the Rocky Mountain region. Further investigations may reveal additional areas needing treatment.

The predatory-animal control work of the Biological Survey has an important bearing on use of the forage resources of the national forests. It is not possible to segregate expenditures on the national forests since the control work is carried on also on other lands.

BUREAU OF PLANT INDUSTRY (DEPARTMENT OF AGRICULTURE)

AID IN DISEASE CONTROL

The control of epidemics of introduced forest diseases through cooperative measures is a necessary function of the Federal Government. The cooperative control work against the white pine blister rust should be increased promptly in order to prevent excessive losses in valuable stands of white pines, which include three important timber species.

It is proposed that the general appropriation act be changed to authorize the Division of Blister Rust Control of the Bureau of Plant Industry to cooperate also in the control of other diseases, bridging the gap between research and application. This would involve service particularly in connection with the elimination of decayed or disease-susceptible trees in cutting operations; and with nursery sanitation and the selection of healthy sites and species combinations for plantations. Much of the recommended expansion of duties can be cared for by utilizing the present forces of the Division with relatively little increase in personnel.

It is estimated that in order to handle this work adequately the present annual expenditure of \$344,500 will require increase at once to \$554,000 and progressively to \$719,000 by 1939. After 1939 the expenditures for maintaining the blister rust portion of this protection should materially decrease if the indicated program is carried out.

RESEARCH IN DISEASES OF FORESTS AND FOREST PRODUCTS

The need for information on control of forest tree diseases and diseases of forest products requires continued forest pathology investigations. The current (1933) appropriation of \$120,000 is insufficient for adequate research upon the great number and variety of problems with which the various owners of forest land are faced. Appropriations are needed up to the \$250,000 authorized by the McSweeney-McNary Act.

For investigation on newly introduced diseases in forests, which are not covered by the act, the present funds of approximately \$24,000 need an early increase if the Dutch elm disease and the new beech bark disease are to be adequately attacked. The seriousness of the beech disease is only now being recognized, and the possibilities for control cannot be determined until further study of the situation is made.

DISEASE CONTROL ON FEDERAL LANDS

The Bureau of Plant Industry cooperates with other Federal agencies by advice in disease control technique on Federal lands. The allotment of the Bureau of Plant Industry of \$40,500 for advice in control work on the national forests should be increased to \$160,000 by 1935, and should progressively increase to \$189,000 by 1939. The allotment of \$15,000 for disease control advice on the national parks should be increased to \$20,000 by 1935 and should increase progressively to \$25,000 by 1939. An increase in appropriations of \$6,000 for the Bureau of Plant Industry should be made for disease control work on the Indian reservations. This estimate is made for a 5-year period only. Due to numerous unknown factors it is impracticable to estimate subsequent needs. If the indicated program is carried out it is probable that expenditures after the 5-year period will decrease.

BUREAU OF ENTOMOLOGY (DEPARTMENT OF AGRICULTURE)

There is need for a great deal of additional study of destructive forest insects as a basis for satisfactory prevention and control methods. Insect attacks cause an annual loss in timber values of millions of dollars. Appropriations should be increased up to the amounts authorized by the McSweeney-McNary Act which provides for a maximum of \$350,000 annually by 1938. Thereafter necessary funds should be made available as provided for under the provisions of the Act.

BUREAU OF PLANT QUARANTINE (DEPARTMENT OF AGRICULTURE)

The Federal Government maintains protection against the introduction of forest diseases and injurious forest insects from foreign countries by the quarantine work supervised by the Bureau of Plant Quarantine. Danger of the spread of destructive diseases or insect pests is reduced by inspection and certification of shipments of plant stock between States. This Bureau also supervises the actual control work in the suppression of the gypsy moth epidemic in the Northeast for which \$400,000 was appropriated in 1933. All of these operations should be continued and adequately financed as a proper governmental function. It is estimated that adequate control of the gypsy moth, with small amounts for control of the brown tail, satin, and European pine shoot moths would cost in the neighborhood of \$700,000 annually.

WEATHER BUREAU (DEPARTMENT OF AGRICULTURE)

In order to make adequate investigations of the relationship of weather conditions to forest fires, as may be necessary to make weather forecasts, the funds authorized for such research in section 6 of the McSweeney-McNary Act should be made available, increasing from present (1933) allotments of \$4,650 up to the full authorization of \$50,000 annually in 1938. Thereafter, funds should be provided as needed.

It is contemplated that the Weather Bureau will continue its service of disseminating fire-weather information to public and private

fire-control agencies during the periods of serious fire hazard. The present (1933) allotment is \$37,690 for this purpose. It is estimated that this amount should be increased to about \$45,000 by 1935.

FOREST SERVICE (DEPARTMENT OF AGRICULTURE)

COOPERATIVE FINANCIAL AID TO STATES AND PRIVATE OWNERS

The Federal Government through the agency of the Forest Service furnishes cooperative financial aid to States and private owners for specified purposes, which at the present time are limited to (1) fire protection, (2) distribution of planting stock, and (3) forest extension. Such Federal forestry aid makes up less than one percent of all Federal aid funds.

FIRE PROTECTION

Funds for fire protection make up the bulk of Federal aid. Some degree of organized protection from fire is now obtained on only 54 percent of the total State and privately owned forest area in the United States. The cost of this cooperative fire protection was \$5,943,000 in 1932, of which the Federal Government put up \$1,573,000 (27 percent), the States \$3,276,000 (55 percent), and private funds amounted to \$1,094,000 (18 percent).

The present Federal authorization as carried in the Clarke-McNary Act amounts to \$2,500,000 on the basis of a former estimate that \$10,000,000 would be the total amount necessary to protect State and private forest land. Estimates indicate that the cost of adequate fire protection may ultimately amount to approximately \$20,000,000. On the 75-25 percent basis for meeting control expenditures as explained in the section entitled, "Federal Financial and Other Direct Aid to the States," the present limitation on Federal authorizations contained in the Clarke-McNary law should be increased to \$5,000,000. Appropriations should be immediately increased to 50 percent of the total current expenditures, provided that no State should in any year receive more than 25 percent of its total needs. On this basis \$2,680,500 could be spent immediately to good advantage on this project. This represents a substantial increase over the 1933 appropriation, which was \$1,611,580. During the following 10 years Federal aid in forest-fire protection should be increased each year until it reaches \$3,703,500 in 1944; thereafter additional funds will be needed as additional areas are placed under protection and for adequate protection on all areas needing protection.

FOREST PLANTING

It is estimated that approximately 25 million acres in the United States, of which 5,755,000 acres are listed as private timber lands, should be planted to forest trees during the next 20 years. It is desirable to continue the present method of Federal cooperation whereby the Government contributes to the costs of establishing and operating State forest nurseries.

Legislation is needed to increase the expenditures authorized by section 4 of the Clarke-McNary Act from \$100,000 to \$350,000 and to broaden the scope of the act so that its provisions will benefit all landowners. Expenditures should increase progressively from \$150,000 in 1935 to approximately \$350,000.

A greatly enlarged forest-planting program such as that proposed for public and private agencies requires aid in securing sufficient seed supplies and all agencies should be protected against inferior seed or seed unsuited to the locality where it is planted. This can best be attained if the Federal Government as a form of public aid will supply of a seed testing and certification service, the cost of which is estimated at \$50,000 per year. Legislative authority to conduct the work and appropriation of funds is needed.

FOREST INSECTS

In insect control work the Federal Government now assists the States and private timberland owners by conducting control work where serious insect epidemics threaten. Legislation authorizing Federal cooperation to the extent of \$250,000 annually for cooperative survey and local insect-control work on State and private lands is needed. Appropriations should begin at \$50,000, increasing in a 5-year period to \$250,000 annually, or as rapidly as private and State cooperative funds are made available. Further increases may later be found necessary for adequate control.

FOREST EXTENSION

Advice on the ground is one of the most effective forms of aid that the Government can give to private owners. The work can probably best be handled through a special advisory service similar to that whereby the Federal Government and the States cooperate in maintaining extension foresters in farm forestry.

At present the Federal cooperative forest-extension activities are limited by the Clarke-McNary Act to farmers. The Federal cooperative effort for the most part fails to reach a large class of other private owners who actually own 270 million acres of forest land. Needed expansion of this work will necessitate an amendment to the Clarke-McNary law providing authorization for increased expenditures for the purpose and broadening the scope of the act to benefit all forest landowners. It is estimated that \$625,000 will be needed for all Federal extension activities. Of this \$225,000 should be available the direct forest-extension work by the Forest Service; \$150,000 additional should be provided the Forest Service to match State funds for work with timber landowners other than farmers; and a maximum of \$250,000 should be provided (\$100,000 at present) to be used annually to match expenditures by the States for farm forest extension through the Extension Service (Clarke-McNary law, sec. 5). Total funds for these three purposes should be increased progressively from \$200,000 the first year to \$625,000 the tenth year, and \$625,000 annually thereafter.

FOREST RESEARCH

Earlier sections of this report have recommended an enlarged Federal forest-research program.

Forest research has been hopelessly inadequate for the forestry effort of the past and work on the present scale would be even more so for the greatly enlarged effort recommended by this report.

The Federal Government's responsibility for adequate forest-research covers not only the problems with which the Federal Government is confronted in the management of Federal forest lands, but

also forestry problems which are of a national or regional character. Technical knowledge is needed on all phases of forestry to guide the work efficiently and prevent serious mistakes.

Research work of the Forest Service has not kept pace with the authority granted by the McSweeney-McNary Act, due to lack of funds. Adequate financing is needed to carry out the program outlined to 1938. It is now apparent, however, that the maximum limitations set up in the McSweeney-McNary Act represent no more than a satisfactory beginning if the need for research is met on an adequate basis. Certain forest-research work that has been authorized has not yet been started. Practically nothing has been done toward setting up an adequate forest experiment station in the central Rocky Mountain region, nor has any attempt been made toward establishing the stations authorized for Alaska, Hawaii, or the West Indies. Expansion and speeding up of certain lines of research is of immediate importance and amply justifiable as an emergency measure.

EROSION AND STREAMFLOW INVESTIGATIONS

Of foremost importance at this time is the need for studies of the relationship between forest cover and erosion and streamflow conditions as a basis for erosion control and streamflow regulation.

A bill similar to that introduced in the Seventy-second Congress (H.R. 4608) which provided for an additional section in the McSweeney-McNary Forest Research Act to cover erosion-streamflow investigations on forest, range, and other wild lands should be enacted. The legislation should provide an authorization for annual appropriations of not more than \$500,000 until 1938, and additional amounts thereafter as needed.

FOREST SURVEY

Since work on the forest survey, a Nation-wide study, was begun in 1930, it has become apparent that its maximum value cannot be attained unless the job is completed in a relatively short period of time.

The results of the forest survey are urgently needed for such things as land-use planning and in fact are already being used for this purpose. The importance of accelerating the work is being strongly urged by States, counties, and other agencies. They recognize the pressing need for such an inventory and analysis as the basis for the formulation of public policies and programs.

The present authorization of \$250,000 should be increased to \$500,000. Provision should also be made for keeping the data current indefinitely, at a probable cost of \$200,000 annually.

LAND CLASSIFICATION

The general land-use situation is one of the most critical of the national internal problems. Prompt and intelligent action based upon a clear understanding of the uses for which different classes of land are best suited is essential in determining the National land-use policy. Classification of our existing and potential forest land according to the use to which it is best adapted is an important part of the whole vexing problem. The funds needed for the forestry part of such a program should begin at \$75,000, the first year, and increase

progressively to \$250,000 the fourth year. It may later be found that as much as \$400,000 will be needed.

Legislation is needed to authorize forest land classification work and to provide funds. Provision may be made either in connection with general classification legislation or as an amendment to the McSweeney-McNary Act.

FOREST ECONOMICS

Forest economics investigations should strike directly at the heart of the baffling economic difficulties which confront the intelligent management of both public and privately owned forest land. They should help to furnish the factual foundation for making forest land use in the broad sense of the term take its proper place in our entire economic and social structure.

To carry out such a program the appropriation for this work for the fiscal year 1933 of \$70,240 should be increased progressively to \$250,000 by 1938. Appropriations thereafter should be increased progressively to \$400,000 by 1944.

FOREST PRODUCTS

As one means of assuring full land use, forest products must be kept in a position to compete on equal terms with other commodities, and research is necessary to this end. Forest-products research would also be effective in alleviating some of the emergency conditions growing out of the depression such as the need for much cheaper houses. Any improvement would be reflected in increased demands for lumber and relief of acute unemployment in communities and regions dependent on the forest industries.

To meet the needs of this program, appropriations for forest products investigations of \$613,640 for the fiscal year 1933 should be increased progressively to \$1,050,000 by 1938, and to \$1,650,000 by 1944.

EXPENDITURES NEEDED FOR ALL FOREST SERVICE RESEARCH

To cover the classes of forest research indicated and in addition research in forest management for the growing of forest crops and their protection against fire, research in the management and utilization of forest ranges, and studies of forest taxation and insurance progressive increases from \$1,666,750 for the fiscal year 1933 to \$3,885,000 by 1938 and to \$5,235,000 by 1944 will be needed.

Since the results of Forest Service research on the broad regional and national forest problems, as well as on the local problems of federally owned and managed lands are of direct benefit to the States and private owners, research constitutes an important form of Federal aid.

NATIONAL-FOREST ACQUISITION

AREA PROPOSED

The total area recommended for acquisition and addition to the national forests (exclusive of the public domain) is about 134 million acres. This is approximately 60 percent of the forest acquisition program for all public agencies and contemplates the purchase or acquisition by other means of 107 million acres east of the plains and 27 million acres in the West over a period of 20 years. Acquisition is recommended at an average annual rate of 5,350,000 acres in the

East and 1,350,000 acres in the West. The program includes the purchase within the first 10 years of about 90 billion feet of stumpage in the West primarily as a means to maintain the existing forest capital.

In addition about 22 million acres of forest land now in the public domain are recommended for immediate addition to the national forests.

LEGISLATION NEEDED

1. An authorization act covering a period of not less than 10 years, with an annual authorization of \$30,000,000 made available until expended.

Stumpage purchases it is estimated would require \$10,000,000 of the above amount. It is suggested that a plan might be worked out for stumpage purchases whereby the Federal Government would purchase the stumpage but would defer payment for a period not to exceed 20 years, until the stumpage is cut. Such a plan would ease the burden on the Treasury by providing for payment coincident with income from stumpage, would relieve the holders of the stumpage in the interim from excessive carrying charges, and would make possible the speeding up of the land-purchase program.

2. An act to permit exchanges of private lands within 6 miles of the exterior boundary of any existing national forest.

3. Legislation providing for the addition to the national forests of about 22,179,000 acres of public domain.

COSTS OF ACQUISITION

Some part of the proposed area will no doubt be acquired by donation and part (mostly in the West) will probably be acquired by exchange. Allowing for this, the cost of acquisition for the entire eastern area is estimated at \$3.23 per acre, or less than two thirds of the average price paid to date. In the West the cost is estimated at \$1.60 per acre exclusive of additions from the public domain which do not involve any costs for land.

THE ADMINISTRATION AND MANAGEMENT OF THE EXISTING NATIONAL FORESTS

The section entitled "Ownership Responsibilities, Costs, and Returns" deals specifically with additional measures needed adequately to administer and manage existing national forests. This program contemplates the intensification and expansion of resource management. It provides for speeding up capital expenditures for physical improvements and cultural operations in order to add value to the resources and to increase returns and services.

In estimating the average annual expenditures for a 20-year period, a lump-sum allowance has been made for replacement and maintenance of roads and trails and structural improvements, after the completion of the programed construction period. In the case of betterment operations for which increases are programed for less than the 20-year period, such as control of the white-pine blister-rust disease, it is assumed that the amounts that are now being expended for these various operations will be sufficient for necessary continuing work.

PROTECTION AGAINST FIRE

Protection against fire is particularly critical on about 30 million acres in three important forest regions. Major conflagrations still occur under adverse climatic conditions, are suppressed at great cost, and with loss of public property and life. The average annual area burned over should be reduced at the earliest possible date.

Completion of an adequate fire-protection system, including the construction of fire roads and trails and other fire improvements, involves an estimated annual expenditure of \$3,700,000 for fire roads and trails programed for 10 years and \$780,000 for other fire improvements programed for 5 years. It is estimated that a progressive annual increase in expenditure will be needed, beginning at \$80,000 and continuing up to \$625,000 the tenth year, for increased man power in inaccessible areas to replace road and trail workers who were available for protection during construction periods. This increased expenditure for man power should continue after the tenth year at the rate of \$625,000.

PROTECTION AGAINST DISEASE

Of first importance in the program for protection against disease is the control of the white-pine blister-rust, which attacks all of the five needle pines.

It is estimated that an increased annual expenditure of \$1,700,000 will be required for about 5 years for adequate control work on 3 million acres in the West where the highest commercial values in white and sugar pine are threatened.

The bulk of this project is concentrated in the first 5-year period beginning with 1935, because delay will jeopardize existing timber values.

PROTECTION AGAINST INSECTS

Work now conducted must be permanently expanded to obtain adequate current control of insect damage, to meet emergencies, and prevent severe losses caused by epidemic insect attacks. This involves an increase of \$100,000 over present annual expenditures of about \$100,000.

TIMBER MANAGEMENT

Probable increases in the sale of timber on the national forests during the next 20 years will, it is estimated, result in a material increase of work, and will necessitate an increase in average annual expenditures of \$215,000.

At the present time stand-betterment work, which is important in placing the forest property in condition to yield maximum timber supplies, is done only on going timber sales. There is no direct expenditure for it. It is proposed to extend this work to areas outside of the immediate timber-sale operations throughout the 20-year period. This would require an annual expenditure of at least \$1,000,000.

The total planting program for the existing national forests is 2,100,000 acres, scheduled for the 20-year period. This will require an increase of \$840,000 over present annual expenditures.

GRAZING MANAGEMENT

Intensification of grazing management is needed to provide adequate protection of forage and watershed values, and to obtain maximum returns from proper grazing use of the forage resource. The work will be a continuing management job, and the estimated needed increase over present annual expenditure is \$50,000. It may be found that additional increases will be needed in the future.

Additional improvements, such as fences, watering places, counting corrals, etc., needed to facilitate and improve the administration and use of the forage resources, are a necessity in developing and protecting forage and water-shed values. For this reason the work and expenditures should be concentrated in the first 10-year period. The increased annual expenditure needed is estimated at \$180,000.

About 100,000 acres of valuable range lands are estimated to be badly infested with poisonous plants, which limit the use of such areas and cause excessive losses of domestic livestock. There is, of course, urgent need that this menace to livestock be removed at the earliest opportunity, and the eradication work is therefore programmed for the first 10-year period. Thereafter current follow-up will be needed to protect the investment and maintain the value of the improved ranges. It is estimated that increased annual expenditures for this project should begin at about \$50,000 and increase progressively in the 10 years to about \$500,000.

Control of range-destroying rodents is also an important factor in restoring the productivity of large areas of rodent-infested range lands on the western national forests. The work, which is carried on in cooperation with the Biological Survey, should be prosecuted aggressively, to prevent reinfestation of areas already treated and to provide adequate control on all areas.

The bulk of the work is programmed for the first 10-year period, and for this purpose increased annual expenditures are needed. Increases should begin at about \$50,000 and advance progressively to \$68,000. The work is important not only to the Federal Government but to users of national-forest range.

Serious erosion is resulting from the depletion of vegetative cover on some 810,000 acres of national-forest range land and immediate control is needed. Artificial reseeding will hasten the restoration of vegetative cover and aid in watershed protection. Reseeding of this area is planned for the next 20 years, at an estimated annual expenditure of \$125,000.

RECREATION

It is estimated that the rapid increase in the recreational use of the national forests involves an increased annual expenditure of \$100,000 adequately to handle the supervision of this activity.

Adequate sanitation and other facilities for use of recreational areas are essential to public health and to other benefits to be derived from recreational use of the forest. Construction of needed recreational improvements is regarded as sufficiently urgent to be programmed for the first 5-year period, at an estimated increase in annual expenditures of \$450,000.

The expansion and intensification of wild-life management work needed to provide for the best use and development of the wild-life

resources of the national forests will necessarily be of a continuing character. The estimated needed increase in annual expenditures for this purpose is \$153,000.

Legislation needed to establish and protect the recreational resources of the national forests includes:

(1) Legal recognition of recreation as a national forest resource to be developed.

(2) Authorization for the development and regulation of camp-site areas.

(3) Amendment to present legislation to allow granting of term permits for areas up to 80 acres. The present limitation is 5 acres.

All of the legislation concerning recreation needs is embodied in a bill (H.R. 58) introduced in the House of Representatives March 9, 1933, and now pending before the Seventy-third Congress.

LANDS

Expansion of the present organization is needed to handle adequately the proposed program for acquisition of forest land, and for management of commercial national forest land uses. The work will be continuing in character. The needed increases over present annual expenditures is estimated at \$64,000.

MISCELLANEOUS IMPROVEMENTS

Construction of additional forest-development roads and trails, such parts of the forest highway program as are chargeable to the development of the national forests, telephone lines, structures, pastures, and other improvements are all needed for adequate national forest administration and management.

Road and trail construction and forest highways chargeable to the national forests are programmed for 10 years, at an estimated increased annual expenditure of \$4,840,000. Other improvements are programmed for 5 years, and are estimated to require an increased annual expenditure of \$300,000.

ESTIMATED AVERAGE ANNUAL EXPENDITURES NEEDED

Expenditures for the fiscal year 1933 will amount to approximately \$7,384,275 for the current management of the national-forest properties, and \$12,036,689 for capital investments. The program of administration and management for existing national forests proposed in the preceding paragraphs on a 20-year basis will require estimated average annual expenditures by 5-year periods as shown in table 5.

TABLE 5.—*Estimated average annual expenditures for administration and management*

Period	Current maintenance	Capital expenditures ¹	Total cost
First 5-year period ²	\$8, 272, 000	\$17, 250, 000	\$25, 522, 000
Second 5-year period.....	8, 581, 000	14, 280, 000	22, 861, 000
Third 5-year period.....	8, 691, 000	² 4, 465, 000	13, 156, 000
Fourth 5-year period.....	8, 691, 000	4, 465, 000	13, 156, 000

¹ Capital investment includes \$3,300,000 forest highway considered as a direct charge to the national forests.

² The decrease in capital expenditures after the second 5-year period is due to the fact that most of the large construction and betterment projects are scheduled during the first 10-year period.

Estimated expenditures needed for the first 10-year period of the program are shown in table 6. Many of the major increased expenditures for capital investments, as far as can now be foreseen, should be completed during this period, some as early as the fifth year. A few of the additional expenditures increase progressively during the first 5-or 10-year period. Therefore the table is arranged to show the estimated expenditures for each year of the first 5-year period, and the estimated average annual expenditures for the second 5-year period, segregated as to current and capital expenditures. The estimated division of fiscal year 1933 appropriations by current and capital expenditures for administration and management are carried through the 10-year period as lump sums, since it is assumed that these appropriations will be continuing. Needed additional expenditures are segregated by the activities to which they contribute.

TABLE 6.—Estimated expenditures for the administration and management of existing national forests
[10-year period]

Activity	First 5-year period						Second 5-year period					
	First year		Second year		Third year		Fourth year		Fifth year		(Average annual)	
	Current	Capital	Current	Capital	Current	Capital	Current	Capital	Current	Capital	Current	Capital
Present expenditures (1933) ¹	\$7, 384, 275	\$3, 131, 689	\$7, 384, 275	\$3, 131, 689	\$7, 384, 275	\$3, 131, 689	\$7, 384, 275	\$3, 131, 689	\$7, 384, 275	\$3, 131, 689	\$7, 384, 275	\$3, 131, 689
Increases needed:												
Protection:												
Fire roads and trails		3, 700, 000		3, 700, 000		3, 700, 000		3, 700, 000		3, 700, 000		3, 700, 000
Improvements	80, 000	780, 000	125, 000	780, 000	200, 000	780, 000	275, 000	780, 000	350, 000	780, 000	² 515, 000	
Man power	100, 000		100, 000		100, 000		100, 000		100, 000		100, 000	
Insects												
Disease		1, 700, 000		1, 700, 000		1, 700, 000		1, 700, 000		1, 700, 000		
Timber management expansion:												
Current work	215, 000		215, 000		215, 000		215, 000		215, 000		215, 000	
Stand betterment		1, 000, 000		1, 000, 000		1, 000, 000		1, 000, 000		1, 000, 000		1, 000, 000
Planting		840, 000		840, 000		840, 000		840, 000		840, 000		840, 000
Grazing management:												
Intensification management	50, 000		50, 000		50, 000		50, 000		50, 000		50, 000	
Range improvements		180, 000		180, 000		180, 000		180, 000		180, 000		180, 000
Poisonous plant eradication		50, 000		50, 000		50, 000		50, 000		50, 000		50, 000
Rodent control		50, 000		50, 000		50, 000		50, 000		50, 000		50, 000
Artificial range: Reseeding		125, 000		125, 000		125, 000		125, 000		125, 000		125, 000
Recreation:												
Increase current work	100, 000		100, 000		100, 000		100, 000		100, 000		100, 000	
Improvements		450, 000		450, 000		450, 000		450, 000		450, 000		
Wild life	153, 000		153, 000		153, 000		153, 000		153, 000		153, 000	
Lands: Increase current work	64, 000		64, 000		64, 000		64, 000		64, 000		64, 000	
Administrative improvements:												
Forest development roads		1, 500, 000		1, 500, 000		1, 500, 000		1, 500, 000		1, 500, 000		1, 500, 000
Forest development trails		40, 000		40, 000		40, 000		40, 000		40, 000		40, 000
Miscellaneous improvements		300, 000		300, 000		300, 000		300, 000		300, 000		300, 000
Forest highways ⁵		3, 300, 000		3, 300, 000		3, 300, 000		3, 300, 000		3, 300, 000		3, 300, 000
Total	8, 146, 275	17, 146, 689	8, 191, 275	17, 198, 689	8, 266, 275	17, 250, 689	8, 341, 275	17, 302, 689	8, 416, 275	17, 354, 689	8, 581, 275	14, 280, 689

¹ Capital expenditures do not include \$5,905,000 for forest highways and \$3,000,000 for forest development, roads and trails.

² Progressive increases from \$350,000 to \$625,000 during the second 5 years.

³ Progressive increases from \$250,000 to \$500,000 during the second 5 years.

⁴ Progressive increases from \$58,000 to \$68,000 during the second 5 years.

⁵ Considered as a direct charge to national forests. (Annual allowance represents the part of total that may be appropriated.)

NOTE.—\$1,000,000 estimated annual expense for construction of check dams and bank control works excluded from table pending further investigations and more detailed cost estimates.

ADMINISTRATION AND MANAGEMENT OF AREAS PROPOSED FOR
EXTENSION OF THE NATIONAL FOREST SYSTEM

This program assumes that administration and management of acquired lands will begin as soon as the Federal Government assumes ownership. Table 7 shows the estimated average annual expenditures for administration and management of the 107,100,000 acres proposed for acquisition east of the plains, and of the 27,100,000 acres in the West, and areas recommended for addition to the national forests from the public domain. The estimated annual expenditure for the above addition from the public domain is \$1,038,000, and this figure is included in table 7, which is arranged in four 5-year periods covering the total 20-year program.

A progressive percentage increase is assumed for capital expenditures, beginning at 1 percent in the East for the first year and increasing to 8 percent for the fifth and sixth years. Thereafter the capital expenditures are figured at 10 percent until the total of annual expenditures reach 100 percent in the thirteenth year. Thereafter, beginning with the sixteenth year an annual allowance is made for replacement, maintenance, and emergencies.

In the West it is assumed that 5 percent of the total capital expenditures will be made the first year, will increase to 25 percent the fifth year, and will be about 10, 10, and 5 percent, respectively, the sixth, seventh, and eighth years. Beginning with the tenth year, an annual allowance of \$500,000 is made for replacement, maintenance, and emergencies.

TABLE 7.—*Estimated average annual expenditures for administration and management of proposed additions¹ to national-forest system*

Region	First 5-year period		Second 5-year period		Third 5-year period		Fourth 5-year period	
	Current expenditures ²	Capital expenditures ³	Current expenditures	Capital expenditures	Current expenditures	Capital expenditures	Current expenditures	Capital expenditures
East.....	\$2, 506, 140	\$9, 424, 800	\$6, 683, 040	\$20, 563, 200	\$9, 253, 440	\$12, 852, 000	\$10, 752, 840	\$2, 000, 000
West.....	1, 444, 500	4, 065, 000	2, 122, 000	1, 355, 000	2, 799, 500	500, 000	3, 477, 000	500, 000
Total..	3, 950, 640	13, 489, 800	8, 805, 040	21, 918, 200	12, 052, 940	13, 352, 000	14, 229, 840	2, 500, 000

¹ Total acquisition program for East, 107,100,000 acres, or 5,355,000 acres per year; total acquisition program for West, 27,100,000, or 1,355,000 acres per year and about 22,179,000 acres of additions from public domain.

² Protection for East figured at 5 cents per acre and for double area actually acquired for first 10 years. For West protection figured at 5 cents per acre. Administration for East figured at 5.6 cents per acre and for West at 5 cents per acre for all areas exclusive of public domain.

³ Total capital investment for eastern acquisition computed at \$2 per acre and for West at \$1 per acre.

Under the proposed program current expenditures will progressively increase as the acquisition program proceeds. Capital expenditures, however, increase rapidly during the first 10 years, and then decline rapidly to an allowance for maintenance and replacement. Table 8 is arranged to show the estimated annual expenditure for each year of the first 5-year period and the average annual expenditure for the second 5-year period. The expenditures are divided by areas east of the Plains and the West.

Current expenditures are separated into those for (1) protection, and (2) administration and management. Capital expenditures cannot be satisfactorily divided and are therefore included as a lump sum.

This table also includes a summary of expenditures which brings together in total amounts for a 10-year period the estimates for administration and management for existing national forests and the areas proposed for acquisition, including additions from the public domain.

TABLE 8.—*Estimated expenditures for administration and management of area proposed for acquisition and extension of the National Forest System*¹

[First 10-year period]

Administration and management	First year, 1935		Second year, 1936		Third year, 1937	
	Current	Capital	Current	Capital	Current	Capital
East of Plains:						
Capital expenditures-----		\$2, 142, 000		\$6, 426, 000		\$8, 568, 000
Protection ² -----	\$535, 500		\$1, 071, 000		\$1, 606, 500	
Administration ³ -----	299, 880		599, 760		899, 640	
Total for East-----	835, 380	2, 142, 000	1, 670, 760	6, 426, 000	2, 506, 140	8, 568, 000
West of Plains:						
Capital expenditures-----		1, 355, 000		2, 710, 000		4, 065, 000
Protection ⁴ -----	67, 750		135, 500		203, 250	
Administration ⁴ -----	67, 750		135, 500		203, 250	
Total for West-----	135, 500	1, 355, 000	271, 000	2, 710, 000	406, 500	4, 065, 000
Total, East and West---	970, 880	3, 497, 000	1, 941, 760	9, 136, 000	2, 912, 640	12, 633, 000
Public-domain additions to national forests, administration and management-----	1, 038, 000		1, 038, 000		1, 038, 000	
United States, total-----	2, 008, 880	3, 497, 000	2, 979, 760	9, 136, 000	3, 950, 640	12, 633, 000
Administration and management	Fourth year, 1938		Fifth year, 1939		Second 5-year period, 1940-44	
	Current	Capital	Current	Capital	Current	Capital
East of Plains:						
Capital expenditures-----		\$12, 852, 000		\$17, 136, 000		\$20, 563, 200
Protection ² -----	\$2, 142, 000		\$2, 677, 500		\$4, 284, 000	
Administration ³ -----	1, 199, 520		1, 499, 400		2, 399, 040	
Total for East-----	3, 341, 520	12, 852, 000	4, 176, 900	17, 136, 000	6, 683, 040	20, 563, 200
West of Plains:						
Capital expenditures-----		5, 420, 000		6, 775, 000		1, 355, 000
Protection ⁴ -----	271, 000		338, 750		542, 000	
Administration ⁴ -----	271, 000		338, 750		542, 000	
Total for West-----	542, 000	5, 420, 000	677, 500	6, 775, 000	1, 084, 000	1, 355, 000
Total, East and West---	3, 883, 520	18, 272, 000	4, 854, 400	23, 911, 000	7, 767, 040	21, 918, 200
Public-domain additions to national forests, administration and management-----	1, 038, 000		1, 038, 000		1, 038, 000	
United States, total-----	4, 921, 520	18, 272, 000	5, 892, 400	23, 911, 000	8, 805, 040	21, 918, 200

¹ Total purchase program for East, 107,100,000 acres, or 5,355,000 acres each year. Total purchase program for West, 27,100,000 acres, or 1,355,000 acres each year. Additions from public domain, 22,179,000 acres.

² Protect double the area acquired at 5 cents per acre for 10 years or until total area is under protection.

³ 5.6 cents per acre.

⁴ 5 cents per acre.

Summary of estimated expenditures for administration and management of the national forests

[First 10-year period]

Administration and management	First year, 1935		Second year, 1936		Third year, 1937	
	Current	Capital	Current	Capital	Current	Capital
Existing national forests.....	\$8, 146, 275	\$17, 146, 689	\$8, 191, 275	\$17, 198, 689	\$8, 266, 275	\$17, 250, 689
Additions to national forests..	2, 008, 880	3, 497, 000	2, 979, 760	9, 136, 000	3, 950, 640	12, 633, 000
Grand total.....	10, 155, 155	20, 643, 689	11, 171, 035	26, 334, 689	12, 216, 915	29, 883, 689

Administration and management	Fourth year, 1938		Fifth year, 1939		Second 5-year period, 1940-44	
	Current	Capital	Current	Capital	Current	Capital
Existing national forests.....	\$8, 341, 275	\$17, 302, 689	\$8, 416, 275	\$17, 354, 689	\$8, 581, 275	\$14, 280, 689
Additions to national forests..	4, 921, 520	18, 272, 000	5, 892, 400	23, 911, 000	8, 805, 040	21, 918, 200
Grand total.....	13, 262, 795	35, 574, 689	14, 308, 675	41, 265, 689	17, 386, 315	36, 199, 889

SUMMARY OF ESTIMATED FEDERAL EXPENDITURES

FIRST 10 YEARS

Table 9 contains a summary of the estimated expenditures for the first 10 years of the Federal program, arranged by agencies, and divided by the broad activities of aid, research, and administration, and management. In a few cases where protection is the major function of forest management "protection" has been used as a designation rather than "administration and management." In some cases other terms are used which will indicate the character of the activities. Under "Forest Service" a slightly more detailed breakdown of activities has been made than for other agencies, due to a wider range of forestry activities and to give a better understanding of the purpose of the expenditures.

The table is divided into two 5-year periods. Estimated annual expenditures are shown for each year of the first 5-year period, and the average annual expenditure for the second 5-year period.

TABLE 9.—Federal forestry program summary of estimates for each year for the first 5 years and average annual estimates for second 5-year period

[10-year period]

Agency and character of expenditure	1935, first year		1936, second year		1937, third year	
	Current	Capital	Current	Capital	Current	Capital
<i>Department of the Interior</i>						
Indian Service, management.....	\$695,000	\$573,000	\$695,000	\$573,000	\$695,000	\$573,000
National Park Service, protection.....	238,200	96,420	238,200	96,420	238,200	96,420
<i>Department of Commerce</i>						
Bureau of Fisheries, management and investigations.....	100,000	-----	100,000	-----	100,000	-----
<i>Department of Agriculture</i>						
Weather Bureau:						
Research.....	35,000	-----	40,000	-----	45,000	-----
Forest fire weather-warnings.....	45,000	-----	45,000	-----	45,000	-----
Plant quarantine, aid.....	700,000	-----	700,000	-----	700,000	-----
Plant industry:						
Aid.....	554,000	-----	595,000	-----	636,000	-----
Research.....	174,000	-----	207,000	-----	240,000	-----
Disease control on Federal land.....	186,000	-----	195,000	-----	203,000	-----
Extension service, aid (farm forest extension).....	100,000	-----	125,000	-----	150,000	-----
Bureau of Entomology, research.....	245,000	-----	280,000	-----	315,000	-----
Biological Survey:						
Research.....	55,000	-----	85,000	-----	115,000	-----
Rodent control on national forests.....	116,000	-----	116,000	-----	116,000	-----
Forest Service:						
Aid:						
Fire protection.....	2,680,500	-----	2,958,500	-----	3,298,500	-----
Forest planting.....	200,000	-----	212,500	-----	225,000	-----
Insect control.....	50,000	-----	100,000	-----	150,000	-----
Forest extension.....	100,000	-----	150,000	-----	200,000	-----
Research.....	2,220,000	-----	2,815,000	-----	3,420,000	-----
Acquisition.....	-----	29,464,650	-----	29,464,650	-----	29,464,650
Management existing national forests.....	8,146,275	17,146,689	8,191,275	17,198,689	8,266,275	17,250,689
Management extension national forest system.....	2,008,880	3,497,000	2,979,760	9,136,000	3,950,640	12,633,000
Total, Forest Service.....	15,405,655	50,108,339	17,407,035	55,799,339	19,510,415	59,348,339
Grand total, Federal.....	18,648,855	50,777,759	20,828,235	56,468,759	23,108,615	60,017,759

TABLE 9.—Federal forestry program summary of estimated expenditure for each year for the first 5 years and average annual estimates for second 5-year period—Continued

[10-year period]

Agency and character of expenditure	1938, fourth year		1939, fifth year		Annual average for 1940-44, second 5-year period	
	Current	Capital	Current	Capital	Current	Capital
<i>Department of the Interior</i>						
Indian Service, management	\$695,000	\$573,000	\$695,000	\$573,000	\$695,000	\$65,000
National Park Service, protection	238,200	96,420	238,200	96,420	313,200	10,000
<i>Department of Commerce</i>						
Bureau of Fisheries, management and investigations	100,000		100,000		150,000	
<i>Department of Agriculture</i>						
Weather Bureau:						
Research	50,000		50,000		50,000	
Forest fire weather warnings	45,000		45,000		45,000	
Plant quarantine, aid	700,000		700,000		700,000	
Plant industry:						
Aid	677,000		719,000			
Research	274,000		274,000			
Disease control on Federal land	211,000		220,000			
Extension service, aid (farm forest extension)	175,000		200,000		245,000	
Bureau of Entomology, research	350,000		350,000		350,000	
Biological Survey:						
Research	150,000		150,000		150,000	
Rodent control on national forests	116,000		116,000		92,000	
Forest Service:						
Aid:						
Fire protection	3,628,500		3,668,500		3,703,500	
Forest planting	237,500		250,000		287,500	
Insect control	200,000		250,000		250,000	
Forest extension	250,000		300,000		360,000	
Research	3,885,000		4,250,000		4,597,000	
Acquisition		29,464,650		29,464,650		29,464,650
Management existing national forests	8,341,275	17,302,689	8,416,275	17,354,689	8,581,275	14,280,689
Management extension national forest system	4,921,520	18,272,000	5,892,400	23,911,000	8,805,040	21,918,200
Total, Forest Service	21,463,795	65,039,339	23,027,175	70,730,339	26,584,315	65,663,539
Grand total, Federal	25,244,995	65,708,759	26,884,375	71,399,759	29,374,515	65,738,539

The estimates do not contain complete expenditure figures. In minor instances the responsible agencies have not cared to make estimates beyond a five-year period. In the main, however, it is believed that the total amounts shown represent a reasonable estimate of expectancy for such a sizeable program.

SUMMARY OF ESTIMATED FEDERAL EXPENDITURES FOR 20 YEARS

Table 10 contains a summary of total Federal expenditures for the Federal Forestry Program, arranged by agencies and activities in the same manner as table 9.

The estimated expenditures are on the basis of annual averages for four 5-year periods.

Explanations of preceding tables with regard to methods of computing capital expenditures by periods, and allowances for replacements apply to table 10.

The table does not include an estimate for construction of check dams and bank protection works for control of runoff for which as much as \$20,000,000 may be needed. Further investigations are necessary to obtain fully satisfactory estimates.

TABLE 10.—Federal forestry program, estimated average annual expenditures

[20-year period]

Agency and character of expenditure	First 5-year period		Second 5-year period		Third 5-year period		Fourth 5-year period	
	Current	Capital	Current	Capital	Current	Capital	Current	Capital
<i>Department of the Interior</i>								
Indian Service, ¹ management.....	\$695,000	\$573,000	\$695,000	\$65,000				
National Park Service, protection.....	238,200	96,420	313,200	10,000				
<i>Department of Commerce</i>								
Bureau of Fisheries, management and investigations.....	100,000		150,000		\$75,000		\$75,000	
<i>Department of Agriculture</i>								
Weather Bureau:								
Research.....	44,000		50,000		50,000		50,000	
Forest fire weather warnings.....	45,000		45,000		45,000		45,000	
Plant quarantine, aid.....	700,000		700,000		700,000		700,000	
Aid:								
Research.....	636,200							
Disease control on Federal land.....	233,800							
Extension Service, aid (farm) forest extension.....	208,000							
Bureau of Entomology, research.....	150,000		245,000		250,000		250,000	
Biological Survey:	308,000		350,000		350,000		350,000	
Research.....	111,000		150,000		150,000		150,000	
Rodent control on national forests.....	116,000		92,000		62,000		62,000	
Forest Service:								
Aid:								
Fire protection.....	3,246,500		3,703,500		3,703,500		3,703,500	
Forest planting.....	225,000		287,500		350,000		385,500	
Insect control.....	150,000		250,000		250,000		250,000	
Forest extension.....	200,000		360,000		375,000		375,000	
Research:								
Acquisition.....	3,318,000	29,464,650	4,597,000	29,464,650		\$19,464,650		\$19,464,650
Management existing national forests.....	8,272,275	17,250,689	8,581,275	14,280,689	8,691,275	4,465,000	8,691,275	4,465,000
Management extension, national forest system.....	3,950,640	13,489,800	8,805,040	21,918,200	12,052,940	13,352,000	14,229,840	2,500,000
Total, Forest Service.....	19,362,415	60,205,139	26,584,315	65,663,539	25,422,715	37,281,650	27,635,115	26,429,650
Grand total, Federal.....	22,942,615	60,874,559	29,374,515	65,738,539	27,104,715	37,281,650	29,317,115	26,429,650

¹ These expenditure figures are based on the assumption that the area of forest land under the jurisdiction of the Forestry Branch of the Indian Service will not vary to any appreciable extent in the period under consideration.

SUMMARY OF LEGISLATION NEEDED FOR THE FEDERAL PROGRAM

NATIONAL FOREST LAND ACQUISITION

Authorization covering a period of not less than 10 years, with an annual authorization of \$30,000,000, made available until expended. Stumpage purchases it is estimated would require \$10,000,000 of the above amount. It is suggested that a plan might be worked out for the stumpage purchases, whereby the Federal Government would purchase the stumpage but would defer payment for a period not to exceed 20 years, until the stumpage is cut.

An act to permit exchanges of private lands within 6 miles of the exterior boundaries of any existing national forest.

Legislative action providing for the addition to the national forests of about 22 million acres of public domain lands.

ADMINISTRATION AND MANAGEMENT OF THE NATIONAL FORESTS

It might be advantageous in financing the management and administration of the existing and proposed national forests if the program received congressional sanction as a long-term authorization. This plan should be given further consideration.

Legislation needed to establish and protect the recreational resources of the national forests includes the following:

(1) Legal recognition of recreation as a national forest resource to be developed.

(2) Authorization for the development and regulation of camp-site areas.

(3) Amendment to present legislation to allow granting of term permits for areas up to 80 acres. The present limitation is 5 acres.

All of the legislation concerning recreation needs is embodied in a bill (H.R. 58) introduced in the House of Representatives March 9, 1933, and now pending before the Seventy-third Congress.

RESEARCH

Amendment of the McSweeney-McNary Act (45 Stat. 699) to authorize erosion and stream-flow research and to authorize annual appropriations of not less than \$500,000. Such legislation has been introduced in the House of Representatives, Seventy-second Congress (H.R. 4608).

An amendment to the McSweeney-McNary Act (45 Stat. 699) authorizing an increase in annual appropriations for the Forest Survey up to \$500,000, and up to \$200,000 for keeping data current after the completion of the initial survey.

Either as an amendment to the McSweeney-McNary Act or as a part of general legislation, to provide for the forest-land phase of land classification and including an annual authorization of not less than \$300,000 for this purpose.

Legislative authority for the establishment of a seed-testing and certification station, and authorization for an annual appropriation of not to exceed \$50,000 for this purpose.

AID TO STATES AND PRIVATE OWNERS

An amendment to section 4 of the Clarke-McNary Act (43 Stat. 653) to broaden the scope of the act so that its provisions for aid in forest planting will benefit all landowners and to provide for increasing from \$100,000 to \$350,000 the amount that may be appropriated annually for this purpose.

An amendment to section 5 of the Clarke-McNary Act (43 Stat. 653) to broaden the scope of the act so that its provisions for forest extension will benefit all landowners. It should also provide for increasing from \$100,000 to \$400,000 the amount that may be appropriated annually for aid to the States in carrying on State extension work, of which \$150,000 should be made available to the Forest Service for work with timber land owners other than farmers, and also authorize an additional \$225,000 for direct expenditure by the Forest Service in forest extension work.

An amendment to the Clarke-McNary Act to provide for cooperative financial aid to States and private owners in the control of insect attacks upon State and private forests, and authorization for expenditure of funds for the purpose to the extent of \$250,000 annually.

Legislation is needed authorizing the Bureau of Plant Industry, through its Blister Rust Division, to cooperate in the control of forest diseases, other than the white pine blister rust disease.

INDIAN RESERVATION FOREST LANDS

Needed legislation for Indian reservation forest land should provide: (1) For discontinuing the present practice of allotting forest and range lands to individual Indians; (2) for the creation by law of Indian forests on the several reservations having large areas of tribal land; and (3) increased appropriations for all forestry work.

WILD LIFE CONSERVATION

Legislation authorizing the Secretary of Agriculture and the Secretary of Commerce to provide expert assistance to Federal, State, and other agencies in rearing, stocking, and increasing the supply of game and fur-bearing animals and fish; in combating disease, and in developing a Nation-wide program of game conservation, and rehabilitation, and to cooperate with such agencies to that end. Such legislation is embodied in "An act to promote the conservation of wild life, fish and game, and other purposes" (S. 263, 72d Cong.), passed by the Senate December 17, 1931.

Legislation providing for consideration of the effect of the construction of any public works or improvements upon the replacement and conservation of wild life, embodied in a bill, S. 5813, Seventy-first Congress, passed by the Senate January 26, 1931.

FINANCING THE PROGRAM

The expenditures needed to carry out the foregoing program fall into two classes, which suggest and perhaps indicate different methods of financing. Except for very small holdings such as farmer's woodlots, forestry involves the setting up of organized forest units, each of which is a going business project in itself. As such it is run like

any other business, and is subject to the same general system of finance and accounting. Disbursements are either current expenditures or capital investment, depending on whether they are a part of carrying on every-day productive business or are a means of increasing the capital assets. For example, the costs of fire protection, of logging and milling, of repairs and maintenance, are current expenditures. The costs of planting vacant land, of a new road, of the purchase of additional land, or of constructing a planing mill represent additions to assets and as such are capital investments. Capital expenses add to the value of the business, so that it will thereafter become more productive and will eventually return the added investment with interest and a profit. Current expenses are recovered out of current income as a part of the cost of the goods sold. This leads to the universal business practice, once a project is organized and on a producing basis, of meeting current costs out of current income and of considering capital expenditures as investments to be met from surplus set aside from profits or from borrowed money.

FINANCING OF CAPITAL EXPENDITURES

FEDERAL GOVERNMENT

An analysis of the Federal Government's estimated part of the cost of this program divided between average annual current and capital expenditures for four 5-year periods, has been given in table 7.

There is no doubt of the soundness of the principle of financing current expenses from Treasury income by annual appropriation of funds. This has always been the practice in governmental business as well as in corporation financing. The Government, however, has generally also financed capital expenditures in the same manner, without distinguishing them in any way either in appropriations or in later accounting. This is, of course, good practice so long as the funds to be raised are within the annual Treasury income. But when strict adherence to this concept leads to the abandonment or curtailing of desirable going projects, because of a slump in Treasury income; or when increased expenditures for investment in needed improvement or facilities that beyond the immediate capacity of Treasury income must be indefinitely delayed; then it is time to consider the use of borrowed capital.

The Federal program involves the purchase of 134 million acres of forest land in the next 20 years, the planting of a part of this land, and the construction of roads and trails, fire-lookout towers, telephone lines, houses and other improvements at an average annual capital cost for the first 10 years of around 63 million dollars and for a second 10-year period of around 31 million dollars. Both the main financial and intangible returns from this investment will accrue to a following generation of Americans who will harvest the forest crop now being started. The major money income from the investment will thus commence to materialize in from 20 to 40 years after initiation and will reach its maximum in from 50 to 80 years, depending upon the section of the country involved.

This suggests that money might be borrowed for a term of years corresponding to the average financial rotation of the forests, that is, the period of growth up to the time when it is most profitable to cut

the timber. This would provide a means of liquidating the principal of the loan from current returns at the time of harvesting.

A financial plan for the capital needs of the Federal Government might be worked out that would involve:

(1) Authorization to the Treasury to issue 30-year, 3-percent, forest-development bonds in each of the next 10 years as called for by the Secretary of Agriculture, and not exceed a specified amount in any one year.

(2) Provision for the retirement of these bonds at an amortization rate of 2 percent per annum which would redeem all the bonds during the next 40 years.

(3) Payment of interest and amortization expense out of Treasury receipts each year as a part of current expenses.

While financing by the issuance of bonds would, in the end, cost somewhat more than it would by the annual appropriation on the pay-as-you-go basis, the advantages are threefold: first, it would allow the prompt initiation of the plan even though Treasury funds might not at once be available; second, it would guarantee and stabilize the financing of the project in a manner highly desirable in a long-time plan; and third, it would place the greater part of the amortization on the period of time during which the income from the investment would be greatest.

STATE GOVERNMENTS

The same general principles of public finance may be readily applied to the proposed State forestry program. Although some States with ample incomes have adopted the pay-as-you-go system, it is recognized as a sound business principle to pay for current expenditures from current income or treasury surpluses, and to finance capital investments from borrowed money. However, the scope of the forest problem varies from State to State, as well as the sources of wealth, so that no general proposal can be made to meet conditions in all States.

The capital investments of the forestry program include the acquisition of State forests, and the permanent improvements thereon that increase the value of the property and add to its productivity. Since the acquisition and development of State forests is largely a self-liquidating investment which will be of greatest benefit to future generations, it appears fair and logical to expect future generations to help pay for them. For this reason it is suggested that capital investments might be made from borrowed capital; for instance, 30-year, 3-percent bonds with a 2-percent amortization rate.

The States have already explored and developed the field of financing by borrowing, and in most instances have determined the methods best adapted to individual needs and to conditions of the existing financial structure of the States.

From the previous tables it will be noted that for the first 10-year period current expenses amount to approximately one third of the total expenditures required, and that in no instance do current expenses exceed an annual average of \$300,000 for each of the 48 States. Of course, the expenses will not be evenly divided, because the States with the major forest problems will naturally carry a proportionately large share of the expenditures. However, when it is considered that

the total expense in any one State may be divided among the many units of State and local government, it becomes apparent that in many instances current expenditures can be met from current treasury resources with little difficulty. Federal aid—financial and through the establishment of national forests—is expected to be greatest in those States least able to finance their forestry program.

FINANCING CURRENT EXPENDITURES

As stated before the current expenditures involved in Federal, State, and private operations will broadly include the annual disbursements for protection, administration, cultural operations, surveys and plans, forestry extension, and harvesting costs. Such disbursements in private business practices are usually met either from current income, from surplus in the event and to the extent that current income is insufficient, or from working capital borrowed on short-time loans anticipating current income.

In the case of governmental agencies, these expenditures are usually met from appropriations of funds against actual or expected treasury income. Deficiencies in income and sums needed prior to realization of income are met from treasury surplus or by short-term borrowings on warrants or on treasury certificates. There is no reason to question the soundness of this method of financing and thus no occasion to suggest any departures.

THE OFFSETS TO TREASURY DRAIN

FEDERAL FORESTS

The outlay required for the protection and management of the national forests must for some years to come exceed the Treasury income from this source. If it were possible, however, to express the dollar value of forests in the form of conservation of water, soil, recreational resources, forest ranges, and timber there would be no such deficit.

Of the 140 million acres of land in the national forests of the continental United States alone, 75 million acres are covered by commercial forest growth and of these only 7 or 8 million acres are so situated as to be available for immediate intensive management involving full realization of timber values. Sixty-five million acres of national-forest land are above timber line, or are covered with noncommercial brush, scrub growth, and open lands. This area is essential for the maintenance of water and other services and values and requires and justifies the expenditure of money to protect, but it holds no immediate promise of financial returns sufficient to meet expenses.

The commercial timber land area now inaccessible for use will gradually come into intensive development as the demand for timber increases, and in the meantime it must be given protection. All of this means that the cost of managing the whole property will temporarily exceed the immediate income from the relatively small area that can produce high returns. The acquisition program set out here provides for the addition of 90 billion feet board measure of commercial timber in the next 10 years. With this addition, plus about 40 million acres of the 75 million acres of commercial timberland now

in Federal ownership, for which demand can be expected to develop within 20 years, the possibilities of financial return takes on an entirely different aspect.

The average annual cost, chargeable to current expenses, of the first 10 years of the Federal part of the program is around \$26,000,000. There is no question, of course, of the Treasury's ability to meet such a relatively small expenditure annually by appropriation from income. By the end of 20 years, if the program is carried out as planned, an annual gross yield of \$160,000,000 worth of marketable products or services might be possible. This is not a forecast of expected returns, but is rather a measure of the value, in place, of the timber and other products that should be available for utilization annually under the management and with the facilities provided for.

Just what part of this annual production can be converted into fiscal receipts it is impossible to forecast 20 years in advance. The studies of forest growth and of trends in requirements point convincingly to a total production by the end of 20 years of less than our needs, and it appears not unreasonable to anticipate a market for most, if not all, of what can be produced on the national forests.

The national forests of the future as balanced by the addition of commercial forest areas to present areas, and as improved and made marketable by the facilities and cultural operations planned, should ultimately pay their way and more.

STATE FORESTS

For the State, as for the Federal Government, if it were possible to determine the actual money value of forests in the conservation of water, soil, wild life, and recreational resources, these services alone would justify their investment. There are, in addition, many sources of direct income from State and private forests, which contribute to the public treasury to offset the drain of initiating their establishment and development.

As timber crops mature under adequate protection and proper silvicultural management, a very considerable income may be expected from the sale of timber products. The returns will vary according to the character of the forest; certain areas of low productivity required for watershed protection may return no income, whereas other areas of high productivity may yield net returns of several dollars per acre per year. After the initial period of their establishment and development, State forests may be expected to return many times the amount of their current carrying charges.

OTHER SOURCES OF TREASURY INCOME

FROM NATIONAL FORESTS

As a means of financing immediate expenditures, there are other possible sources of Treasury income that should be considered. Upon the principle that the chief beneficiaries of the management proposed should bear a share of the cost roughly commensurate with the special benefits enjoyed, one must take into account the industries and communities that use water on a large scale, such as hydroelectric power companies and municipal water users, as well as those engaging in traffic on the navigable rivers and inland waterways.

All of these benefit greatly and uniquely from the water-conservation and flood-control effects of managed forests—especially those on drainages of major interstate streams.

In 1931 the production of electricity from water power was 30,603,000,000 kilowatt-hours, about a third of the total electric current produced from all sources. The gross sales value of the current at an average of 2 cents per kilowatt-hour is roughly estimated at \$600,000,000 per annum. An excise tax of 2 percent on gross sales would produce now around \$12,000,000 annually. Probably with complete development of the water power resources of the whole country the installed capacity would amount to 80 million horsepower or more. This is more than five times the present developed horsepower and indicates the possibilities of this source of tax income.

Our urban population is, according to the last census, about 69 million. It is estimated that cities and towns consume 1,800 billion gallons of water for domestic and industrial uses annually. The greater part of this water is taken from streams and the quantity and purity of the supply depends largely on the maintenance of forest cover on the watersheds. It is difficult to appraise the money value of this service of forests but the magnitude of the possibilities of income will be realized when so small a rate as 1 cent per thousand gallons would produce \$18,000,000 annually.

The commerce carried on the principal rivers and fresh-water canals of the United States in 1929, not including commerce on the Great Lakes, aggregated 130 million tons of freight. The probable increase in this freight traffic may lead to as great an annual business as 500 million tons by the end of 20 years. The development of water-borne commerce on our inland streams depends in large part on the control of run-off at headwaters and upon checking the silting up of channels caused by erosion of watersheds. In both of these cases forests play an important part, and it does not seem illogical to charge this business with a share of the cost of forestry.

It is apparent that in dealing with charges or taxes on water-power development, or water used for domestic or industrial purposes in cities and towns, and on water-borne traffic, there are legal, constitutional, and economic questions to be solved which are beyond anything attempted in this report. Nevertheless these are special beneficiaries of forestry and the field is of such magnitude as a source of Treasury income that it is worthy of consideration.

One of the possibilities for increasing Treasury income from Federal forests lies in licensing the large and rapidly growing recreational use. In 1931, 32 million persons from all parts of the United States visited the national forests. Some of these undoubtedly were entirely transient travelers, many of whom were probably counted more than once. Millions of persons, however, spent one or more days in the national forests in camping and hunting or fishing. At present there is no charge of any kind for this use of the forests, although the Forest Service has for years had to use an appreciable part of its funds to employ personnel and maintain facilities to care for this traffic. In addition it has been necessary to increase fire protection to meet the materially augmented fire hazard introduced. A hunting, fishing, and camping permit or license costing \$2 per person per season would work no hardship on individuals and should bring in an additional income of many millions of dollars.

FROM STATE FORESTS

Upon the principle that those who use the forest and who benefit directly from it should help to defray its expenses, game and recreational facilities become possible sources of forest income for the States also. The States now derive considerable revenue from the sale of hunting and fishing licenses; it appears not illogical to suggest that part of these funds should be devoted to the maintenance of the forest cover upon which wild life depends to a large measure for food and shelter. Nominal charges for the recreational use of State forests is already recognized in some States as a legitimate source of income.

The development of hydroelectric power, of most potable water supplies, and of commercial water navigation, is dependent in a large measure upon the regulation of stream flow from forested watersheds. Therefore, it would appear equitable to help pay the costs of forest protection and administration by some system of water taxation.

The expenditure of public funds for forestry, particularly through State aid to private owners, contributes directly to increased State income. As private forest lands are kept productive, and as profitable forest industries are maintained, the entire tax base is widened and the income from taxation is increased. By the establishment of State or other public forests in backward regions, with the abandonment of decadent communities and costly public improvements no longer necessary in those regions, large savings of public funds may be made. These savings may contribute very greatly to the accomplishment of the State forestry program.