Here are Forests

U.S. Department of Agricultu

Forest Service

HERE ARE FORESTS

FOR THE WORLD
POWER CONFERENCE
FROM THE
FOREST SERVICE
U.S. DEPARTMENT
OF AGRICULTURE

Here are forests

F-48608

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Here Are Forests

THEIR RELATION TO HUMAN PROGRESS

IN THE AGE OF POWER

BY

MARTHA BENSLEY BRUÈRE

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The sources of hydroelectric power need the sustaining influences of the forests.

Gentlemen, here are forests!

One-third of the United States is forest land.

Along the road toward higher civilization we have come beyond the Age of Steam into the Age of Electricity We have a rising population which makes steadily increasing demands on the limited sources from which electric power now comes. Can our forests increase the supply?

Living things are the only renewable sources of energy that we have. Except the wind, which we have not yet learned to control, and such forces as cosmic rays, to which we have no more than been introduced, all other sources of power are either rapidly diminishing or else have a clearly defined top limit.

The earth cannot be expected to return to its coal-making unless the polar ice cap melts and the warm moist climate of the Carboniferous Age is renewed. Ton for ton petroleum has every advantage over coal as a producer of power, but the forms of life that created it are all as dead as the fern-trees that created the coal. No expert is wise enough to say how much of our natural gas is still underground, but we know that most of the wells give less than they did. We do not know how to create any more coal, oil, or gas.

Just in its adolescence, the age of electric power looks forward to a future full of promise. In order to transform water power into electricity we are building dams and reservoirs, impounding rivers, and setting hitherto idle lakes to work. But for all practical purposes the amount of water is as limited as the amount of coal, although we can use it over and over again. How much power can we get from it?

Just about as much as we get out of our total coal consumption, said the late Charles P. Steinmetz. Already we use much more power than our vanishing coal can give us. What can we do?

F—308989

By protecting the watersheds and by producing fuel, the forests can help keep the American "grid" straining full forever.

Well, here are forests!

Twenty-eight percent of the timber that is cut in our forests is still used for fuel, burned almost as wastefully, economically speaking, as though it were thrown on Halloween bonfires kindled to be sat around and sung to. But wood does not have to be used that way. Just as dry distillation of 1 ton of good bituminous coal can get from it 1,500 pounds of a smokeless fuel much like anthracite, 10,000 cubic feet of gas, 1½ gallons of benzol, and 9 gallons of tar—all of which may be used as fuel, so wood may be resolved by quite other treatment into a variety of fuels, including charcoal, fuel alcohol, and gas, all of which can be used to produce power. The forests can well help to keep an American transmission system, which carries the combined kilowatts from coal, oil, gas, and water, straining full.

And to keep it full forever! The only limit to the power to be derived from our 550,000,000 acres of forest land is their ability to grow trees. To create an inexhaustible supply of fuel is the direct part forests can play in the production of power.

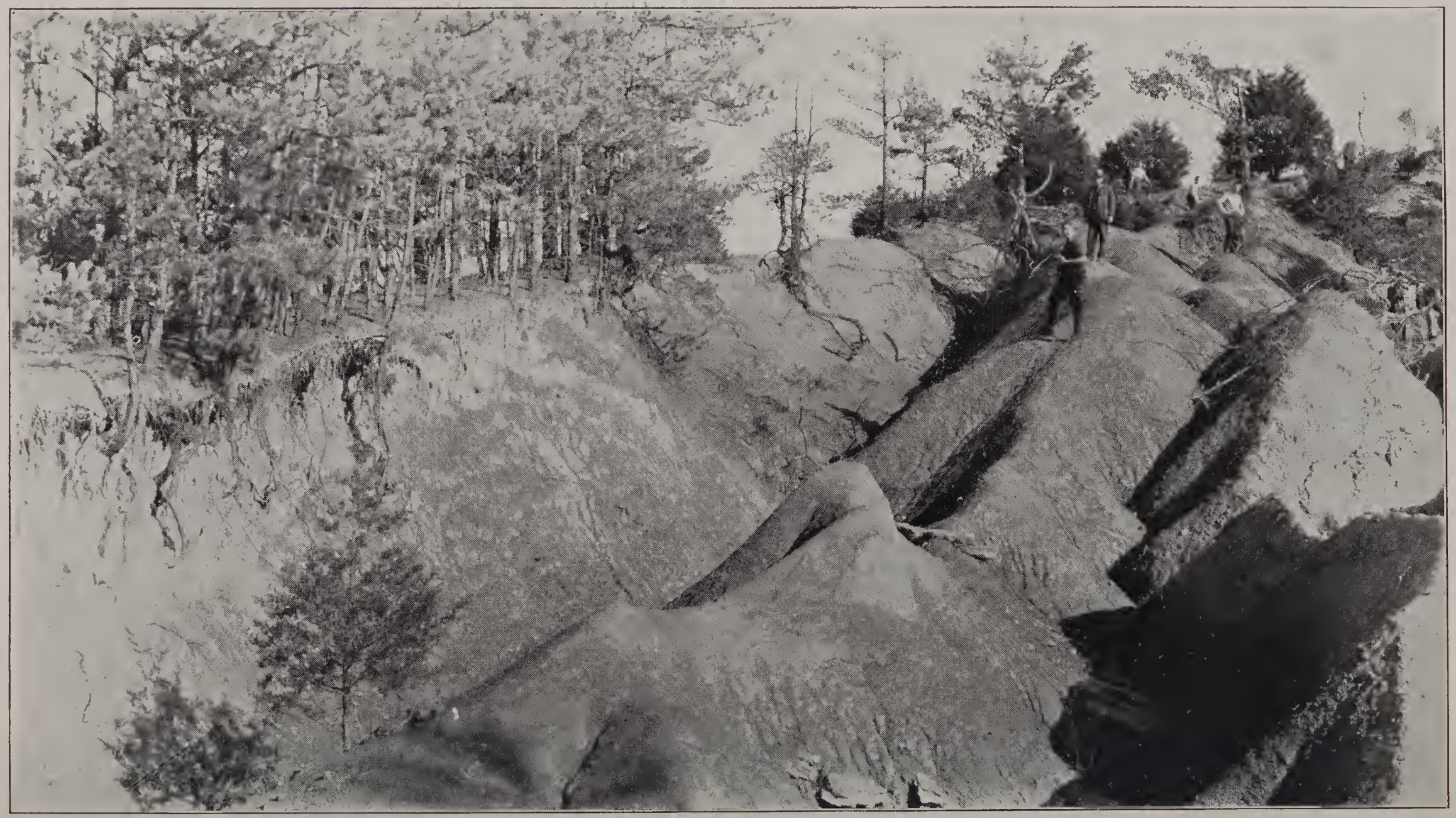
Their indirect, indispensable part is a service function; they act like the throttle on an automobile; they are part of the mechanism to even up the flow of streams from which hydroelectricity is produced; they can balk the attempt of water to run too fast downhill.

Hydroelectric power need not cost much more than enough to pay the fixed charges on the plant. But this cost is determined by our ability to modify the earth's surface in a big way; to pile up the rocks, to move the hills, to shift the watercourses. By and large, hydroelectric plants cost a lot, but they are expected to last a long time. Suppose they don't? One of the habits of water running downhill is to bring with it loose earth and drop it when it comes to a standstill as it does above a power dam. Under continued silting the reservoir becomes a useless archeological specimen.

The question is how to stop the silting.

Well, here are forests!

Except for a layer of concrete there is nothing known that will hold the soil so firmly on sloping land as a cover of trees.



One of the habits of water running downhill is to carry with it loose earth. *Courtesy T. V. A.*

Except for a layer of concrete there is nothing that will hold soil so firmly on sloping land as a cover of trees. *Courtesy T. V. A.*

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The remains of a once beautiful and rich forest—the inevitable result of destructive logging and repeated fires.

F-176392

Mountain streams run clear if they rise in forests, but not if they rise on sloping land from which the trees have been cut or burned. From the steep sides of the Cascade Mountains where there is much rain, very little soil is washed away because 90 percent of them are covered with dense forests. In California where there is much less rain, water flowing from burned-over watersheds brings down from 20 to 67 percent of ash and silt. In the southern Appalachians there is 50 times more silt in streams coming from treeless hills now used for pasture than from those still covered with forests.

It is foolish of course to pretend that, however thick the trees stand along the watercourses, the Missouri and the Ohio and the Arkansas will run clear. Behind the Mississippi and her tributaries are 800 million acres where the floods that bring down the silt originate in rain and melting snow. One-hundred-and-sixty million of these acres are, or can be, covered with forests. Back of the rivers that flow into the Atlantic and the Gulf and the Pacific are more millions of acres in forests. On all of these we can have as many trees as we will take the trouble to plant.

It is fortunate for the success of the Power Age that 172,600,000 acres of our forest lands are in the hands of the Federal and State Governments—also fortunate that almost all the streams west of the Great Plains and many of those in the northern and eastern part of the country rise in forests which are publicly controlled. The Government—having, let us hope, a longer expectation of life than any of the individuals who compose it—is not under pressure to show present profit in trees at the cost of future scarcity of water power. No such obligation is felt by owners of millions of acres used solely for commercial purposes. They have usually been managed with an eye single to one immediate return—a profit from lumber. But the Forest Service in charge of the national forests must meet the challenge of returning not only wealth measurable in money, but also services and social values which will continue as far into the future as men have need of trees. As a basis they must assure us of an ample perpetual crop of timber.

The Forest Service has established many forest nurseries.

F-200914

Our forests once lay in two great blankets of green over half the country. One extended from the Atlantic seaboard up over the tops of the Appalachians and west to the prairies. The other began beyond the Great Plains, reached as far up the sides of the Rockies as the timber line, and down beyond to the Pacific coast. We have sheared off the edges of these great forest blankets and left them full of holes. We would not if we could stretch them over as much land as they once covered. Too many of us would go hungry! But we are busily mending the holes and darning spots that are too thin.

On the 170,000,000 acres which are in the national forests trees are given every chance to reproduce and grow, and where they will not or cannot, the matter is being taken out of their hands.

Up in the Lake States fire has followed the lumberman, burning the young trees that had seeded-in; burning the forest litter that protected them year after year and burning the seed on the ground. Through the pine country of the South are patches of no man's land, where one-third of the trees have been turpentined to death and fire has gone through like a blast from below to destroy the few parent trees left standing and razorback hogs have dug up the roots of the seedlings. In the Rockies are wide strips of Englemann spruce which have been felled by fire. Down in the spaces between the fallen trees is often nothing but a carpet of mountain flowers—Indian paintbrush, Mertensia, fireweed. Not one single young tree of any sort! From Maine to California; from Florida to Washington is idle land on which trees are the perfect crops. And we are cutting nearly twice as much timber every year as we are growing and are importing more than half of our pulpwood and paper from Canada and Europe!

To replant these devastated acres and catch up with the deficit, the Forest Service has established nurseries where tree seedlings spend their first 2 or 3 years. When they are ready to go out into the world they are taken by a corps of forest workers—perhaps C. C. C. boys—to the place for the new forest. Each boy has in his right hand a sort of glorified cross between a large sharp chisel and a small dull spade with

They form a line with the boss at one end and go across the land leaving a new forest as they go.

F-268015

a long steel handle. They form a line with the boss at one end, each boy back of the spot which has been prepared for him to plant the first tree. Then at the signal it is "Left foot . . . right foot . . . stoop and plant!" The planting tool strikes deep, the boy pulls it toward him, leaving a narrow wedge-shaped pit, sets in a tree, makes it firm with a foot on each side—and then it is "Left foot . . . right foot . . . stoop and plant!" again, and the boys go on across the land, leaving a new forest as they go.

In this forest no time is wasted in that prehistoric makeshift, the struggle for existence, because the forester enforces peace. Each tree is allowed the space it needs to grow into what the forester has determined it shall be—not a giant grown great at the cost of those around it—but one of a group sharing the light and food among themselves. In the interest of producing a perpetual harvest the forest is made into a democracy.

Now it is one thing to plant forests, and quite another to bring them up. Trees have diseases and enemies and are subject to terrible hazards. There, for example, is the lodgepole pine of Montana. Timbers sawed from it shore up the great copper mines of Butte and Anaconda. The trunks of millions of them have laid the beds for the railroads that cross the northern Rockies, and 95,521,200 new railroad ties are needed every year. But the lodgepole pine has no defense against the well-organized attack of a tiny beetle not a fifth of an inch long. A few beetle scouts are sent ahead of the main body to spy out the land. If they find a favorable area they take possession of a group of sheltered, well-placed trees. The next year hosts of their relatives move in and the scouts go forward to the next post and again the main body follows on behind. These beetles bore in between the bark and the wood and girdle the tree as effectively as it could be done with an ax. The campaign against them is being pushed by the Forest Service.

From the time that a tree begins its life the great overwhelming danger it has to meet is fire. There is no way of making forests immune—wood will burn. But the Forest

F-251835

To build a fire and boil a pot of coffee has all the joys of youth regained but afterward carry water from the creek in the coffee pot and soak every smoldering spark.

Service is carrying on a country-wide campaign of education, prevention, and cure.

Prevention begins with ourselves. It is hard to alter habits. A cigarette butt is uninteresting. There is really nothing in a burned match to allure and charm, but the imperative need is to keep the mind on it, break it in two, and insert the charred end in a pocket instead of in a pile of dry leaves on the roadside. To gather sticks and build a fire beside a stream, boil a pot of coffee, and broil a strip of bacon has all the joys of youth regained; but to dig down afterward and lay those burned sticks in a hole, to carry water from the creek in the coffeepot and soak them past any disposition to smoke, to cover them with earth that has nothing more inflammable in it than pulverized rock, and then to stamp on the place—these processes are as dull as brushing one's teeth. But to prevent fires must become a human habit, if we are to have forests to serve us.

After fire is once started, it must be found. Towers are being built all through our national forests from which men can look across the sea of trees below. Up there in the singing wind the lookout has a small room, glassed all around as though he were in a lighthouse. Before him is a map of the locality over which he is looking. As a captain finds the location of his ship with a quadrant, so the lookout locates a column of smoke by an alidade and telephones its position to the nearest ranger station. Usually some other lookout also sights the fire and telephones from his post. The ranger knows that where the air lines from two lookout towers cross is the place of the fire. He has the records of the amount of moisture in the litter on the forest floor. He has the latest reports on probable directions of the winds and the possibility of rain. He has maps showing roads passable for motors and fire trucks, trails that can be followed by a horse, paths through the forest over which men must carry their own equipment. He knows where the streams and ponds are and whether there is water enough in them to supply the pumps. His fire truck is ready to shoot out through the loose-swinging fire-house doors within a minute. He will call the nearest patrol plane so as to have a continuing report from all parts

F-285471

Finding the fire.

of the fire; he will send men out with portable short-wave radio sets to get the news and send reports; he may have a traveling weather bureau to tell him what to expect next. Everything is organized to catch a fire near the relatively helpless moment of its birth.

Following the fire truck go the truckloads of men, the camp equipment, food, first-aid tent, and extra tools. The cook is almost as important as the foreman. The food for 25 fighters to last 4 days will weigh 700 pounds packed, that is, 5 pounds of food per man per day, and in addition, tobacco.

Only men "strong of their hands" are good fire fighters; only men well shod so that their feet will not be blistered when they work in hot ground; no boys so young that they have not got their full strength; no men so old that they have lost theirs; and always men with "intestinal fortitude." The minimum work of these men is 12 hours a day cutting down trees, digging fire lines down to mineral soil, grubbing out the underbrush, sometimes in an atmosphere of terrific heat, always of smoke, and frequently of danger. There will be no bath. They will sleep on thin beds spread on the ground. In any emergency the gang that is sleeping is roused and sent to the lines again. It is a question of just how long human doggedness can hold out, for a fire fighter must stand up to a fire as he would to a human enemy, get it down and hold it down when he is blistering with heat and choking with smoke. If we cannot protect our forests from fire we shall have no perpetual harvest.

Those forests which once covered half our country contained an enormous store of wood that had been ages in growing. What we are aiming at now is to get from a third less land a perpetual harvest of the trees large enough to satisfy the increasing demands of a rapidly swelling population.

Let us make no pretense that to develop electric power is the primary object of the Forest Service. We have direct obligations to improve human life that are all our own. For example, we are not housed—we Americans—up to our own standards of comfort and decency. There are "dog-trot" houses in the hills and sod huts on the prairies still being lived

F-238984

Destroying the harvest.

in. It is estimated that during the next 10 years we shall need at least a million new living places. The Forest Products Laboratory has shown how we may prefabricate low-cost wood houses that can be erected by seven men in 21 hours for as little as $1,400.

It has also found that arches built of small pieces of wood glued together can substitute for steel in large structural spans. To satisfy our demand for wood pulp we are planting forests of slash pine on that old "no man's land" in Mississippi the thinnings of which will be ready for pulping in 10 years from seed, while the trees that are left go on for turpentining, and after that are sent to the mill as saw timber—three uses for the same forest at the same time. We are concentrating on the raising of the best trees to produce both board feet and cellulose so that in addition to a suitable supply of lumber, we may have that whole series of products: Rayon; substitutes for leather, wool, lacquer, and glass; the films on which moving pictures are taken; the guncotton of which explosives are made.

The forest is, among other things, a cattle and sheep range. Upon the Forest Service lies the responsibility of determining how many cattle to the acre can be allowed to feed in the forests, when the herd must be driven up to the mountain meadows where the snow is melting and the summer feed is thick among the great trees, just how late in the autumn they can stay there, when they must be driven back to their home ranches for winter feed.

One acre in every thirteen in the United States is managed by the Forest Service and on them is being conducted a vast enterprise in the multiple use of land. There are in the proud young Power Age many other uses for a forest than just to grow trees. A forest is as much a community of living things as a city. Although it is dominated by trees other things live there also. Many of the wild animals within our forests no more chose that place to live than the flocks and herds we send there to graze. We have crowded them off the land we cultivate. The tribes which filled the prairies of the Mississippi Valley and the marshes and little lakes to the north of them, for example, left within three

Only men "strong of their hands" are good fire fighters.

F-223740

decades. The prairies were plowed and the wild things that fed in the deep grasses crowded back into the forests along the mountain sides. The marshes were drained and there was little left of the wild rice on which the ducks had fed. The trees were cut from around the little lakes and along the streams, and the spring freshets washed the fish eggs out of the shallows before they had time to hatch. This emigration has worked out rather disastrously for the dispossessed wildlife.

It is true that in the summer the forest underbrush and trees set a rich table for the deer and elk and rabbits, but in the winter when the snow is so deep that they cannot dig down through it for food, the deer strip the trees of branches up to the "deer line" which is as high as they can reach, and then gnaw the bark till they have girdled the trees. If the deer multiply too rapidly—and this applies to all the tree eaters from the rabbit to the moose—they kill trees which we cannot spare at the same time that they destroy their own winter food supply and die of hunger. The flesh eaters have followed them into the forest—cougars, lynx, bobcats, and wolves. And because these, too, are full fed they increase rapidly and the deer decrease in proportion, till the flesh eaters also have destroyed their food supply and go hungry. These three forms of life—the trees, the vegetarians, and the carnivora—might make some sort of adjustment, but into this forest problem comes another factor—man. Our killing, whether of necessity or for sport, has been almost as destructive to wild animals as our tree cutting has been to the forests. If we are to make hunting an increasing pleasure to an increasing number of us, whether we do it with rod and gun, or with camera, bird glasses, and flashlights, we have got to control for our own benefit the whole of that three-cornered struggle.

That is exactly what the Forest Service, in cooperation with the Bureau of Biological Survey and the State game departments, is doing. The supply of wildlife hinges on the answers to such questions as "How much of what does a deer eat?" It took long and careful observation to discover that a deer requires 2.2 pounds of food for every hundred

F—189073

For 30 years the grazing ranges in the national forests have been managed on the principle of the largest carrying capacity consistent with forest protection.

pounds of its weight every day; and that it will stay on and starve rather than hunt for food beyond its usual range; still more investigation to determine that a hungry moose will pass by piles of carefully dried alfalfa in order to find pungent boughs of balsam. Where the game have increased beyond the possibility of feeding themselves, groups of them are transplanted, the open season for hunters is lengthened, or they are systematically reduced to the number that can keep themselves alive without danger to the perpetual harvest of timber.

The forest streams are being improved and stocked with young fish; water plants for duck food are being kept in the little ponds, and nests are built in trees for the wood ducks; fur-bearing animals like beaver, mink, and otter are being protected.

It devolves upon the Forest Service to maintain inside the forests such a balance as will provide us with the greatest possible harvest of what we want both from the trees and the animals that live there.

And to help make the plains country a better place to live the Forest Service is offering seedlings and encouraging the planting of windbreaks to protect prairie farmsteads. Anyone who has sat in the lee of a farmer's woods knows that the air there is still; anyone who has driven along a dry macadam road knows that a slow wind carries no dust; anyone who has seen Monday's wash flapping on the line knows that the faster the wind the quicker the clothes dry. On the basis of this common knowledge, backed up by the 2,700 short shelterbelts already in use, the Forest Service has worked out plans for farm shelterbelts.

We have not, we human beings, lived permanently inside the forests since our culture got beyond the hunting-age pattern. In early days we built our villages close to the forest edge on the same principle that we select a city apartment within walking distance of a grocery store. During the first great cutting of our American timber, temporary towns for the workers did spring up in the midst of the forests, but when the trees around them were gone these towns died. On the basis of the perpetual harvest the Forest

The Deer Line.

F-253597

F-314077

Protection of the wildlife is correlated with other forms of use of the national forests.

F-311718

Winter sports is a growing use of the national forest.

Service plans to create something unusual in human experience—permanent forest communities. Some of these have been established; for others the land has been laid out and the plans made. There are to be no more people in these towns than can find employment; enough men to cut each year's quota of trees, enough to run the mill which is to operate the year round, enough to run the woodworking industries, enough to man such service occupations as keeping the store and the post office and the bank, teaching in the school, and caring for the public health. In these towns the workers will have that precious social possession—security.

One of the most important uses of the forests would have been impossible without the leisure provided by the Age of Power. The national forests are being transformed into the most wonderful playgrounds a people ever had. Roads are being laid so that we can reach them in our 23,000,000 automobiles. Camping grounds and shelters are being built for us to stay in. We are told when and where the fishing is good, when the hunting season opens, the time of the turning of the autumn leaves to red and gold, when there is snow enough on the mountains for skiing. In 1935 there came and went through the national forests 17,000,000 of us who had time to visit these great playgrounds because of the new-found leisure provided by this Age of Power.

The problem which the Forest Service has to meet is to get as much service of as many different sorts as possible out of the forest at the same time. If a specially lovely section is equipped as a camp for tourists, obviously it cannot at the same time be used as a grazing ground for cattle, although it may be imperative to log out some overmature timber. We can use our full-grown forests for playgrounds without destroying them. A tree can be sat under; a stream may be fished in; a lake may be swum in; a trail may be walked over with practically no disastrous results. But a newly planted forest must be barred to guests like a child's nursery. There are no rules in these great playgrounds but those which we have laid down for ourselves under the law.

Money is of course a poor measure for pleasure. It is, however, the only common one we have. The American

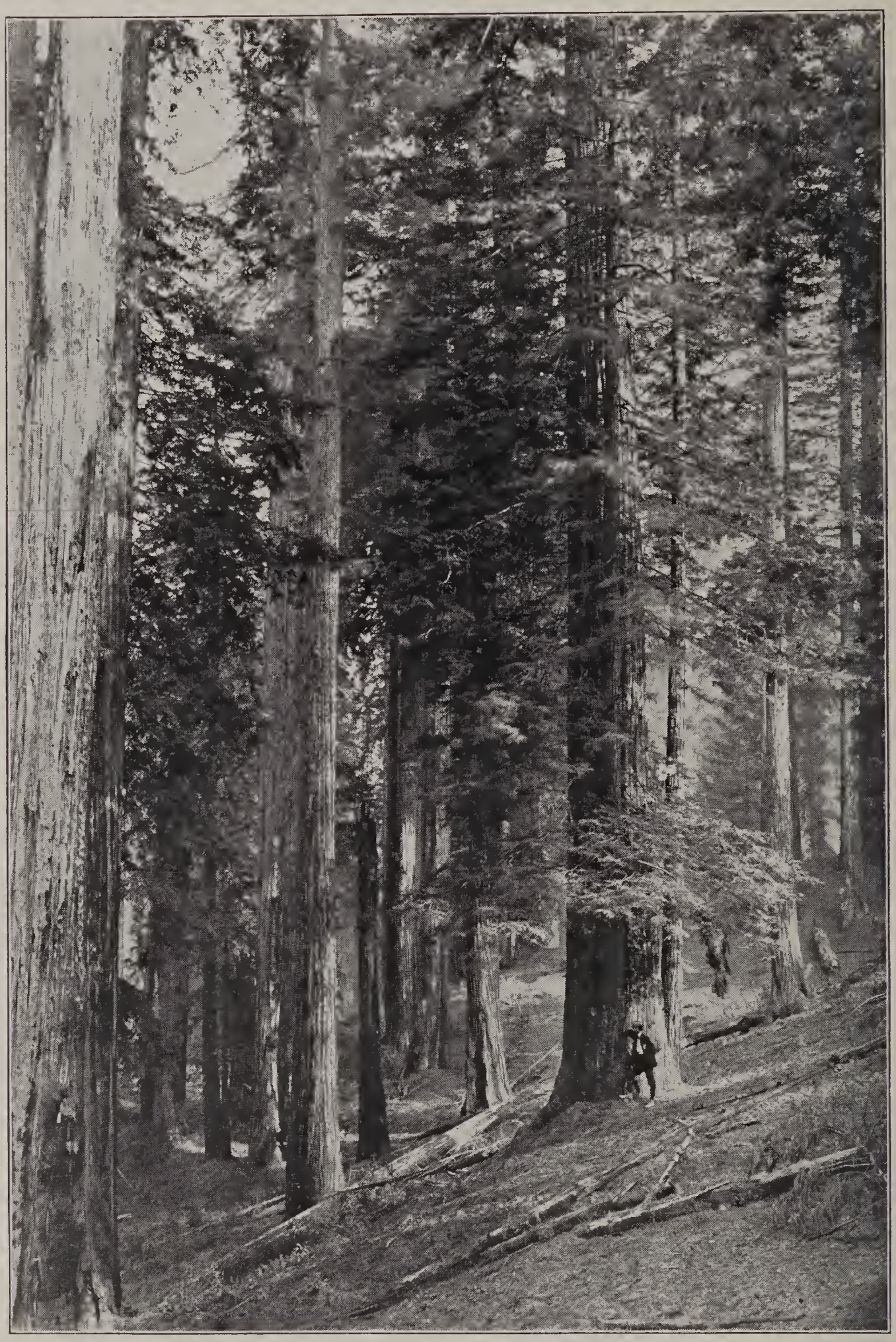
We go to the national forests to play.

F-253347

people's expenditures for forest recreation are estimated to be $1,750,000,000 a year. This is a dollar yardstick of the delight we get out of our 154 forest playgrounds.

The thirteenth of our land which is in national forests is scheduled for planned management and use. An ample perpetual harvest of wood is just ahead; cattle and sheep are being fed together with the wild things; the clear streams are being filled again with fish; men are finding permanent homes in the forests and great numbers of our population go there to play. There is no known limit to the amount or kind of service we may get when we turn to our forests.

The end product of all these integrated services is the same for which power is being produced—human security and comfort and happiness. When the oil wells run low and the gas wells are no more than a remembered aroma, when all that is left of the "Coal Measures" is a note or two on the doings of Carboniferous times, when each raindrop is giving an account of itself, and the cry is still for more power, then here are forests, gentlemen.



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Here are forests.