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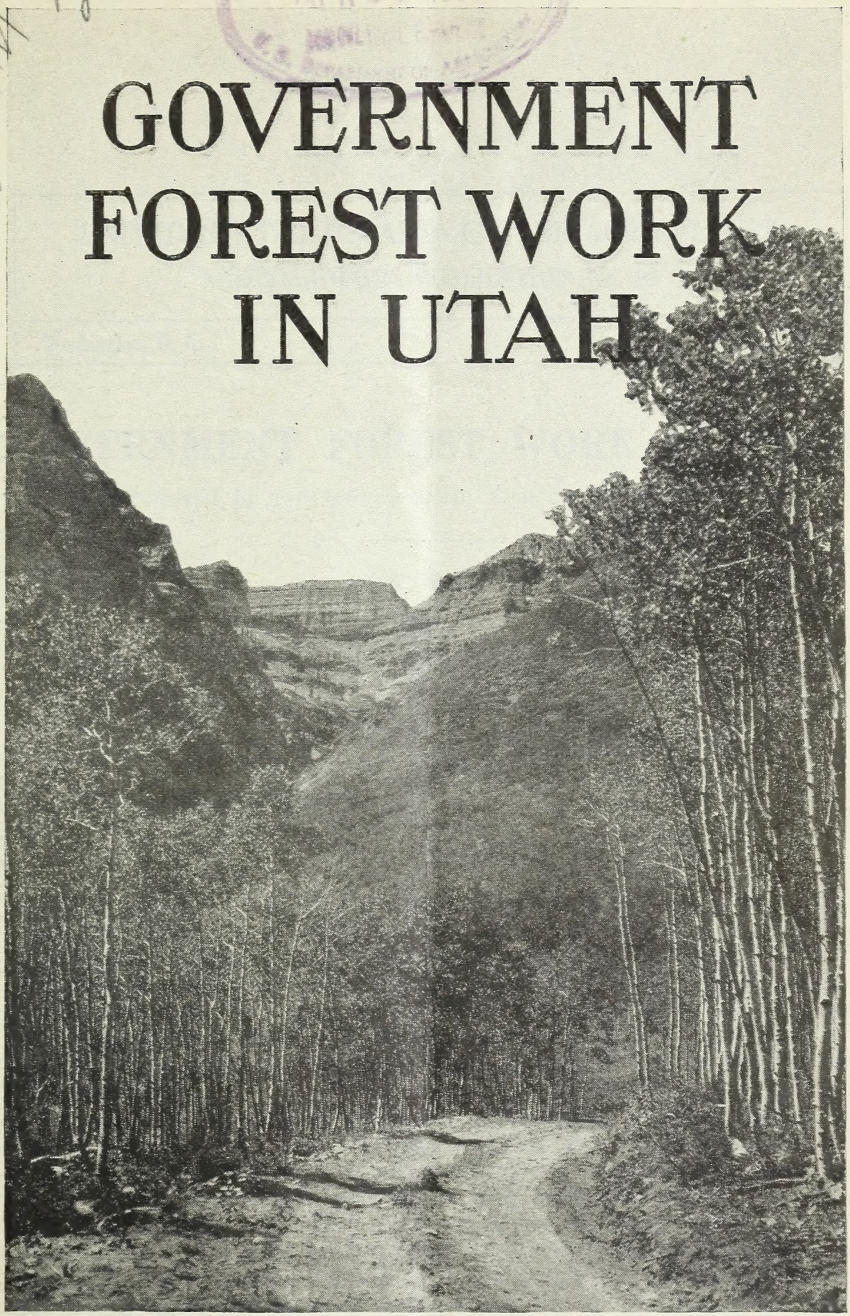
GOVERNMENT FOREST WORK IN UTAH



UNITED STATES DEPARTMENT OF AGRICULTURE
MISCELLANEOUS PUBLICATION Nº 99

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GOVERNMENT FOREST WORK IN UTAH

Prepared by the Intermountain Region, Forest Service

CONTENTS

To the people of Utah the rugged mountain ranges ever within their view mean much more than a wonderland of scenic beauty and grandeur; much more than a national playground and resort of rare distinction. Such values the natives of the State see and increasingly appreciate; but they also see in these towering hills the primary source of that productivity which, coupled with the ambitious industry of her citizens, has given Utah an enviable rank among the Western States.

Thirty years ago these great mountain areas were in danger of rapid devastation. The timbered slopes, the natural sources of supply of wood essential to continued civic progress, were afforded no protection against fire, reckless cutting, mismanagement, or wasteful exploitation. The vast areas of livestock range were steadily being turned into dust beds through overintensive and uncontrolled grazing. In those days the traveler in the valley might have counted the herds upon the near-by mountain sides by the clouds of dust which rose above them. The future of irrigation and the continuance of pure and plentiful supplies of water for domestic use were threatened through the destruction of the forest and vegetative cover

This publication supersedes Department Circular 198, Government Forest Work in Utah.

on the mountain watersheds. Without the restraining influence of such a cover, early and disastrous spring floods, followed by extreme shortages of water during the dry summer months, were inevitable, with all their blighting effects upon agricultural development and upon community life and growth.

It was the recognition of these dangers which led to the establishment of the 10 national forests of Utah, which now contain approximately seven and a half million acres, or four times the area cultivated. There are five national forests entirely within the State and five others partly in adjoining States. The major portion of three of the latter forests is within Utah, while the greater part of the forest area of the other two is in Idaho. Supervisors' headquarters for nine of the Utah forests, as well as the headquarters for the Kaibab Forest of northern Arizona, are located in Utah. There are more than 70 yearlong employees—supervisors, rangers, and clerks—on these national forests. The headquarters of the Intermountain Region, called Region 4, which includes 26 forests in southern Idaho, western Wyoming, northern Arizona, Nevada, and Utah, is located at Ogden and has 52 more employees. The supply depot for all national forests in the United States, with 11 employees, is also at Ogden.

National forests were not established for the purpose of returning a profit, nor is the question of receipts a prime objective. Because of the fact that the national forests keep lands off the State tax roll, the Federal Government turns over to the counties in which the forests are located 25 per cent of the gross receipts to be used for schools and roads. In addition to this 25 per cent, 10 per cent of the forest receipts is used in the construction of roads and trails within the national forests. Every county in the State participates in these 25 per cent and 10 per cent funds. Through special legislative acts of Congress, additional sums have been appropriated for the building of roads. These appropriations have given tremendous impetus to the road-building program not only of Utah, but throughout the entire West.

The following figures for the fiscal year 1929 illustrate the financial benefits derived by Utah from the national forests:

National forest receipts

Total receipts	$205,148.21
Appropriated to Utah for schools and roads—25 per cent	51,287.05
Net receipts to Federal Government	153,861.16

National forest expenditures

Administration	$211,621.77
Research and investigations	18,101.74
Roads and trails[1]	356,244.95
Other improvements	52,212.39
Total	638,180.85

It is thus seen that the Federal Government expended $638,180.85 in Utah in the fiscal year 1929 for administration and improvement

[1]An increase of the forest road appropriations from $7,500,000 to $12,500,000 beginning July 1, 1930, will increase this item proportionately.

of the national forests. To this sum should be added $51,287.05 (25 per cent of the national forest receipts), making a total of $689,-467.90 expended in Utah by the Forest Service in that year.

HISTORY

When the Mormon pioneers settled Utah, they found in the mountains that bordered the valleys a generous supply of wood for fuel; logs for houses, barns, and other buildings; poles and posts for fences; in fact, timber for all purposes. At first, with the aid of whipsaws, lumber was manufactured for doors and windows only. Later portable mills operated by steam or water power were brought into the Territory, and for many years following the advent of these mills, the manufacture of lumber for home building was one of the

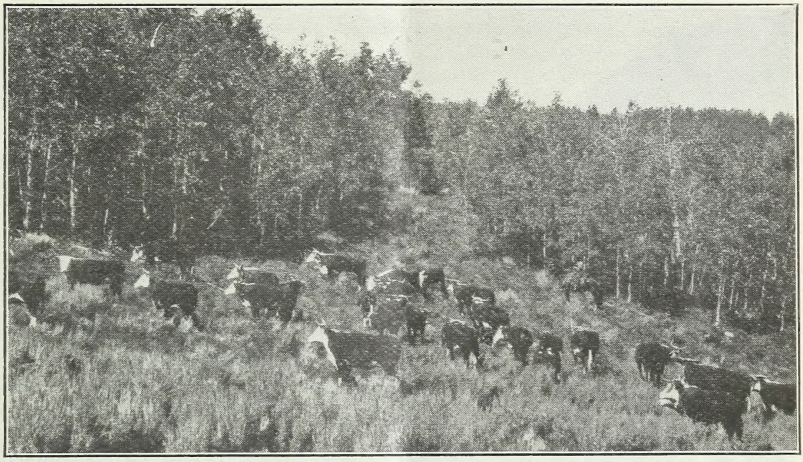

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FIGURE 1.—High-grade Hereford cattle on the forest range

principal industries. It continued as such until the railroads brought in the cheaper lumber from outside points.

During the early years in the settlement of Utah the watersheds of all the streams were generously covered with timber, shrubs, and other vegetation. As a result, there was regulated run-off, not only during the heavy discharge from melting snows in the spring, but during heavy summer showers. Streams supported trout in abundance and stream-flow conditions generally were satisfactory.

The construction of roads and trails up the canyon bottoms to the timber broke the vegetative carpet and provided waterways which facilitated erosion. The most accessible stands of timber were depleted by fire and heavy cutting. The unregulated and excessive grazing of cattle and sheep, especially on the watersheds, was, however, responsible for the greatest damage to the near-by communities. The mountain ranges were readily reached by countless herds of sheep which swarmed over the watersheds year after year until the forage cover was denuded. During the period of spring run-off from melting snows, many farmers who were dependent upon water for irriga-

tion suffered through the washing out of their reservoirs, dams, and ditches. During the later part of the summer months their crops suffered from the extreme shortage of water. Following heavy summer showers, floods came that threatened the very life of some communities. Roads and trails in many of the canyon bottoms were completely destroyed. The maintenance of the roads between the sawmills and the settlements became very expensive for the timber operators. Conditions grew worse. The injury to watersheds increased. Immediate relief was necessary if some of the communities were to continue. After Congress in 1891 had authorized the President to establish forest reserves, the conservative people of the State began to seek relief through the reservation of the more important watersheds. In 1897, President McKinley set aside the Uinta Forest Reserve, and on June 4 of the same year, Congress enacted

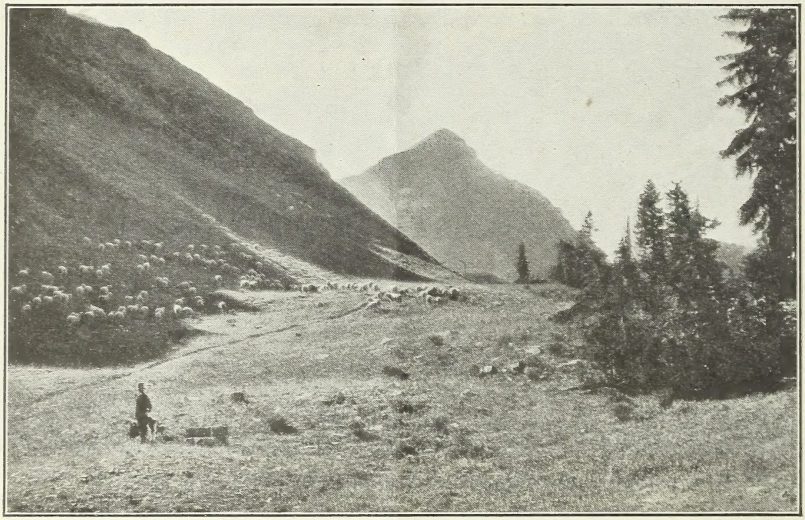

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FIGURE 2.—Harvesting a forage crop in Utah

a law which gave the Secretary of the Interior the authority necessary to open these reserves to all forms of legitimate use, consistent with the primary purposes for which they were established and which were defined to be "the protection of a permanent supply of timber for the use and benefit of the citizens of the United States, and the regulation of stream flow."

From 1897 to 1907, from all parts of the State, petitions were sent to Washington asking for the setting aside as forest reserves the areas most in need of protection. The area of national forests to-day is approximately the same as it was in 1907, although Utah is now one of the few Western States in which areas may still be set aside for national-forest purposes by presidential proclamation without a special act of Congress.

The Bookcliff Mountains and the Henry Mountains in eastern Utah, the Deep Creek Range in western Utah, and other isolated areas have never been placed under Forest Service management.

These areas have been badly overgrazed, except the part that has gone into private ownership. In some cases the original users of the areas have been driven out by transient stock owners.

ADMINISTRATION

The old forest reserves proclaimed by Presidents Harrison, Cleveland, and McKinley were placed under the administration of the Department of the Interior. In 1897, they were opened to grazing and other forms of legitimate use. But the report of the Commissioner of the General Land Office, for the fiscal year ended June 30, 1904, says in regard to the national forests:

> I desire to renew the recommendation heretofore made by this office that the work connected with the administration of forest reserves be transferred to the Bureau of Forestry, in the Department of Agriculture.
>
> * * * The work is proving to be one of great magnitude, such industries as agriculture, grazing, mining, lumbering, transportation, manufactures, and commerce, in general, having a most intimate and dependent relation to it, as has been pointed out by President Roosevelt, in connection with expressing the opinion that "the forest problem is in many ways the most vital internal problem of the United States."
>
> Plainly, work recognized as involving interests of such magnitude should be intrusted to a branch of the Government which can command the expert talent needed to cope with the intricacies and difficulties of the problems involved.
>
> It is needless to state that the General Land Office is neither organized nor equipped for such work * * *. The application of scientific methods in the development of a system of national forestry is altogether outside of and beyond its scope.
>
> I, therefore, most earnestly desire to see this work placed by Congress in the charge of a scientific branch of the Government, in which it can be expanded properly along the lines essential to its success.

The Secretary of the Interior in his report for the fiscal year ended June 30, 1904, said:

> Forestry, dealing as it does with a source of wealth produced by the soil, is properly an agricultural subject. The presence of properly trained foresters in the Agricultural Department, as well as the nature of the subject itself, makes the ultimate transfer, if found to be practicable, of the administration of the forest reserves to that Department essential to the best interests of the reserves and of the people who use them.

and adds—

> I am still of the opinion therein expressed, and concur, therefore, in the Commissioner's recommendation.

In 1905 Congress transferred the administration of the forests to the Department of Agriculture.

Gifford Pinchot was the first chief forester of the United States, serving from 1905 to 1910. H. S. Graves succeeded him and served until 1920, he in turn being followed by W. B. Greeley, who retained the position from 1920 to 1928. In the spring of 1928, R. Y. Stuart was appointed chief forester.

On December 1, 1908, in an effort to bring the administration of the national forests closer to the people who used them, forest units were grouped into field administrative districts, with a district forester in charge of each. There are now nine such districts (designated as "regions" in 1930) in the United States.

The national forests of Utah, together with the headquarters and the net area of each, are given in Table 1.

TABLE 1.—*Utah national forests*

Forest	Headquarters	Net area	Forest	Headquarters	Net area
		Acres			*Acres*
Ashley [1]	Vernal, Utah	980, 329	Minidoka [1]	Burley, Idaho	70, 651
Cache [1]	Logan, Utah	282, 246	Powell	Panguitch, Utah	1, 039, 996
Dixie [1]	Cedar City, Utah	796, 970	Uinta	Provo, Utah	1, 078, 217
Fishlake	Richfield, Utah	1, 387, 079	Wasatch	Salt Lake City, Utah	610, 754
La Sal [1]	Moab, Utah	504, 291			
Manti	Ephraim, Utah	725, 229	Total		7, 475, 762

[1] This forest is in more than 1 State. The area for the Utah portion only is shown and is the record of June 30, 1929.

FOREST ORGANIZATION

The regional forester at Ogden, Utah, has general supervision over all the forests in region 4. When information is desired concerning the region as a whole, or all forests in a State, communications should be addressed to Regional Forester, Forest Service, Ogden, Utah.

Each national forest (fig. 3) has in charge a forest supervisor, working under the general direction of the regional forester. When information is desired concerning any particular national forest, write to the nearest forest supervisor, addressing the communication, for example, to Forest Supervisor, Moab, Utah.

On forests which have a particularly large volume of business the supervisor is assisted by a deputy, and sometimes by technically trained specialists in scientific forest or range management.

Every national forest is divided into ranger districts with a district ranger in charge of each. Under the supervisor the forest ranger is responsible for the protection of his district and the administration of its affairs. The average ranger district embraces about 225,000 acres. The ranger supervises and directs the timber sales and the grazing, recreational, and other uses to which the area under his charge is put. He builds roads, trails, bridges, telephone lines, and other permanent improvements. During the long, dry summer he directs the fire-protection system on his district. A ranger must naturally be sound in body, for he is called upon to work during long periods at strenuous work in all kinds of weather. He must also know how to pack supplies and take care of himself and his horses in regions where he is thrown entirely upon his own resources.

Temporary fire guards, as well as men to assist in the handling of the intricate grazing problems and timber-sale work, are often employed during the busiest part of the season. In addition, there are also available for special work logging engineers, lumbermen, scalers, and other specialists. In the office of the regional forester there are chiefs of branches in charge of the major lines of work—grazing, forest management, lands, operation, accounts, engineering, and public relations. Specialists, both mechanical and clerical, are also available when needed.

NATIONAL-FOREST POLICY

THE FORESTS ARE FOR USE

The national forests are administered to make them of the most use possible to the most people, but especially to the local farmer and settler. They are, first of all, to enable the citizens of the West to build and maintain homes. This policy was laid down by the Secretary of Agriculture in a letter to the Forester dated February 1, 1905, in which he said:

In the administration of the National Forests it must be clearly borne in mind that all land is to be devoted to its most productive use for the permanent good of the whole people, and not for the temporary benefit of individuals or companies. All the resources of the National Forests are for use, and this must be brought about in a thoroughly prompt and businesslike manner under such restrictions only as will insure the permanence of these resources. You will see to it that the water, wood, and forage of the forests are conserved and wisely used for the benefit of the home builder first of all, upon whom depends the best permanent use of lands and resources alike. * * * In the management of each forest local questions will be decided upon local grounds; the dominant industry will be considered first, but with as little restriction to minor industries as may be possible. Sudden changes in industrial conditions will be avoided by gradual adjustment after due notice, and where conconflicting interests must be reconciled the question will always be decided from the standpoint of the greatest good to the greatest number in the long run.

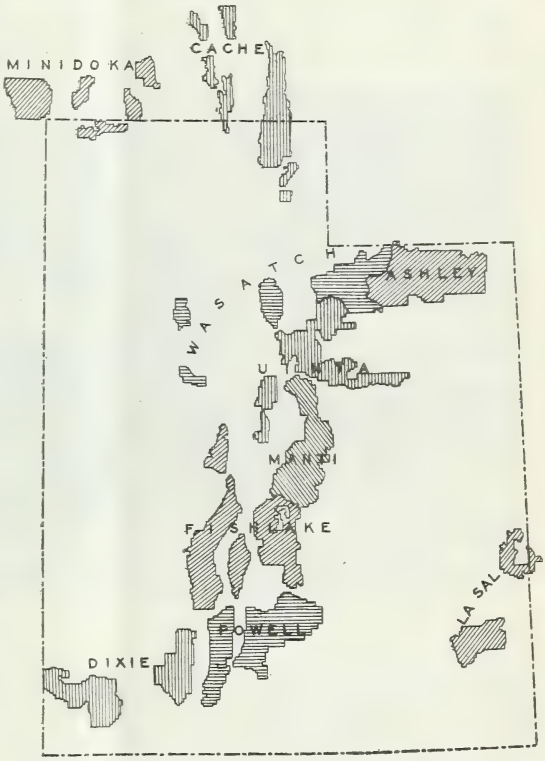

FIGURE 3.—Location of the national forests in Utah

A brief statement of some of the principal activities within the national forests of Utah will indicate how the above-stated policy is being carried out.

AGRICULTURAL LAND

At the time the national forests were created, boundaries were drawn to exclude, so far as practicable, all land chiefly valuable for agriculture. It was impossible to exclude all such land, however, and the act of June 11, 1906, was passed to provide for entry and settlement of agricultural tracts within the forests. All land within

the national forests of Utah has been classified after a careful examination and survey by experts. As a result of this classification, the remaining agricultural area, which was very small, was listed for entry, and to-day there is very little land suitable for homesteading within the forests which has not already been filed upon.

Under these provisions for settlement and entry, tracts embracing over 73,000 acres have been taken up as homes within the Utah forests. The Forest Service is glad to have settlers in the forests. Not only are they of material help in fire protection and in many other ways, but they also make use of the resources and help build up the country.

SALE OF TIMBER

Ripe timber on the forests, of which there is a large amount, is sold at a fair price. Anybody may purchase timber, but no one can

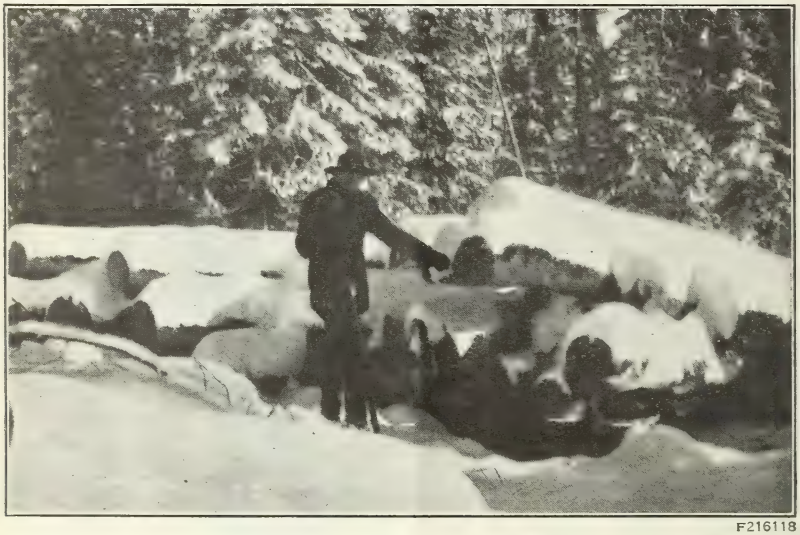

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FIGURE 4.—Utah ranger scaling logs

obtain a monopoly of it or hold it for speculative purposes. The fewest possible restrictions are imposed upon purchasers of timber, only such as will insure cut-over areas being left in the best condition for future growth. Experienced woodsmen estimate the quantity and quality of national-forest timber and its approximate value as a basis for the stumpage price to be charged. In fixing this price all factors which affect the cost of lumbering, such as the accessibility of the timber and the number and kinds of improvements necessary, as well as the general market conditions, are taken into account. The prices asked allow the purchaser of national-forest timber opportunity for a fair profit. Attractive logging chances are made known to the public, and full information regarding them and the conditions of sale is given to inquirers.

The trees to be cut on a sale are marked in advance by a forest officer, the object being to leave enough of the younger trees to form the basis of a second crop of timber on the same land. A limited number of mature seed-bearing trees also are left to effect natural reforestation should the younger growth be destroyed by fire, insects, or disease.

Timber on the watersheds of streams is never cut so extensively as to impair the protective cover that the forest affords, because one of the chief objects of establishing and maintaining the national forests is to regulate stream flow.

Small sales of timber are made by forest officers on the ground without delay. Larger sales are made either by the supervisor of the forest, the regional forester, or the forester, according to the quantity of timber involved. (Fig. 4.)

Small sales of timber for local use are encouraged. This is one of the ways in which the national forests are made to serve the small lumberman and consumer. Though single sales have been made for several million board feet, over nine-tenths of all sales made in Utah are for less than $100 worth of timber each. Sales are made to settlers and farmers at the actual cost of making the sales, without charge for the timber itself.

The national forests of Utah as a whole are not heavily timbered although they contain most of the timber within the State. This timber resource is of great value, and its value will increase as the potential forest lands, through the application of scientific forestry practices, are put into condition for maximum production. Some loss of timber each year is caused by tree diseases and insect depredations. Measures designed to check such losses are adopted wherever this is practicable. The principal native timber species of Utah are western yellow pine, Engelmann spruce, lodgepole pine, and Douglas fir. There are also vast quantities of cordwood such as quaking aspen, juniper, pinon, oak, and maple. It is estimated that the total supply of the State is 5,604,000 feet of merchantable saw timber, and 10,700,000 cords of fuel, pole, and post material. There are large areas of aspen which are available for pulp material should a mill be established in this region. The heaviest bodies of timber in the State are in the Uinta Range.

There are at the present time only a comparatively few mills operating in the national forests. These mills cut timber with a stumpage value of from $20,000 to $40,000 per year. They supply, however, less than one-fifth of the timber used in the State. Most of the timber is imported from outside points where it is more accessible in larger tracts, has the advantage of large-scale production, better grading, and better selling organization. The development of transportation facilities within local timber regions and use of more efficient mills will bring about increased activity in the local timber business.

FREE USE OF TIMBER

In addition to the timber sold under commercial and domestic-use sales, large quantities of dead and down timber and material suitable for fence posts and other purposes are removed from the national

forests each year under the regulations permitting the granting of this material free of charge, within limits, to local residents.

During the year 1929 more than 30,000,000 feet of such material was taken from the national forests of Utah under free use. In addition to this, thousands of feet of insect-infested, diseased, and stunted trees are given away annually under free use, so as to improve conditions for the better growth of the remaining stand.

MINING

All mineral deposits within the national forests are subject to location and development under exactly the same conditions as are the deposits found outside the forests. Prospecting is permissible anywhere within the forests. However, claims must be initiated in good faith and can not be located for the purpose of acquiring the timber, for town sites, or water-power sites, or for monopolizing the water supply on stock ranges. Legitimate mining operations are welcome and encouraged.

Eighty-nine per cent of all mining claims, within the national forests of the intermountain region, covered by applications for patent since 1906, in which final action has been taken, have been recommended for patent by the Forest Service. The other 11 per cent were protested and all but approximately 1 per cent were relinquished or canceled by the General Land Office, as a result of the protest.

In Utah no case since 1915 has been protested by the Forest Service which was not relinquished by the claimant or canceled by the General Land Office.

Timber needed in developing prospects may be secured without charge and the Forest Service gives the mining man what help it can in other ways.

GRAZING USE

In Utah the grazing of livestock constitutes one of the most important uses of the national forests. (See illustrations on pages 3 and 4.) Each year nearly a quarter of a million cattle and horses, and a million sheep are driven to the national forests for summer pasture. The livestock business in Utah is conducted principally by small owners, many of whom own stock of high quality. More farmers and ranchers hold grazing permits on the national forests in Utah than in any other State. Approximately 7,000 permittees graze a part or all of their stock during the summer season on these national-forest ranges. In no other part of the United States is the demand for forest range so intensive as it is here, and nowhere is there greater need to provide for the fullest possible use of the forage by livestock and at the same time to conserve the watershed values of the mountain slopes. In the valleys below the forests lie the irrigated lands, the basis of the key industry of Utah. The farmers are absolutely dependent upon an ample and regular supply of water, without which farming would be seriously handicapped. No abuse of the watersheds can be allowed which would impair the purity of the water needed for domestic use, or which would reduce the forage

cover to a point that would endanger cities and towns lying below, to damage from floods. For a period of nearly 25 years the application of sound principles of range administration has demonstrated the practicability of harmonizing the needs of the livestock industry, the farm, and the municipality.

Inaccessible range areas have been opened up through the development of watering places and the construction of drift fences and trails. (Fig. 5.) Improved methods of handling stock have been developed and brought into use. The elimination of poisonous plants and, when the poison affects only one class of stock, the changing of the class of stock have reduced summer losses. Grazing seasons have been changed to secure the best growth of forage, and studies are being continued with the object of making the ranges more productive. Stockmen have assisted in revegetating areas of low production within their allotments. Each year many forest users collect seed from the more palatable range plants which they sow on the areas that are not producing to capacity. The results are improved watersheds and range conditions, more stability to the livestock business, and greater production of meat and the by-products incident to the livestock industry.

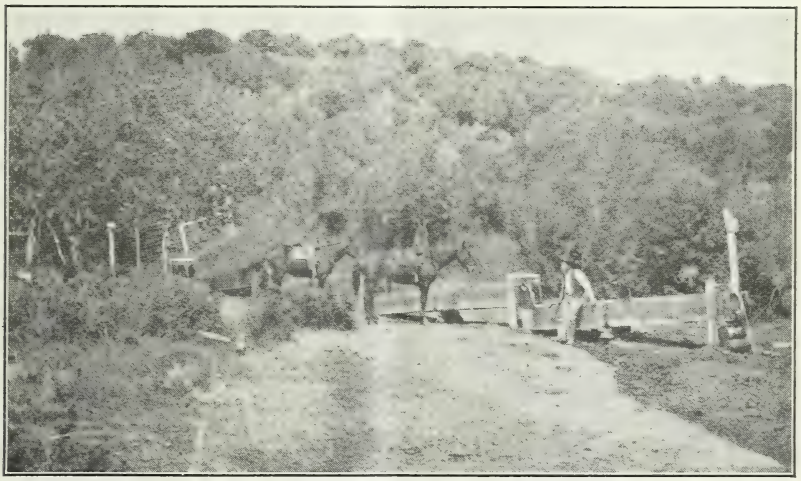

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FIGURE 5.—A water development. Troughs of clean water can be substituted for trampled mires by the expenditure of a little time and money

Livestock owners are showing keen interest in the management of the forest ranges. More than a hundred community livestock associations within the State are actively cooperating with the forest officers. The suggestions and help of these associations and individuals have a marked influence in improving the general handling of the stock while on the forests, besides bringing about marked improvements in the methods of marketing, improvement in the quality of the stock, etc. The old range wars and the hard feelings between the owners of different classes of stock have largely been overcome, while a growing spirit of cooperation and open-mindedness toward new and improved methods of range management has been brought about.

At the same time the livestock industry in Utah has thrived without injury to the other resources on which the State so largely depends.

THE INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION

Very soon after the national forests were placed under control it became apparent that better knowledge of the range vegetation and the influencing factors must be secured. From 1907 to 1912 a small force of investigators were trying to cover the general field of range problems in an effort to assist forest officers and stockmen. In 1912, on the Manti National Forest, at an elevation of 9,000 feet, the Great Basin Experiment Station was established. In various types of Utah range this station (now included in the Intermountain Forest and Range Experiment Station) is determining the frequency and degree of grazing that will restore and maintain the forage productivity of the range under the various climatic and soil conditions; the best methods of handling livestock on the range; methods of recognizing overgrazing in its early stages, and the rate of improvement of the range in different stages of depletion; means to control and prevent erosion on range lands; and methods of improving the production of range lands by plant introduction.

Too early use was found to be one of the main causes of range depletion and low forage productivity. Experiments have proved that the removal of the forage crop at monthly intervals during the growing period year after year weakens the plant, gradually delays the resumption of spring growth, postpones the period of seed maturity, decreases seed production, as well as the fertility of the seed crop, and ultimately results either in replacement of the better forage plants by plants of little value or in complete denudation. Some other findings are the following: By delaying grazing in the spring until all of the important forage plants have made from three to four weeks' growth, by limiting the grazing over the range to two or three times in a season, by applying the deferred and rotation system of grazing and leaving from 10 to 25 per cent of the palatable forage ungrazed, the range in good condition may be maintained at a high state of productivity and the forage may be efficiently utilized, and many depleted lands may be revegetated as rapidly as if complete rest were given. Under the deferred and rotation system grazing is deferred on a portion of the range until after seed maturity, then the forage on this area is utilized. When the first area is thoroughly reseeded a second area is treated in the same way and so on over the whole of the range. A seed crop is allowed to mature over a portion of the range unit each year without any loss of forage.

Over 600 tests with cultivated and native forage plants have been made in the more important range types in the West in order to increase the forage crop. These results have shown that a few of the cultivated grasses, including common bromegrass and Kentucky bluegrass, and certain of the native forage plants, including mountain bromegrass and some of the wheatgrasses, may be sown with success on areas having growing conditions considerably above the average and where the natural improvement of the range may not be expected within a reasonable period. The building up of the range on areas

with less favorable growing conditions is dependent upon that manipulation of grazing which will afford the native forage plants an opportunity to mature seed and revegetate themselves.

An experiment on range where shrubs, principally oak brush, make up approximately 80 per cent of the vegetation, showed that such range should be grazed only to a degree that will permit the increase and perpetuation of the more palatable browse species and grasses and weeds of approximately equal palatability, even though these last species make up considerably less than half the total vegetation and even though such grazing results in the nonuse of the bulk of the less palatable shrubby vegetation.

It is important to be able to recognize and correct overgrazing in its early stages. On many summer ranges in Utah the wheat grasses constitute the highest type of vegetation. If this cover is weakened by overgrazing, such plants as yellow brush, lupine, mountain sunflower, sneezeweed, yarrow, sweet sage, and pentstemon take the range and more or less erosion of the soil takes place. If overgrazing is continued, these perennial weeds sooner or later are replaced by annual plants of little forage value. Finally even these give way, leaving the area denuded and subject to heavy erosion, and eventually the fertile mountain slope is reduced to a barren waste. By learning what plants come in as the desirable type of plants begin to give way, it is possible to recognize overgrazing in its early stages, and to apply remedial measures.

Since one of the chief objects of Utah forest-land use is to provide a continuous supply of timber, it is important to so manage grazing that it will not interfere with timber reproduction. Investigations have shown that injury to timber production by grazing in Utah, regardless of the class of stock, varies with the intensity of use of a range. It has been found that on cut-over aspen lands, sheep and goats should be entirely excluded for at least three years in order to give the young sprouts time to extend their leaders beyond the height at which sheep browse. On cattle range light grazing is seldom injurious to the aspen sprouts. Where young conifer or evergreen species are being established, light grazing and open herding are essential.

Poisonous plants are one of the principal causes of losses of livestock on range lands. Experiments have shown that many of these poisonous plants may be economically eradicated either by cutting or grubbing. In the case of larkspur for example, if the cutting method is used, the plants should be cut twice the first two seasons and once the third year for complete eradication. If grubbing is applied, the plants are at once destroyed, provided the roots are grubbed to a depth of 8 or 9 inches. Usually a light regrubbing is necessary in the second year.

The water supply for irrigation, hydroelectric power, and domestic use is the most important resource derived from mountain lands in the West. An experiment has been under way at the Intermountain Forest and Range Experiment Station since 1915 to determine the effect of grazing on the herbaceous plant cover in relation to stream flow and erosion. Its object is to determine the kind and degree of grazing that may be practiced without adversely affecting the water

supply or causing abnormal erosion of the soil. Results thus far show that where the vegetation has been reduced to approximately 16 per cent of a total cover, about 8 to 9 tons of soil per acre were carried away by running water each year. The eroded soil left on the slopes is incapable of producing a satisfactory forage crop. The soil removed from the mountain slopes by erosion is deposited in reservoirs, in irrigation ditches, and on valuable farm land at the mouths of the canyons where it becomes a detriment and liability. Moreover, surface run-off from torrential summer rains is very much greater on the depleted lands, a condition that contributes materially to the danger of floods from summer rains, and reduces the moisture supply for plant growth on the mountain slopes. Better management of the range to permit an increase in the plant cover to the point where it occupied approximately 40 per cent of the surface of the ground resulted in reducing the erosion so that only 44 per cent as much sediment was being removed as formerly and there was a corresponding amount of reduction in the torrential run-off from heavy summer rains.

The McSweeney-McNary Forest Research Act, approved in May, 1928, authorizes an enlarged forest and range-research program more commensurate with the needs of solving the problems on forest and range lands. Plans are now under way for the development of a more adequate amount of research to cover all of the important forest and range problems in the State of Utah, as well as throughout the intermountain region.

OTHER FOREST USES

Many other minor uses of the forest resources are in effect under the Government policy of fullest possible utilization and development. Many special-use permits are issued on the forests every year, some for which nominal charges are made and some entirely free. They cover the construction of reservoirs, ditches, conduits, private telephone lines, cabins, corrals, and pasture fences, the cutting of wild hay, and a wide variety of other desirable uses.

Water-power development is one of the most promising future uses of the forest resources. The swift mountain streams offer sufficient power to meet every need of the State's growing industrial activities, and under recent legislation great progress in power development is to be expected. Where power is developed within the forests, no charge is made for municipal purposes. Where power is developed for sale by a commercial company a reasonable annual charge is made.

MUNICIPAL WATER SUPPLIES

The municipal water supply of 65 cities and towns in Utah, including that of Salt Lake City, is taken directly from the protected national-forest watersheds. These municipal water systems supply a total population of nearly 225,000, using approximately 80,000,000 gallons of water daily. Approximately $16,000,000 has been invested by these Utah communities to provide their citizens with an

adequate supply of pure water. This situation serves to emphasize the vital relation between the effective protection of these forest watersheds and the daily welfare of the individual citizen.

RECREATION

The national forests of Utah offer unexcelled opportunities for public recreation. No restrictions of any kind are placed upon the summer visitor to the forests, except that fire precautions and sanitary requirements must be observed. He is free to come and go where he wishes, and may select his own camp site or use one of the increasing number of sites provided with camp conveniences by the Forest Service for public use. The forests have everything the out-

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FIGURE 6.—Hikers returning from Mount Timpanogos

door enthusiast could desire—scenic grandeur, a most healthful and invigorating summer climate, pure mountain water in abundance, fishing and hunting, mountain climbing—in short, every natural attraction. (Fig. 6.) In addition, the growing system of national-forest roads, trails, and telephone lines, and the courteous attention and help of the forest ranger and his assistants are all at the service of the visitor. Any forest supervisor will gladly furnish detailed information concerning the attractions and advantages of the forest under his charge.

FISH AND GAME

Not only are fish and game protected within the national forests of Utah, but the Forest Service is closely cooperating with the State game department and the United States Bureau of Fisheries in systematically restocking streams in order to maintain and improve the fishing in the wonderful mountain streams of the State. Every forest officer is a deputy State game warden, fully empowered to enforce the

State and Federal game laws. Sportsmen's associations are rapidly gaining in number and strength throughout the State, and are actively working with the State and forest officials for the improvement of fish and game conditions generally and to solve the deer, elk, and other game problems. (Fig. 7.)

When the national forests of Utah were first established means of travel and communication within the forests were in most instances lacking. To provide a better system of fire protection and to open hitherto inaccessible resources, the Forest Service has expended vast sums of money in constructing roads, trails, and telephone lines through the forests. Administrative sites have been selected and improved; dwellings and facilities necessary for its field forces have

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FIGURE 7.—Mule deer are plentiful on the national forest

IMPROVEMENT WORK

been constructed. The livestock ranges have been improved through the development of watering places, the construction of drift and division fences, and other range improvements. While much remains to be accomplished, each year sees consistent progress.

FIRE PROTECTION

When Utah was settled her forests provided an ample supply of timber to meet the immediate needs of the people. Had this timber been protected and wisely used, the forests would have been capable of providing all the timber needed locally for many years. But the forest area in Utah has, through carelessness with fire, been greatly reduced. The rarity of dry electrical storms, the well-watered slopes, and the small, open, broken stands of timber have made it possible to

secure fairly good control of the fire situation since the forests have been placed under Government administration. The serious fires of the past were usually the result of human carelessness. Early mill operators have been accused of burning over areas before cutting, in order to get rid of the underbrush. They were also responsible for unintentional fires that got away through carelessness. Indians were charged with starting fires for the purpose of driving game into the open. At the present time fire losses within the national forests have been largely eliminated. There are, however, each year a number of fires due to the carelessness of visitors. These fires can be eliminated completely if pleasure seekers visiting the forests will be careful with their fires and cigarettes. Adequate protection can be obtained only through the cooperation of the many

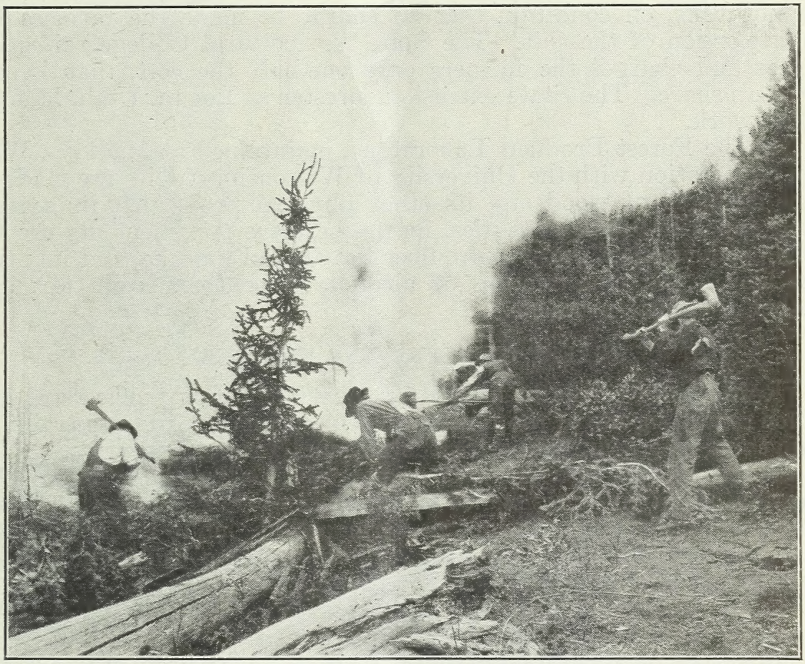

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FIGURE 8.—One of the meanest jobs in the world is fighting fire, but when a fire is discovered in a national forest it is fought by forest officers until extinguished. Fire lines cleared of brush and débris are usually made to check the spread of fires running along the ground. Wasatch National Forest, Utah

visitors and by a constant effort on the part of the forest officers to impress the traveling public with the necessity of playing safe with fire while in the woods.

INVESTIGATIVE AND COOPERATIVE WORK

Besides administering the national forests, the Forest Service conducts a number of special investigations. Those relating to range use have already been mentioned; others concern the growth and

management of forests and their utilization. They include studies of the characteristics and growth requirements of the principal tree species in order to determine how different types of forest should be handled, and also the best methods of forest planting, both on the national forests and elsewhere. Thus the scientific problems underlying the management of forests, the relation of forests to stream flow and climate, and the like are being worked out.

The Forest Service cooperates with States in studying their forest conditions in order to develop forest policies adapted to their needs. It assists private owners by furnishing advice concerning the best methods of managing and protecting their forest holdings.

Under the Clarke-McNary Act, the Federal Government, through the Forest Service, gives Utah, among other States, one-half the cost of raising trees for farmers to plant in woodlands, shelter belts, and windbreaks, on condition that no charge be made the farmers for this portion of the cost. The State Agricultural College raises the trees and charges the farmers only one-half the cost, that is, the State's share. The State extension forester at Logan, Utah, handles this work.

At the Forest Products Laboratory, maintained at Madison, Wis., in cooperation with the University of Wisconsin, studies are made of the strength of wood and its other physical properties, its seasoning and kiln-drying qualities, its preservative treatment, its use for the production of paper pulp, fiber board, and the like, and its utilization in the manufacture of alcohol, turpentine, rosin, tar, and other chemical products.

FOREST OFFICERS AND THE PUBLIC

Readers are cordially invited to consult the forest officers at any time regarding use of the forests, the condition of roads and trails, or anything else connected with the national forests' resources.

Forest officers as agents of the people are always willing to give any information or assistance which their work will permit. Forest users can aid in the efficient performance of public business by according to forest officers the same frankness and consideration which the officers are expected to show them.

SCHOOLS

In the early days of the service, the best men that could be secured were those with practical experience in the major activities for the particular regions for which they were selected. At the present time, because of the demand for specialists, schools in many of the Western States give special training in scientific forest and range management. The Utah Agricultural College at Logan now offers courses in both these subjects. Men who are graduated from these schools may find employment either in the Forest Service, or with individuals or companies who have large holdings of timber or range lands. Wherever practicable, forest rangers are selected from the State in which the forests are located. For most positions in the Forest Service special training is required.

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