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Mississippi State Geological Survey

E. N. LOWE, DIRECTOR.

BULLETIN No. 7

PRELIMINARY EXAMINATION
OF THE
FOREST CONDITIONS
OF
MISSISSIPPI



BY
C. E. DUNSTON
FOREST EXAMINER, FOREST SERVICE

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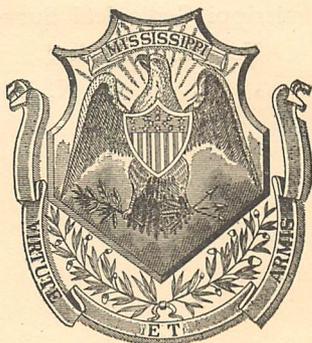


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LETTER OF TRANSMITTAL.

STATE GEOLOGICAL SURVEY,
JACKSON, MISSISSIPPI, June 16, 1910.

To His Excellency, Governor E. F. Noel, Dr. Dunbar Rowland, Chancellor A. A. Kincannon, President J. C. Hardy and Superintendent J. N. Powers, Members of the Geological Commission:

GENTLEMEN: I submit herewith a report on Preliminary Examination of the Forest Conditions of Mississippi, by Mr. C. E. Dunston, of the United States Forest Service, and respectfully recommend its publication as Bulletin No. 7 of the Mississippi Geological Survey.

Very respectfully,

E. N. LOWE, *Director.*

STATE GEOLOGICAL COMMISSION.

HIS EXCELLENCY, E. F. NOEL.....*Governor.*
DUNBAR ROWLAND.....*Director of Archives and History.*
A. A. KINCANNON.....*Chancellor of State University.*
J. C. HARDY.....*President of A. & M. College.*
JOE N. POWERS.....*State Superintendent of Education.*

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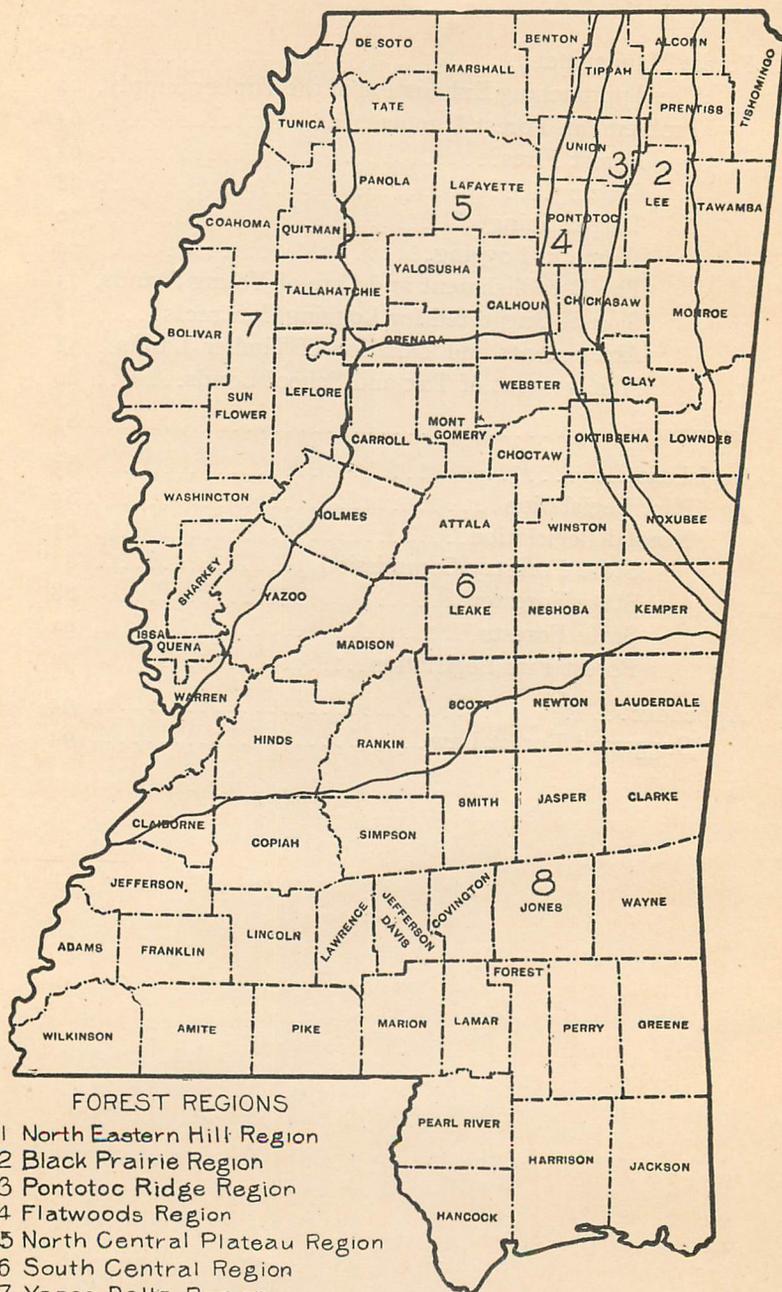
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MISSISSIPPI



FOREST REGIONS

- 1 North Eastern Hill Region
- 2 Black Prairie Region
- 3 Pontotoc Ridge Region
- 4 Flatwoods Region
- 5 North Central Plateau Region
- 6 South Central Region
- 7 Yazoo Delta Region
- 8 Longleaf Pine Region

Field examination by C. E. Dunston, Oct. - Nov., 1909

PRELIMINARY EXAMINATION OF THE FOREST
CONDITIONS OF MISSISSIPPI.

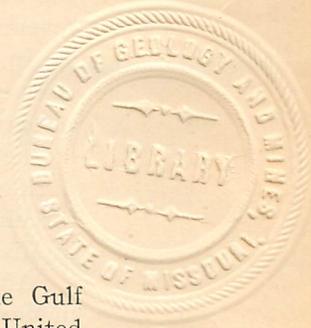
BY C. E. DUNSTON,
Forest Examiner, Forest Service.

INTRODUCTION.

The rapidly diminishing timber supply of the Gulf States, from which the bulk of the lumber-cut of the United States is now derived, has begun to cause a general awakening to the seriousness of the situation and an apprehension as to the future supply of timber needed for home consumption in the region. At the present rate of cutting the lumber industry in these States thirty years hence will be conducted on a very small scale, unless every effort is made to keep lands which are unsuited for agriculture fully stocked with rapid-growing, valuable trees.

The future wealth of Mississippi lies in agriculture. No one can travel in the State and fail to be impressed with its vast agricultural resources. The causes for its undeveloped condition are many and complex, but an awakening is taking place and a vigorous spirit in favor of agricultural development is apparent in all parts of the State. Forest conservation is closely akin to conservation in agriculture. The agricultural prosperity of a State or country is bound up in the wise use of the soils. Just as certain soils and certain situations are suited to various branches of agriculture, so certain other soils and situations are suited to the less intensive use of land—forestry.

Forestry does not necessarily mean the careful, painstaking methods applied in agriculture to the raising of crops. This comes later when the high value of wood crops makes it profitable. Forestry as needed at present in Mississippi is very simple. It means chiefly that the land not in cultivation and not likely to be in cultivation



for years to come shall not lie barren and unproductive, but shall be covered with fast-growing trees. In this way the land will improve in quality and will be a source of revenue to its owners, to the counties, and to the State.

In 1907 the State Geological Survey requested the co-operation of the Forest Service in a study of the forest resources of Mississippi. The examination was conducted in the southwestern counties, in the longleaf pine region, during November and December, 1907. Forest Service Circular 149, "Condition of Cut-over Longleaf Pine Lands in Mississippi," was issued as a result of this examination.

After the conference of Governors at the White House, in May, 1908, the Forester of the United States Department of Agriculture wrote to the Governors offering to co-operate in a preliminary examination of the forest resources in their respective States. In response to this offer, Governor Noel requested that a member of the Forest Service be detailed to an examination of this kind in Mississippi, and set aside the sum of \$200 to cover in part the expense of the work. The salary of the examiner and his traveling expenses in excess of \$200 were paid by the Forest Service.

The examination on which this report is based was made during October and November, 1909, and as much detailed study was given to each region as the time would allow. The data regarding forest industries and the market conditions were obtained from county officials, lumbermen and private owners of timberland. Much information was given by the State Geologist, Dr. E. N. Lowe, and Professor G. L. Clothier, of the A. and M. College. Dr. Eugene Hillgard's report on the geology and agriculture of Mississippi was consulted for descriptions of the forest as it existed before 1860.

GENERAL DESCRIPTION.

Geology and Topography.—With the exception of a small area in the northeast corner, the entire State lies within the coastal plain. The surface slopes gently southward and westward from the Tennessee River hills and the plateau region of the northern part of the State.

Northeast Mississippi is a region of high, abrupt hills. The hard limestone and sandstone rocks of the carboniferous geological period form great outcrops through the region. The ridge dividing the waters of the Tennessee River from those of the Tombigbee has an average altitude above sea level of 600 feet. The broad valley of the Tombigbee River lying west of the Tennessee River hills is commonly known as the Black Prairie. The wedge-shaped Pontotoc Ridge extends from northeastern Alcorn County to central Chickasaw County, and separates the fertile prairie region on the east from the poor, post oak flatwoods on the west. It is characterized by the red soils of the Lafayette formation. West of the Pontotoc Ridge the flatwoods extend southeastward in a narrow strip of gently undulating land to the Sucarnoochee River in Kemper County.

The north central part of the State is a large plateau sloping gently southwestward. Many streams have carved deep, narrow valleys through the unconsolidated materials which form this plateau. Its western border is sharply defined by the high line of loess bluffs which extend in a great inward curve from Vicksburg to Memphis, enclosing the great flood plain of the Mississippi River known as the Yazoo Delta. The whole southern part of the State constitutes the longleaf pine region. Its topography is for the most part very similar to that of the north central plateau. The large streams also flow in deep, narrow valleys, and the small streams are short and have steep gradients. The roughest country lies west of the Pearl River, where interstream areas have a maximum elevation of 600 feet.

Climate.—Mississippi lies wholly within the warm temperate zone. The summers are long and warm and the winters mild, except for occasional short cold snaps. The average growing season for field crops is seven months, while forest trees often grow during eight months. Live-stock can graze in the bottom-land woods during the entire year.

The annual precipitation, which is almost entirely in

the form of rain, averages fifty inches, and is fairly well distributed throughout the year. The heaviest rains occur in January, February and March, when torrents cause a great deal of erosion in the cultivated uplands and flooding and filling of ditches in the lowlands.

THE FOREST BY REGIONS.

Eight forest regions are distinguishable in Mississippi, corresponding more or less closely to the chief geological subdivisions of the State. They are as follows:

1. Northeastern hill region.
2. Black Prairie region.
3. Pontotoc Ridge region.
4. Flatwoods region.
5. North central plateau region.
6. South central region.
7. Yazoo Delta region.
8. Longleaf pine region.

Although in the discussion of the geological formation of the great central plateau this whole area was considered as one subdivision, on account of the covering of brown loam which is found practically everywhere throughout its extent, in the consideration of forest conditions it seemed advisable to distinguish between the northern plateau region and the country lying south of the Yalobusha River and north of the longleaf pine region because of the wide difference in the economical development of these two sections. The former was one of the first regions to be extensively cultivated, while the latter still contains vast areas of excellent timber lands.

1. *Northeastern Hill Region.*—This region includes the eastern portion of Alcorn and Prentiss Counties, the whole of Tishomingo, nearly all of Itawamba, which lies east of the prairie section, parts of eastern Monroe and Lowndes and the northeastern corner of Noxubee. It is best described under a number of subdivisions.

Tennessee River Hills.—The eastern part of Tish-

omingo and Itawamba Counties lie in the oldest geological formation of the State. Here alone has a high-grade building stone been found. This stone and the gravel of these hills are excellent for road building, and will doubtless be exploited for that purpose.

On the Mississippi side of the Tennessee River, which borders the northeast corner of the State, the hills begin only a short distance away, and there is very little bottom-land. The original forest of oaks, black walnut, yellow poplar, ash, hickories, sycamore and gums on the immediate banks of the Tennessee has for many years been culled of the merchantable species. The Tennessee hills, which divide the waters of the Tennessee River from those of the Tombigbee, were originally forested with shortleaf pine mixed with post, blackjack and Spanish oaks. In the more fertile situations, as on the low slopes and near the heads of streams, white and red oaks, yellow poplar and dogwood enter into the mixture.

One portion of the region within eight or twelve miles of railroads have been cut over for from fifteen to twenty-five years. A line of railroad, extending in a southeasterly direction through Tishomingo County, has recently been built by the Illinois Central. It traverses large tracts of virgin shortleaf pine timber land, the greater part of which is held by a few large companies. One company owns 130,000,000 feet of shortleaf pine stumpage in Tishomingo County. This is less than nine years' run with a mill cutting about 15,000,000 feet a year. The largest tract in the region contains approximately 28,000 acres, and is located in eastern Itawamba County along the Alabama State line. The timber on this tract is mainly shortleaf pine mixed with white and red oaks and yellow poplar. It will average fully 6,000 board feet an acre. The land was purchased a few years ago for about \$5 an acre, and the timber alone is now worth several times that amount.

In northern and eastern Lowndes County there are a few very large tracts of shortleaf pine timber land. On one tract of 5,000 acres, where the company which owns the timber has already cut a great deal, it is estimated

that there still remains 10,000,000 board feet. Another large belt of pine land in Lowndes County, a few miles south of Buttahatchie Creek, contains between 3,000 and 4,000 acres. The cut-over hill lands along the eastern tier of townships in Lowndes and Monroe Counties contain large areas of excellent second-growth shortleaf pine.

None of the large shortleaf pine lumber companies are at present operating in the Tennessee River hills, because of the low price of this lumber. The price is kept low because of competition with longleaf lumber from Southern Mississippi and Louisiana, where logging and manufacturing expenses are very much lower than in the shortleaf pine hills of Northeastern Mississippi. A lumberman of Northern Mississippi asserts that shortleaf pine cannot be manufactured profitably while the average price remains, as it is now, less than \$18 per 1,000 board feet.

Bottom-lands of the Tuscumbia River and Yellow Creek.— Fifty years ago the bottom-lands of the Tuscumbia River and Yellow Creek were timbered with excellent white oaks, willow and water oaks, yellow poplar, hickories, ash, cypress, red gum, maple and beech. Being near the Southern Railroad, these lands were exploited from fifteen to twenty-five years ago by stave cutters, who culled the choicest white oaks for tight cooperage stock, and by saw-mill men, who cut the finest yellow poplar, ash and cypress. There are only a few scattered tracts on which the timber has never been culled, and these, as a rule, are ten miles or more from a railroad. Nearly all the bottom-land of the Tuscumbia River within Mississippi is subject to annual overflow, and though the land is extremely fertile probably not more than 3 per cent of it is in cultivation. It is possible that at some future time much of this bottom-land will be reclaimed by means of large drainage projects; but undoubtedly the greater part of it will remain wild for a great many years.

Uplands of the Tuscumbia River and Yellow Creek.— The interstream areas of Yellow Creek and Tuscumbia River are for the most part pine hills, from which, in almost

every locality, the virgin shortleaf pine has been cut. This cut-over land, as well as a great deal of farm land which was abandoned after the Civil War, is now, for the most part, thickly covered with second-growth shortleaf. The tree grows very rapidly on old fields; a tract east of Corinth, in Alcorn County, which was in cultivation in 1885, is now being cut over for ties. A yield of 500 ties an acre on second-growth pine land is not uncommon, and the profit is at least 8 cents per tie, or \$40 per acre for such a stand.

Between Corinth and Iuka the Illinois Central Railroad Company has cut a large number of cross-ties from second-growth pine, which, with a preservative treatment of creosote, will far outlast untreated oak ties. This company pays from 20 to 25 cents apiece for pine and gum ties delivered at the railroad right of way, and from 30 to 32 cents apiece for good oak ties.

Bottom-lands of the Tombigbee River.—The original forest on the Tombigbee River bottom-lands contained the same species as that in the bottom-lands of the Tusculumbia River and Yellow Creek, and in addition a great deal of loblolly pine. Near the streams in low, wet situations the gums now predominate, while on the higher and more sandy and loblolly pine forms the bulk of the stand. After heavy cutting loblolly pine reproduces in dense stands, often extending its range close to the streams. Since this tree grows much more rapidly than the hardwoods, and furnishes material for a number of important uses, it offers large returns on land completely stocked with it. Loblolly pine responds readily to increased light, and in large openings, made by the removal of the first growth, it often grows to an average diameter of 18 inches in thirty years.

The best virgin tracts of hardwood timber are on Bull Mountain Creek, where, in some localities, the stand averages 12,000 board feet an acre.

Practically all the timber land along the Tombigbee River and its larger tributaries has been culled of the best white oak and of most of the cypress and yellow poplar.

Hickory has been cut in small amounts for spokes and handles, but there is a large amount left. Red gum is the most plentiful species, and is being cut on a very small scale because of the low price of its lumber.

The largest mill sawing hardwood lumber in the region is located on the Tombigbee River in Monroe County. The company owns several thousand acres of timber land along this river and its tributaries. Much of this land was bought for from \$1 to \$5 an acre; some of it is now worth \$40 an acre. The company also purchases stumpage and buys logs delivered at the river bank. The logs are floated to the mill during the time of high water, in the late winter and early spring.

East of the Tombigbee River, toward the Alabama line, the country becomes quite hilly, and, owing to the poor, sandy soil and rough land, is sparsely settled. Loblolly pine and upland hardwoods constitute the forest. There are many small tracts of excellent white oak, hickory and other hardwoods in this section.

Stave and Heading Operations.—Through most of the region the choice white oak has been largely cut for staves and heading. This early logging was very wasteful, especially in the case of stave cutting. Twenty years ago only the finest staves were cut for tight cooperage. Since the white oak of the uplands is of very much better quality than that of the overflow bottom-lands, it was the first to be exploited, and was taken from all accessible localities. Whiskey and wine barrel staves 36 inches long and pipe staves often 20 feet in length were split in the woods and hauled long distances to railroad points. They were almost always for export to France, Germany or England. Only the finest white oak (*quercus alba*) trees, 30 inches and more in diameter at the stump, were cut. Stumps were invariably cut 3 or 4 feet high. Seldom as much as 12 feet of the trunk was utilized; the remainder usually contained excellent lumber, but was allowed to decay on the ground. Unfortunately this practice in stave cutting still prevails in localities far from railroads, where timber has little present value.

At Corinth and other towns along the Illinois Central Railroad in Tishomingo County are located stave and heading mills, usually of the portable type. These mills either buy oak stumpage and carry on their own logging, or they purchase heading and stave bolts delivered to them or at railroad points. In purchasing stumpage, they usually offer the owner a definite sum for all the oak above a certain diameter; for heading this diameter is usually 16 inches, and for staves 18 inches. A company sends its cruiser to a tract to estimate the number of cords of heading or stave bolts. His estimate is for the company alone, and the owner, unless he is an expert, does not know how much timber he has. Sometimes a company sends as many as three cruisers to a tract, and then buys according to the lowest estimate. When stumpage is bought by the cord the price varies from 60 cents to \$2.25, according to the quality and accessibility of the timber, and companies generally specify in the contract that they shall be allowed a number of years, usually from three to five, in which to remove the timber.

Management.—In general, owners of timber land in this region have not received full value from the sale of stumpage. This is largely because of the fact that few of them are able to estimate closely the amount and quality of timber on their holdings. Within the past few years there has been considerable competition among the buyers of hardwood timber to secure the choice stumpage on virgin tracts. Owners often receive offers from several timber-using concerns, and are puzzled to know which one to accept. For instance, a buyer of logs for a veneer company will offer to pay for the white oak logs of a quality suitable for veneer use at the stumpage rate of \$10 a thousand board feet. But the company will take only sound white oak and cow oak logs 28 inches and larger in diameter at the top ends. For the timber on the same tract a stave man may offer to pay either a fixed sum or on the basis of an estimate at the rate of, say, \$3 per cord. He will cut trees as small as 18 inches in diameter, and will utilize a greater number of trees, as well as a greater amount of

each tree. A third offer may be made by a sawmill owner, who will perhaps cut all species except gum, and will cut trees down to a diameter of 14 inches. He offers to purchase on the basis of an estimate at the rate of \$2 per 1,000 board feet for oak and ash and \$1 for other species. If the owner of the timber is not an experienced estimator and woodsman, he is often at a loss to determine which offer promises the largest returns.

When it is possible to sell the choice trees or the choice, lower cuts of the trees at a high price, the owner should endeavor also to sell the large tops, in order that a profit may be made, if possible, on material which would otherwise be wasted. Often an owner may most advantageously do his own logging and dispose of the products. The choice, large white oak logs may be hauled to the railroad and sold for from \$20 to \$25 a thousand board feet, and the tops of these trees may be worked up into stave and heading bolts or into cross-ties. If a hardwood mill is nearby the remaining merchantable timber may be disposed of for lumber. An owner may cut timber from the same tract annually and realize considerable returns each year. At each cutting he should take out as many as practicable of the injured, diseased and overmature trees. By so doing he will steadily improve the condition of his forest and keep it productive.

Oftentimes timber owners have failed to realize full value from their timber through selling only one particular grade of material, the removal of which caused a decrease in the value of the remaining timber. For instance, one owner on the Tombigbee River was offered \$1,600 for the oak on 300 acres by a heading company, while a veneer company offered him \$10 per thousand board feet for the white oak logs suitable for veneer use. He accepted the latter offer. So few of the logs met the requirements of the veneer company, and so great was the waste, that only 60,000 board feet were obtained, or \$600 worth of timber. The remaining timber cannot be sold for some time, because its value has been so decreased by the removal of the best trees that it will not pay other timber

operators to buy it. If, however, there had been a greater percentage of large, high-grade white oak on this tract, the veneer company would probably have paid more for the timber than heading, stave or lumber companies. It would seem, therefore, to be well worth while for the owners to inform themselves as to the grade of timber, in order that they may dispose of it in the way which will be most profitable.

Owners of second-growth pine land should realize that such land is a good investment, and that if it is given a little judicious care the returns from it can be greatly enhanced. Young stands of seedlings and saplings should be as thick as possible. As they grow older many of the weaker and suppressed trees will be killed out in the struggle for sunlight, and the lower branches of the survivors will die and drop off, giving a long clear length for lumber. When the trees are 20 to 30 feet tall a thinning, which will take out the small-crowned and unhealthy ones, will be of great benefit to those which are left. In this way, by a small expenditure of labor a stand of second-growth pine may be made to yield a high rate of interest on a small investment. Second-growth pine lands are held at values ranging from \$2 to \$5 per acre in this region. Every effort should, of course, be exerted to keep fires out, for even a light grass fire is apt to kill young seedlings.

There is a large number of portable mills and of mills run in conjunction with cotton gins engaged in cutting second-growth pine. They manufacture principally dimension material and planks, for which an average price of \$12 per 1,000 board feet is obtained. Only sap lumber is cut from old-field pine, and the grain is very coarse. Clear boards are highly desirable for interior finish.

At Iuka one lumberman has cut as much as 15,000 board feet per acre on tracts of old-field pine. He is now cutting sawlogs from a tract which was n cultivated thirty years ago. Some tracts have been cut over three times. Each cutting took out all the merchantable sawlog trees. By the removal of these and the consequent

increase of sunlight, the growth of the remaining trees was greatly accelerated.

Fires are less prevalent in the western part of this region than in the eastern part. This is probably due to the fact that the former is more thickly settled than the latter. Wherever stock laws are enforced, and where there are many farms interspersed with woodland, fires are not apt to be so prevalent as in sections where opposite conditions prevail. Farmers are usually opposed to burning the woods where there is risk of destroying fences and buildings. When stock is allowed to graze through the open woods people are more apt to set out fires for the supposed improvement of the range. Throughout the region, however, there are many fires each year, especially in September, October and November.

Fires hinder the establishment and growth of tree seedlings, and thus cause direct loss to the owners of much of the poor hill land, which can grow good stands of short-leaf pine. They also impoverish the soil by destroying the humus.

2. *Black Prairie Region.*—The Black Prairie region is a strip of country varying in width from about twelve miles on the Tennessee border to about twenty-five miles where it passes into Alabama. It extends in a southeasterly direction from the Tennessee border in Alcorn County along the basin of the Tombigbee River, and enters Alabama through Noxubee and northeastern Kemper Counties. The region is bordered on the west by the Pontotoc Ridge and the flatwoods, and on the east by the sandy, rolling and hilly country of the Northeastern Hill region.

The surface of the Black Prairie region is generally level or slightly undulating. The prairies proper form belts with a more or less north and south direction, and are interspersed with narrow hilly tracts on which the soil is light and pale and as a rule very poor.

Very little of the hill land is in cultivation, but it is usually covered with blackjack, post and Spanish oaks, which are indicative of poor soil. These oaks are short and scrubby, and seldom attain saw-timber dimensions.

The woods on the hill areas have been heavily culled for fuel, posts and timbers for local use and for railroad ties.

The soil of the prairies proper is a very heavy dark-colored clay of limestone derivation. The prairies were never extensively forested, but contained small scattered clumps of crab apple, wild plum and honey locust where the underlying limestone is close to the surface, and isolated blackjack and post oaks where the soil is deep. These lands very closely resemble the great prairies of the West, and many of their shrubs and herbaceous plants are also natives of the western prairies.

The bottom-lands of the large streams of the region were formerly forested with fine oaks, hickories, ash, yellow poplar, cypress, red gum and less important species. The best timber has been cut for lumber, staves, cross ties and other materials, until there are very few tracts of virgin timberland left. Some of the best tracts are located on Mantachie Creek, in northern Lee and Itawamba Counties. On Houlka Creek, in Clay County, there is considerable excellent cottonwood timber, and on Line Creek, near Cairo, in the same county, is the largest body of white oak timber in the region, although it contains only about 100,000 board feet. In the part of Oktibbeha County within the prairie region probably the best timber is located in the bottom-lands of Folsom Creek. The bottom-lands of the Oaknoxubee River contain a few tracts of excellent virgin timber. The hickory on a tract of 6,000 acres, estimated to contain 9,000,000 board feet, was recently sold to a spoke company for \$10,000.

The few mills of the region obtain timber chiefly from the hill regions on the east and northwest. There are stave and heading mills at Columbus, West Point, Aberdeen, Macon and a few other towns in the region. They draw oak timber from small scattered tracts within a radius of fifteen miles. The available supply is so nearly exhausted that it is doubtful if, in five years, a single mill of this character will be left in the region.

Management.—Forestry in this region means the improvement of the stands now occupying the hill areas,

and the stream bottoms where annual floods prevent profitable agriculture. The excellent soil of the prairies proper makes the farms among the most prosperous in the State, and these stands are held principally as farm woodlots. There will always be a demand for a large amount of post and pole timber and fuel for farm use, and it is fortunate that these nearby areas, which cannot profitably be cultivated, can be used to supply the demand. As timber in other regions becomes scarce, and as prices advance, the advantages of devoting these hills and bottoms to the growth of timber will be more appreciated, and better care will be taken of the woodlots as a necessary part of the farms.

The improvement of these stands requires first of all protection from fire. So long as fires are allowed to burn the humus and leaf litter, there can be no increase in the fertility of the hill regions. The fires also kill the seedlings and saplings which are the basis of future timber crops, and frequently do some damage to trees of or approaching merchantable size. Fires also make the surface of the ground more susceptible to washing, while the maintenance of a good forest cover exerts exactly the opposite influence. If fires are kept out of the hill forests there will be far less danger of the poor soil washing from these hills to cover the good agricultural land in the prairies. At present forest fires are frequent in the region during drought periods, and the damage from them is severe. This damage is preventable, and it would be for the benefit of the community and of the State to prevent it.

With the danger from fire reduced, it would pay the owners of woodlots, both in the hills and in the bottoms, to improve the quality of their stands. In cutting wood for use on the farm, it is frequently possible to take trees of slow-growing or inferior species, or trees which are partially diseased or crooked. The removal of these would benefit the young, healthy trees of good species and would enable the owner to cut better material for his own use in the future and to obtain higher prices in case he sells timber.

3. *The Pontotoc Ridge Region.*—The Pontotoc Ridge region is a narrow belt of high land ranging from more or less rolling to rather hilly, which forms the divide between the waters of the Tombigbee and Hatchie Rivers on the north and east and the Schoona and Yalobusha Rivers on the west. The soil is limestone and sandstone very largely overlaid by the orange sand or Lafayette formation which gives the ridge its name—the “red hills” country.

The rich red uplands were formerly covered with a fine forest of white, black and red oaks, hickory, yellow poplar, black walnut and black locust, a type found only on very fertile soil. Naturally, this region was cleared many years ago, and all except the roughest situations were placed in cultivation.

The northern part of the Pontotoc Ridge, which is drained by the Hatchie River, is rather broken and contains a large amount of the pine hills forest type. In this part of the ridge, known as the Tippah Hills, there remains considerable good oak, yellow poplar and red gum timber.

Much of the Hatchie bottom-land is subject to long periods of inundation, and is, therefore, unsuited for agriculture. Eventually much of this overflow land will doubtless be reclaimed, but in the meantime it ought to be devoted to the growth of valuable hardwood species, and should be managed on a rational basis of forestry.

Farther south, between the heads of Hatchie and Tallahatchie Rivers, the country becomes more rolling and less broken in character. The virgin forest, which has been mostly replaced by farms, contained a smaller admixture of pines than that farther north, but a greater amount of red and white oaks, yellow poplar and black locust. The virgin hardwood forests of the headwaters of the Tallahatchie have been exploited by stave and heading companies for the finest white oak, by spoke companies for hickory, and by sawmill men for hardwood lumber, until there are very few tracts containing virgin timber. There is, however, a great deal of young, thrifty hardwood timber, which, if cared for, will form the basis for future cuts. There is also a considerable amount of loblolly and short-

leaf pine in this locality. These species reproduce prolifically on cut-over hardwood lands which are not subject to long periods of overflow.

The red uplands which were once farmed extensively have in many places been abandoned because they have been made worthless by erosion. The soil was originally deep and mellow, and when carelessly cultivated on the rolling surface has washed badly. Much of this abandoned land is nearly barren. It ought to be devoted to the production of valuable timber trees. Forest cover on this land would not only stop further washing of the soil, but it would also heal the great gashes that have been cut in the surface, and build up the soil so that, eventually, with careful, scientific farming methods, parts of it might again be used for agriculture. Furthermore, if devoted to tree growth this land would be a source of timber supply for local needs. Before a great many years the timber needed on farms, which is now largely obtained from southern Mississippi, will become very expensive because of the exhaustion of the supply in that region. This dearth in the timber supply is inevitable, and will be keenly felt within fifteen or twenty years.

Planting.—With protection from careless and ruthless burning of woodland through the enforcement of a suitable forest fire law, it would doubtless prove financially beneficial to plant rapid-growing and valuable trees on badly-eroded hill lands. This can be done at a total cost of about \$10 an acre. Planting is being carried on extensively in several middle western States where timber is very scarce and expensive. In some States it has paid well to devote small portions of the finest agricultural land to the raising of tree crops. In Mississippi this is unnecessary, but it will pay to plant lands which are worthless for agriculture and where natural regeneration of valuable species is not possible because of the absence of seed trees.

4. *The Flatwoods Region.*—The Flatwoods region is a narrow belt of level or slightly undulating country lying west of the Pontotoc Ridge and the Black Prairie and east of the hilly region of the North Central plateau. Its usual

width is from three to six miles, though in places it is ten or twelve miles wide. Its southern limit is the Sucarnoochee River in Kemper County. The eastern border of the region as far south as Houlika Creek is sharply defined by the red hills of the Pontotoc Ridge. The northern portion of the western border is less distinct, the Flatwoods in places being associated with the badly washed uplands of Benton and Union counties. In the southern portion, however, the western limit is sharply defined by the high, sandy, Noxubee hills.

The two principal classes of soil within the Fla woods are heavy clays and fine sands, both of which bear the same forest types though they differ radically in their agricultural value. The heavy soil is most prevalent, especially in the southern portion of the Flatwoods. Very little of the region, however, is in cultivation. Farms as a rule are located close to the streams where the soil is more fertile.

In the northern portion of the Flatwoods, the forests consist of scrubby, stunted, upland oaks with some shortleaf pine. South of Houlika Creek loblolly and shortleaf pines predominate in the stand. In low, more fertile situations such as the headwaters of creeks, the pine in the remaining virgin stands is of large dimensions, but this virgin pine, because of the excellent quality of its lumber, has been cut from practically all parts of the region for twenty years, and only occasional small tracts are left. The same is true of the original forest of hardwoods of the stream bottoms. Probably the largest and finest body of hardwood timber within the Flatwoods region is a tract of 6,000 acres on the Schoona River in northern Calhoun and northwest Chickasaw counties. This was bought nineteen years ago for \$1 an acre and was recently sold for \$20 an acre.

In Oktibbeha County and southward the region is forested largely with young loblolly and shortleaf pine, the loblolly forming from 50 to 80 per cent of the forest. These pines frequently grow in such dense stands as to prevent the growth of the oaks which are usually found mixed with them. Usually, however, there is present beneath the

large pines a growth of stunted and limby oaks (post, blackjack, red and Spanish) and hickory. These trees scarcely ever reach dimensions suitable for any use except for cross-ties, posts, or fuel, but they are extensively cut for these purposes. The farmers cut and haul oak firewood to the towns, selling it usually at the rate of \$1 per load. Loads vary in size from one-quarter to one-half of a cord.

Management.—Located close to the fertile, popu'ous prairie region and to other agricultural sections of northern Mississippi, the timber resources of the Flatwoods will be drawn upon increasingly for pine lumber, cross-ties, posts, and fuel. The Flatwoods are pre-eminently suited to the practice of forestry.

Loblolly and shortleaf pine are the trees which should be favored by forest management in this region, since they grow very rapidly and can be used for many purposes. Fortunately, they are abundant, and loblolly is especially aggressive in taking possession of cut-over land. In the southern part of the Flatwoods, the pines are steadily seeding up the land from which the oaks have been removed. Each year loblolly pine produces an abundance of light, winged seed which is widely distributed by the wind. The seedlings grow rapidly for the first few years, soon becoming high enough to escape death from light surface fires.

Thickets of pole size trees may be thinned with advantage to the stand. The time is not far distant when returns will be obtained from the product of such thinnings which will pay for the labor and yield, at least a small profit. These pines need a great deal of sunlight for rapid growth, and respond vigorously when the suppressed trees and some of the large-topped ones are removed from thick stands. Under favorable conditions of light and moisture, pines in this region often grow at the rate of an inch in diameter a year for several years. An average annual growth of from 500 to 1,000 board feet per acre may be counted on in fully-stocked pine stands. With the steadily increasing stumpage values, a growth even of 500 board feet per acre will, within a few years, mean the addition of from \$1 to \$2 to the value of each acre every year.

In the northern portion of the Flatwoods, where the upland hardwoods predominate in the stand, forest management is a simple matter of selection. The old, slow-growing, and diseased trees should be removed so that the young ones may have ample sunlight and grow rapidly. The better kinds of oaks should be favored through heavy culling of the less valuable trees.

The item of chief importance in the management of the forests of this region, particularly of the pines, is the protection of the young stands from fire. Every year during the dry autumn months, practically every acre of woodland is burned over at least once, and often two or three times in the same season.

Market Conditions and Land Values.—There are many portable sawmills and cotton-gin sawmills in this region working in loblolly and shortleaf pine. Pine stumpage usually sells for \$1 per thousand board feet, and land covered with second-growth timber of saw-log size can be purchased for from \$5 to \$10 per acre. The pine stands average about 5,000 board feet per acre. As a rule, the lumber manufactured in the Flatwoods is not graded, and mill men seldom attempt to improve the grade by careful sawing. The lumber is sold locally or shipped short distances to points within the State. The usual price is \$12.50 per thousand feet, f.o.b., though it is sometimes as low as \$10. The oaks are chiefly cut for cross-ties, which sell at an average price of 32 cents apiece.

5. *North Central Plateau Region.*—The north central plateau region comprises the country between the Flatwoods on the east and the Yazoo Delta on the west. It slopes gently southward to the Yalobusha River.

The chief soil of the region is a yellow or brownish-yellow loam, known as the Columbia loam, which varies in depth from a few inches to several feet, with an average depth of 3 feet overlying the orange sand of Lafayette formation. Because of its exceeding fertility and because it occurs in a region of high land and healthful climate, it was among the first soils of the State to be widely cultivated. It was especially suited to cotton culture. For many years

previous to the Civil War, this region was the most prosperous in Mississippi, and the plantations were often of large size.

Where the loam soil is underlaid with loose sand, as between the headwaters of Wolf and Hatchie Rivers, the washing has been especially rapid and disastrous. The exposed sand is carried down and deposited during flood periods on the fertile bottom-lands, many thousand acres of which have been rendered worthless by this sterile covering. On large areas, from which the mantle of brown loam has been washed away and the orange sand gullied, the appearance is that of miniature barren mountains with sharply serrated ridges and steep narrow ravines and valleys.

In the northern part of the region the original forest on the better upland soils consisted of red, black, post, Spanish, and blackjack oaks, and hickory of rapid growth and large size. This fertile land was cleared early for farm use. The poorer upland soils, in which the orange sand either appeared on the surface or was mixed to a considerable degree with the surface loam, produced the same species, but their stunted appearance plainly denoted soil of inferior fertility. These soils, therefore, have never been cultivated extensively.

There is very little shortleaf pine north of the Tallahatchie River in the tableland region, but southward from this river in Lafayette County, as the hills become rough and more broken, and the ridge soils very sandy, pine occurs with increasing abundance.

The hills extending north and south through Lafayette, Yalobusha, Calhoun, and Grenada Counties, a few miles east of the Illinois Central Railroad, are forested mostly with shortleaf and loblolly pine, accompanied by the usual upland oaks which are seldom large enough for saw-timber. The major part of this hilly country is too rough for cultivation, but the fertile lower slopes and bottom-lands are farmed extensively. The virgin pine has been almost entirely cut from these hills, and there are only occasional small patches left. One of the largest in Lafayette County contains only 400,000 board feet.

There is, however, a vast amount of young second-growth pine, which has come in on the old cut-over areas. A great many small, portable mills are now operating in second-growth timber. The lumber is rough because of the knotty and sappy timber and careless methods of sawing, and is, for the most part, used locally.

The worn-out and badly eroded fields in the southern part of the plateau region very frequently become covered with stands of old-field pine. These lands can be put to no better use, for a forest cover prevents further erosion and keeps the land productive. They should be protected from fire and the timber harvested in such a way as to insure the continuance of a healthy forest cover.

The narrow line of bluffs which border the Yazoo Delta are, in most places, too hilly and rough for cultivation. Their average elevation above the Delta is about 200 feet, and the streams, flowing into the Delta, have cut deep, narrow ravines through them. The soil is a deep, fertile loam containing a great deal of calcareous silt. The finest of yellow poplar, basswood, red gum and white oak have been obtained from these bluffs. The white oak was especially prized for ship-building and, before the civil war, thousands of trees were cut for this purpose. Though the best of the timber has been taken from the bluff section, there still remains a great deal of excellent hardwood timber. A common practice among lumbermen is to operate in the Delta close to the bluff region until the winter rains make logging there impracticable, when they transfer their operations into the high, well-drained bluffs.

Planting.—The worn-out hills of the northern portions of the north central plateau region are in many localities too steep and badly eroded to permit agricultural development. With care, however, trees can be made to grow on such sites. Pine is especially adapted to poor, sandy soil. It is remarkable how rapidly a forest cover will stop the washing of the soil and smooth over the gullies with a deep layer of humus and litter. Fields on which erosion is not too far advanced might, after a few timber crops have been harvested, be again cleared for cultivation.

Before planting can be undertaken, however, owners must have reasonable assurance of fire protection. They will not expend from \$8 to \$10 an acre in planting when there is a strong possibility that the young trees will be destroyed by fire.

6. *South Central Region.*—The south central region includes the portion of central Mississippi lying between the north central plateau and the longleaf pine region. The greater part of this region, as has been pointed out, lies in the same geological division as the north central plateau. It is desirable to distinguish between these regions chiefly because of the difference in their economic development. The north central plateau is an old agricultural section, while a large part of the south central region is covered with forest growth and has never been in cultivation. The western boundary of the south central region is the Yazoo Delta, and its eastern boundary the Flatwoods and the Alabama border. The southern portion includes the Jackson prairies, a rolling country forested in places with hardwoods and pine, but for the most part under cultivation. North of the Jackson prairies the drainage is toward the Pearl River, while southward the streams contribute to Strong, Leaf and Chickasahay Rivers.

In general, this region is rolling, though in many sections the surface is broken or even hilly. The light loam soils prevail as in the north central plateau.

There is a great deal of high ridge land where the soil, a deep, light sand, is liable to erode badly if cleared of forest cover. An example of this is found on the ridge lands in western Kemper County, where the sandy soil is not underlaid by a retentive stratum of hardpan. Erosion in these localities is ruinous to the adjacent bottomlands upon which the sand is deposited, and many fertile fields have been rendered worthless for all time. These sandy hills ought always to be covered with forests, which will help to prevent erosion, and the owners of such land should be shown the necessity for such forests. When protection from fires is assured and the forests are managed

conservatively, this land will become a source of continued revenue.

The bottom-land soils of the Pearl River and its tributaries, as well as of many other streams in the region, are light and sandy, being derived from the sandy hills of the region. The bottom-lands are, as a rule, subject to annual overflow, and therefore a very large part of them is still forested, although most of the finest white oaks have been cut for staves.

The prevailing type in the uplands consists of loblolly and shortleaf pines mixed with post, blackjack and Spanish oaks. On the lower, more fertile slopes red and black oaks enter into the mixture. The bulk of the hill land has been culled of the virgin loblolly and shortleaf pine timber, though in Leake, Neshoba, Winton and Kemper Counties there are large tracts of original pine forest. Probably 75 per cent of the upland type has been cut over. The bottom-lands of the Pearl, Yalobusha, Schoona and Big Black Rivers, on the other hand, contain thousands of acres of the finest hardwood timber, those of the Big Black River having been cut over somewhat more extensively than the others.

One company which operates a large mill in Neshoba County has 44,000 acres of timber land extending along the bottoms of the Pearl River and its tributaries. Forty per cent of the timber is hardwood and the remainder pine. The pine is chiefly loblolly, the most favorable site for which is on the sandy hummock soil near the outskirts of the overflowed areas. Loblolly pine in this region is particularly fine, and contains a large percentage of the upper grades of lumber. When grown in the thick forest there are often six or seven 16-foot 'ogs in a tree.

Three other companies, not operating now, own between 90,000 and 95,000 acres altogether, chiefly of hardwood lands, in Leake, Neshoba and Winston Counties. One company owns practically all of the hardwood timber land on Pearl River for a distance of about thirty miles above Jackson.

Along the Pearl River there are virgin timber lands

extending for a distance of fully eighty miles above Jackson, and as this land is controlled almost altogether by a few large lumber companies there is an absence of the small portable mills so common in most parts of northern Mississippi.

One of the best tracts of virgin pine is located in the northwestern corner of Neshoba County. It was purchased a few years ago for \$4.50 per acre. The land is too hilly to clear for farm use, and the owners intend holding it for the production of timber.

Another tract of excellent virgin timber is located in the southernmost township of Choctaw County, and contains 1,000 acres. The average stand of pine and oak on this tract is 8,000 board feet per acre.

In Winston County three companies own approximately 60,000 acres of timber land. The land is very hilly and for the most part covered with loblolly and shortleaf pines. The stand averages 3,000 board feet of pine and 1,500 board feet of oaks and other hardwoods per acre.

One of the chief reasons that the region immediately north of the Jackson prairies contains so much virgin timber land is that only within a few years has a railroad passed through it. There was very little activity in the sawmill business in Newton, Neshoba and Winston Counties until the advent of the Mobile, Jackson & Kansas City Railroad. Choctaw, Webster, Montgomery, Carroll and Holmes Counties, on the other hand, contain very little virgin timber land, and the holdings are of small size and owned by farmers.

The largest mill in Choctaw County cuts an average of 20,000 board feet a day of yellow poplar and oak logs, shipped from nearby points along the Southern and Mobile, Jackson & Kansas City Railroads. Although the company is able to obtain all the logs needed now to keep the mill running at full capacity, it will probably not be able to do so many years longer.

Market conditions and Stumpage Values.—Practically all the the yellow poplar has been cut within a distance of from 8 to 12 miles of the older railroads in the region. The

price paid for yellow poplar logs delivered at the railroad varies according to the quality of the timber from \$8 to \$20 per 1,000 board feet.

There are many stave mills along the railroads, which cut the timber from small holdings. Companies usually buy the stumpage or purchase stave bolts at the mills. The usual stumpage price for oak is \$2 per 1,000 feet; for stave bolts delivered at the mills, the prices are \$5 per cord for red oak and \$8 for white oak. Many thousand carloads of choice white oak staves have been shipped from the region for export to Europe. Occasional small tracts as far as 30 miles from a railroad are even yet exploited for staves. High prices are paid for these choice staves, but the waste in cutting them is so large and the expense of marketing so great that only meager profits are obtained.

Veneer companies generally secure the best oak and poplar timber from small tracts.

There is considerable hickory in the bottom-lands of the streams, but the spoke companies have bought most of it that is good hickory and accessible to the railroads. One spoke company recently purchased the hickory suitable for spokes and wheel rims on two tracts of 1,000 and 800 acres on the Big Black River, paying \$1,400 for the timber on the former and \$800 for that on the latter. From the largest tract 225,000 spokes were obtained and from the smaller 140,000 spokes. The value of spokes delivered at the railroad is \$16 per 1,000.

The average value of first-class virgin loblolly and short-leaf stumpage is \$2 per 1,000 board feet, while second-growth sap pine can usually be purchased for \$1 per 1,000 feet.

7. *Yazoo Delta Region.*—The Yazoo Delta region, the great alluvial flood plain of the Mississippi River, covers an area of about 6,000 square miles. Its eastern boundary is the line of high bluffs which form the border of the north central plateau. The topography of the region is remarkably level, the highest lands being the immediate banks of the streams. There are a great many large, sluggish, and

meandering streams and numerous bayous, sloughs, and lakes.

Before the completion of the levees along the Mississippi River, the entire region was a wilderness unpenetrated by roads and having no towns except along the river and at the inland border of the high bluffs.

The delta country was acquired by the State of Mississippi under the Swampland Act of September 28, 1850. Before the settlement of the region, thousands of the finest cypress trees growing along the lower water courses were annually cut and floated out. The timber was considered as having no value then and State authorities made little attempt to stop this cutting.

With the reclamation of the greater part of this vast fertile country, the land was rapidly cleared for agriculture. The State was anxious to have the country developed as soon as possible, and by selling the land very cheaply encouraged pioneers to establish homes. The first lands were sold for the accrued taxes, which amounted usually to a sum not exceeding 25 cents per acre. The Yazoo & Mississippi Valley Railroad Company bought about 700,000 acres from the State for from 7 to 14 cents an acre. After it had built a railroad through the country, the company began selling the land at very low prices in order to encourage settlement. The first lands were put on the market at \$1.25 per acre. To-day many tracts of this land containing virgin timber are worth \$50 an acre, and only occasional small areas are for sale.

An estimate on 49,000 acres in the eastern part of the delta shows an average stand of 7,000 board feet per acre. Red and tupelo gum form a little more than 50 per cent of the stand. The other species, in the order of their abundance, are red, white, and overcup oaks, elm, cypress, ash, pecan, hickory, and miscellaneous species such as cottonwood, maple, and birch. This estimate probably represents the best forest conditions existing in any section of the delta. An estimate on a tract of similar size within Sharkey and Washington Counties showed an average stand of only 4,000 board feet per acre.

On areas between the Mississippi River and the levees the species of greatest commercial importance is cottonwood. The best stands of cottonwood contain from 10,000 to 15,000 board feet per acre, while a stand of 6,000 feet is generally considered good. Lumber and box companies seldom cut cottonwood trees smaller than 25 inches in diameter after logging operations.

Reproduction in the delta is generally unsatisfactory. The failure of the forest to reproduce more rapidly is not due to a lack of seed production, but very largely to long periods of inundation at the season of the year when the seed should be germinating. Lumbering creates ideal conditions for regeneration, but these conditions are also favorable for fast-growing shrubs and weeds so that promising seedling stands are often choked out on cut-over lands. In many localities a dense growth of cane retards reproduction. The reproduction following lumbering operations is often composed mainly of undesirable species, owing to the lack of seed trees of the valuable species.

The delta probably suffers less from fires than any other forest region in the State. During the dry summer and autumn months, extensive fires are prevented by the abundance of green growth, and during the winter season the ground is too wet. During prolonged periods of drought, however, fires are frequently started by sparks from engines and by careless hunters and campers, when young gum and ash suffer badly because of their thin bark. When fires burn in old logs and debris piled against large trees, great scars are made which afford places of attack for worms and decay.

Management.—It is the general opinion among large timber land owners and sawmill operators in the delta that during the past fifteen years fully 30 per cent of the merchantable timber has been cut. Probably half the cut-over land has been placed under cultivation. Upon the remainder of these cut-over lands practically all the red and tupelo gum timber has been left. Most large operators intend to go back over the old cutting areas and log the timber which was unmerchantable at the time of the first

cutting. The minimum diameter to which the oaks and other valuable species are cut is 16 inches breast high. Gum, when cut at all, is seldom taken below 20 inches in diameter.

It will be seen, therefore, that a great deal of timber is left standing after the ordinary logging operations. A few companies with large holdings have adopted the policy of closer utilization of wood material by a varied output of products. For instance, one large company in Tallahatchie and Quitman Counties, besides sawing lumber, cuts material for wagon manufacture, operates a box factory and also a factory for producing dimension furniture stock. This company cuts practically all trees to a diameter of 12 inches.

The greater part of the lands of this company are valuable for agriculture. Instead of selling in small tracts, as many companies do, it holds the farm lands and grows field crops upon them. Last year several hundred bales of cotton and a great deal of sugar cane and corn were produced. The absolute forest land along sloughs and bayous belonging to the company and to individuals who are pursuing a like policy of managing their cut-over lands should be handled under a careful system of forest management.

While probably at least 80 per cent of the delta will eventually be reclaimed for farming use, it is likely that a large percentage of swamp land will not be fit for agriculture for several decades. In large drainage projects plans are seldom made to reclaim all the land within the district to be drained. The cost would in most instances be prohibitive under present economic conditions. When land values warrant very costly drainage systems, they will be constructed. The land which will never be placed under cultivation includes cypress sloughs and the land between the levees and the rivers.

It is not improbable that with the inevitable decrease in the supply of hardwood timber in the future, people will find it profitable to plant valuable species, to a limited extent, on high-priced agricultural soil. For the present,

however, forestry in the delta must be confined to those lands for which there is no prospect of sale for agricultural purposes.

Conservative forest management aims to encourage the most valuable species. Since in the delta region undesirable trees occupy ground space on which the best trees should be growing, and, by their shade, check the growth of the valuable trees, one of the most important aims in forestry is to reduce the reproduction of the less desirable or weed trees. In logging operations in the situations unfit for future agricultural use, the less desirable trees should be cut to the smallest diameter limits at which they can be handled profitably, while provision should be made for the reproduction of the valuable species by leaving thrifty seed trees scattered over the cutting areas. Much of the suppression of young trees through too dense shade can be overcome by judicious thinnings and improvement cuttings.

The localities in which forestry will probably pay better than agriculture are (1) sandy ridges now covered chiefly with sycamore and (2) lands in the sloughs along the rivers and bayous covered by water for many months of the year. The thin, silty soil covering the sand ridges will produce fair agricultural crops for a few years, but then becomes exhausted. It is excellent forest soil, however, for trees are not dependent on the thin top layer of soil for nutriment, but send their roots deep into the subsoil. With the coming shortage of hardwood timber and the consequent high stumpage values, land of this character containing fast-growing oaks, yellow poplar and white ash cannot fail to yield its owners reasonably large returns. Most of the sloughs would be difficult to drain, and very little of the badly-inundated lands will be reclaimed for many years. Cypress usually occupies such situations, and gums will also grow on the outskirts of the cypress ponds, where better drainage conditions prevail.

Cottonwood is undoubtedly the tree to be favored in the region between the levees and the river, since it grows very rapidly, reproduces naturally and abundantly, and

is uninjured by long periods of inundation. Its wood is valuable for many uses. With plenty of sunlight and deep mellow soil, cottonwood will grow at the rate of an inch a year in diameter for about the first ten years. It may be cut for saw-timber at an age of about thirty-five years, when the trees will have an average breasthigh diameter of 24 inches. To obtain the best results in the management of cottonwood stands, thinnings are advisable when the trees are about ten years of age. The material removed by this thinning will in most instances be too small for use, but the expense of the work will be more than offset by the future benefit to the stand. When the trees are fifteen or twenty years old there should be a second thinning, to leave the largest and healthiest trees standing about fifteen feet apart. After these thinnings the stand will grow very rapidly. The material removed by the second thinning can be utilized for pulpwood, match manufacture and other purposes.

Growth studies of oaks, hickory, ash, red gum and cypress show that these species can be grown to an average breasthigh diameter of 20 inches in from forty-five to fifty years in the delta region.

The chief points of forest management in the Yazoo delta may be summarized as follows:

1. The sandy ridges now chiefly covered with sycamore and the swampy areas which will not be reclaimed for agriculture should be kept as forest lands.
2. These lands should be devoted to the valuable trees, and so far as is practicable the undesirable trees should be removed in logging operations.
3. Rapid growth of young stands should be induced by improvement cuttings and thinnings.

Ownership and Values of Land.—In the Yazoo delta the large areas of timber land where there are very few farms are, for the most part, controlled by large lumber companies. It has been the policy of these companies to buy up all the good timber land which could be obtained, cut the valuable species, such as the oaks, cypress and ash,

which can be handled profitably now, and hold the gums and other inferior trees for future operations. One company owns 150,000 acres in Washington and Sharkey Counties, and another owns 50,000 acres in Tallahatchie and Quitman Counties. Several other companies own from 5,000 to 20,000 acres apiece. There are no longer any tracts as large as 2,000 or 3,000 acres on the market.

The value of timber land depends upon its accessibility, the quality and amount of the timber, and the value of the land for agriculture after the timber has been cut. The best timber land can seldom be bought for less than \$20 an acre, while much of it can not be bought for less than \$50. Land covered with an ordinary stand and situated eight or ten miles from a railroad is worth about \$20 per acre. The value of timber land has increased enormously in the past few decades. In Yazoo County there are several tracts ranging in area from 3,000 to 20,000 acres which were purchased shortly after the completion of the Mississippi River levees for an average of ten cents per acre. Most of this land is now worth at least \$20 per acre. A company recently refused an offer of \$25 per acre for the 16,000 acres of land which it purchased two years ago for \$18 per acre.

Small mills which pick up scattered small tracts of stumpage are often able to purchase at very low prices. In Sunflower County a millman is cutting choice cypress and oak logs for which he paid \$10 per thousand board feet, delivered at the mill. For poorer logs of these species he pays only \$5 per thousand feet. The owners of this stumpage are receiving little more than half its value.

Cottonwood stumpage above 28 inches in diameter, breast high, sells for from \$5 to \$7 per thousand feet in accessible localities. Twenty years ago timber of the same quality could be purchased for twenty-five cents per thousand. It was used then only to float heavy logs of the valuable hardwood species.

Although the tax rate in the delta is higher than in other regions, the assessments on timber land are not excessive. In addition to the regular State and county levy of from \$1.30 to \$1.80 on a \$100 valuation and the general levy of

twenty-five cents on \$100 for the maintenance of the Mississippi River levees, there is an acreage tax on land in the various special drainage districts which usually amounts to seven or eight cents per acre per annum.

8. *Longleaf Pine Region.*—This is the most extensive as well as commercially the most important forest region in the State. Its western boundary is formed by the narrow loess hill or bluff section bordering the flood plain of the Mississippi River. Its northern boundary extends across the State from the vicinity of the loess hills in Claiborne County through Copiah, Rankin, Smith, Scott, Newton, Lauderdale, and Kemper Counties. Southward it continues into Louisiana and to the Gulf of Mexico.

The region is uniform in soil and vegetation, but is somewhat varied in topography. The greater part of it is gently rolling, but west of the Pearl River much of the land is extremely hilly. The rolling pine uplands of Alabama continue into the eastern counties of Mississippi often for a distance of several miles. West of these uplands there are frequent extensive plateaus which are level or gently undulating. A narrow strip of country bordering the Gulf consists of level, sandy plains.

The Lafayette formation of orange-colored sands and clays is common throughout the entire region. This formation is usually overlaid by a yellow sandy loam, while the soil overlying the loam is generally a fine, grayish-white sand. In places the light, sandy soil covers the loose orange sand directly, resulting in land of poor quality. Cultivation on these sandy lands is apt to have ruinous effects, for, when exposed, the orange sands will wash and gully badly.

The forests of the longleaf pine region may be divided into a large number of types according to the topography, soils, and various other influences. In this report, however, only the prominent features will be described under the three following types:

1. Piney woods type.
3. Mixed pine and hardwoods type.
3. Bottom-land type.

Piney Woods Type.—This type occupies fully 75 per cent of the longleaf pine region. The stream bottoms, the belt of hills bordering the lowest bluff section in southwest Mississippi, and the narrow transitional belt of mixed pine and hardwoods along the northern border of the region constitute the other types. In this type longleaf pine grows in practically pure stands. While requiring plenty of sunlight it thrives on soil containing very little plant food. It occupies the ridges and low tablelands, but never the swampy areas. At the borders of its range in moist localities it grows very slowly and never reaches the dimensions attained on the dry upland situations. Isolated black gum and dogwood trees are usually found in the piney woods, and low, brushy post and blackjack oaks are almost invariably present. The oaks are most noticeable in openings, and where large clearings have been made by logging operations or hurricanes, they soon claim the ground in thick stands.

The mature forest of longleaf pine is park-like in appearance. The trees are tall and cylindrical and free from branches to an average height of 40 or 50 feet. There is practically no reproduction and the forest floor is usually bare of shrubby growth. Grass, however, covers the surface, often forming a close sod.

The average stand of longleaf pine varies with localities and according to the damage from turpentine, fires, and windstorm. While the finest trees and the largest stands on small areas are found in parts of the hilly interior section, the heaviest stands over extensive areas occur near the Gulf coast. As a result of turpentine and the subsequent burning of the land a large amount of timber has been destroyed. The pitchy boxes burned deeply, and many trees were so weakened at the stumps that they were easily blown down. The turpentine timber also suffered greatly from the attack of bark beetles. On a tract of several thousand acres near the Gulf where all the timber has been boxed, the average stand per acre is 6,000 board feet, while on another extensive tract in the same section where turpentine has not been practiced, the average stand contains between 9,000 and 10,000 board feet per acre.

After logging operations on longleaf pine lands, loblolly pine often regenerates extensively. This is due chiefly to its large annual production of seed and to its rapid height growth at the start, which enables it the better to get beyond reach of fires. Experience has shown that young pines are not usually destroyed by fire after they have reached a height of about 12 feet. Longleaf pine, on the other hand, produces a seed crop only at intervals of from four to eight years, and its height growth is very slow during the first four or five years. The odds, then, are clearly against the longleaf, notwithstanding that its seedlings are more fire-resistant than the loblolly. Hogs also destroy a great many longleaf seedlings by digging up and eating the tender roots.

Windstorms do the most serious damage to standing trees in the longleaf pine forest. This is especially the case near the Gulf coast. In September, 1906, owners of forest land in the southeastern part of the State suffered enormous losses from wind-thrown timber. From 30 to 90 per cent of the merchantable timber was blown down on a strip of country about 50 miles wide and 150 miles long. Fortunately, the storm occurred in the fall, a season when insects and fungi do not work in fallen timber. The owners, therefore, had six or seven months in which to work up the wind-thrown trees, and probably 30 per cent of the timber was saved. A heavy storm during the autumn of 1909 caused a great deal of loss in the southeastern part of the State. This storm was most destructive in Louisiana.

Mixed Pine and Hardwoods Type.—This type occurs along the western and northern borders of the piney woods. In southwest Mississippi it extends from western Amite and eastern Wilkinson Counties through central Franklin and southwestern Copiah Counties. On the north it is found in a narrow strip of country which is transitional between the piney woods and the shortleaf and loblolly pine uplands of the south central region.

West of the Pearl River the country occupied by this type is usually rolling, though in some sections the surface is extremely hilly. The level portions have long been under

cultivation, but the abrupt slopes and narrow ravines are still covered with forest growth.

On the upper slopes and ridges longleaf and shortleaf pines predominate, mixed with upland hardwoods and some loblolly pines. On the lower, more fertile slopes, the pines give place to oaks, hickory, ash, and sweet gum. Longleaf pine steadily becomes less abundant toward the west until in the loess bluff country, bordering the flood plain of the Mississippi River, it disappears altogether. The best stands of shortleaf in the type contain from 8,000 to 12,000 board feet per acre, while an average would be from 5,000 to 7,000 feet.

The original forest in the loess hills was composed entirely of hardwoods. Since logging operations began, loblolly and shortleaf pines have extended their range into these hills, and most of the old fields are now covered exclusively with these trees. The soil of these hills is very fertile and the level portions were among the first lands in the State to be cultivated. The forest cover now, therefore, is confined chiefly to the very steep slopes and narrow ridges. Practically all of the virgin timber has been cut except in the most inaccessible locations, but cut-over areas have generally grown up with thrifty young timber.

At the northern border of the longleaf pine region the surface is usually rolling, but in no place is it as hilly as in the country bordering the piney woods on the west. Longleaf occurs in more or less isolated tracts on the high, sandy flats and ridges. It is usually accompanied by shortleaf pine and a small admixture of oaks, hickory, and sweet gum. The forest of the lowlands is comprised of hardwoods and loblolly, shortleaf, and spruce pines. The soil of the lowlands is usually a loam of considerable fertility, while the ridge soil is almost invariably light and sandy. The steep slopes and ridges, when tilled, often become badly eroded.

Bottom-land Type.—The bottom-lands of the larger streams of the region often contain two distinct soil and forest types. In many localities, close to the rivers, the surface is covered with water for several months of the year. Only species able to endure wet conditions can exist

here. Cypress is the prominent tree of the type and is usually accompanied by sycamore, ash, and tupelo gum. On the higher, better-drained hummock lands or second bottoms, the stand is composed of loblolly and spruce pines, water willow, and cow oaks, sweet gum, magnolia, and beech.

The estimate on a tract of 20,000 acres of virgin timber land in the bottom-lands of the Pascagoula River in Jackson County shows an average stand of 8,000 board feet per acre. Tupelo and red gum are about equal in numbers, and together form 70 per cent of the stand. The oaks are not so abundant or of as good quality in the river bottoms of southern Mississippi as in those of the northern part of the State. Extensive cane brakes in the bottom-lands afford excellent pasturage for cattle during the entire year.

The forest of the river and creek bottoms of southern Mississippi differs from that of the Mississippi River flood plain chiefly in the absence of willow and cottonwood and in the presence of loblolly pine. Tupelo and red gum form a much greater percentage of the stand in the bottoms of the interior rivers and creeks than in the delta forest.

A great deal of bottom-land forest is included in the holdings of the large lumber companies, but very few of these companies cut hardwood lumber. As in all other parts of the State, the finest cypress, yellow poplar and white ash trees have been cut and floated down the rivers to the mills, and much of the best oak has been taken for stave and heading manufacture.

General Economic Conditions.—When the great white pine forests of the northern States began to be exhausted many lumbermen went south to the yellow pine forests and acquired extensive holdings. As a result the greater part of the timber land in southern Mississippi is controlled by large lumber companies, and the lumber is cut almost entirely in large mills. Before the advent of these lumbermen this land had been held chiefly for grazing and the production of naval stores, and the value of the timber was

not considered. The land was, therefore, sold at very low prices. Twenty years ago large tracts covered with the best timber were sold for from 50 cents to \$1.50 per acre. This land is to-day valued at from \$20 to \$40 per acre, according to its location. Within a few years southern Mississippi has developed from a great, sparsely-settled forest region, where turpentine and stock raising were the chief industries, into one of great commercial activity.

A few years ago, when lumber prices rose rapidly, many small sawmills were established along the Alabama & Vicksburg Railroad. Their owners purchased timber on the small holdings close to the railroad. This supply soon became exhausted in most localities, and the mills have disappeared. Many portable mills are now operating from four to eight miles from the railroad. The lumber is hauled by ox and mule teams to the railroad for shipment. As a rule, owners of portable sawmills employ very wasteful methods of logging, because, with their simple mill equipment and comparatively high logging and manufacturing expenses, they can afford to market only the high-grade material. Their unnecessarily wasteful logging methods often incur for them a direct financial loss. They leave in high stumps and large tops from a fourth to a third of the actual amount of timber cut. The large companies, on the other hand, log much less wastefully. Stumps are not cut higher than 14 inches, and all trees are utilized into the tops to a diameter of 8 inches.

West of the Pearl River the lumber industry was developed many years ago, and is now rapidly declining. East of the Pearl River, however, in almost every county the lumber industry is flourishing, and the forests are being cut very rapidly. Large lumber companies, owning as much as 250,000 acres distributed through several counties, have established one or more mills in places most accessible to their holdings and with good shipping facilities.

In Clarke and Wayne Counties, which are traversed by the Mobile & Ohio Railroad, lumbering has been carried on much longer than in any except the Gulf Coast counties and the counties traversed by the Illinois Central Railroad

west of the Pearl River. The greater part of the timberland in Wayne County is held by one company, whose lumber output averages 75,000,000 board feet per year. The company has been operating for eighteen years, and owns a great deal of cut-over land. Practically none of this land has been sold for farm use, though the company is anxious to dispose of it at low prices. At present the land is virtually unproductive. It affords only a meagre amount of grazing. The reproduction of pine has been impossible, owing to the frequent summer and fall fires. Undoubtedly this land will eventually be largely placed under cultivation, but until changed economic conditions render its use as farm land profitable, it ought to be producing wood crops. If the land had been given fire protection it would to-day be covered with a healthy growth of longleaf pines, many of which would be large enough for cross ties, piling and telephone poles.

The largest company operating in Clarke County controls about 300,000,000 board feet of stumpage, which will last ten years at the present rate of cutting. This company, and most other large companies of the region, purchase a considerable amount of stumpage in small bodies, as their logging railroads penetrate outlying districts.

Most of the timber in Clarke and Wayne Counties was boxed many years ago for turpentine. This class of timber has suffered greatly from windstorms and insect injuries. A great deal of waste is incurred in its utilization, for the butt logs are often left on the ground and stumps are invariably cut very high. Large lumber companies do not now box their trees in these counties.

Three large companies have mills at Laurel in Jones County, and they, together with two other companies which have mills in other parts of southern Mississippi, own most of the timber in Jones, Jasper, Smith and Covington Counties. The estimate on about 150,000 acres belonging to one of these companies shows an average stand of 10,000 board feet per acre. A great deal of the cut-over land of this company has been recently placed

in cultivation, with excellent success. The same company has already sold 10,000 acres for from \$3 to \$5 per acre, and has recently placed another block of 25,000 acres on the market at \$7.50 an acre, which is being rapidly sold. The country is for the most part gently undulating, but contains much hill land where many slopes will never be cultivated. With the development of this section into a populous farming country there will be need of woodlots to supply the farm with fuel, posts, poles and other materials. In logging on these steep slopes and narrow ridges lumbermen would do well to leave several healthy pines for seed trees. With protection from fires, these lands would soon become fully covered with young longleaf pines.

Northern Greene County contains unbroken forest cover over many townships. The timber land is practically owned by less than half a dozen lumber and investment companies. Along the line of the M. J. & K. C. Railroad, which was recently built from Hattiesburg to Mobile, almost all the timber within a few miles of the right of way has been cut. During the first few years after the completion of this railroad, a great many small mills were engaged in cutting the timber held in small bodies by the farmers. Meanwhile the lumber companies bought all the available large tracts of timber, and as soon as the owners of small mills had cut a short distance away from the railroad they came to the holdings of the big companies.

In south Greene County, a considerable amount of the level land is in truck farms, and it is probable that this industry will be extensively practiced within a few years. The best improved farm land is valued at from \$100 to \$150 per acre. Much of the land in the eastern part of the county, however, is exceedingly hilly and will probably not be used for agriculture for many years. In Greene, Perry, Jones, and Wayne Counties a few investment companies own more than 200,000 acres of virgin timber land. A great deal of this land was bought for \$1.25 per acre fifteen years ago, and is now valued at from \$15 to \$30 per acre.

A company owning the largest mills in Lamar and Forest

Counties controls 300,000 acres of timber land, of which 40,000 acres are stump lands. In common with other large timber land owners, this company has had under consideration various plans for handling cut-over lands. They desire to sell all that is suitable for agriculture, but thus far have been able to dispose of only a very small portion of the stump land. It is the usual type of longleaf pine uplands. The soil contains little plant food, but it is usually capable of being built up by careful scientific methods of farming. Eventually, the greater part of it will probably be used for farms, but in the meantime these lands ought not to remain unproductive. If the lands were protected from fire for a period of ten years, it is safe to say that fully fifty per cent of them would be completely stocked with healthy young tree growth.

With the advent of the Gulf and Ship Island Railroad a great many mills sprang into existence along its route between Hattiesburg and Gulfport. Within a few years all of the merchantable timber within sight of the right of way was cut and most of the small mills had disappeared. A small number have located a few miles from the railroad, but most of the available timber has been cut and only the great tracts belonging to the large companies remain.

In the counties bordering the Gulf, a considerable part of the timber land along the large water courses and near the coast has been exploited for a great many years. Most of the choice pine, cypress, and hardwood lumber has been exported. Far from the railroads and streams vast bodies of virgin timber land still remain in these counties, but large lumber companies are rapidly extending their operations into these timber lands.

Near the Gulf Coast occasional small areas of cut-over lands and old fields are covered with dense stands of young Cuban and loblolly pines and 500 small poles per acre is not uncommon on such lands. A very large number of poles with an average length of 16 feet and a top diameter of 4 inches are annually used for piling for bath houses and small piers in front of the numerous homes on the Gulf Coast. These poles are worth from twenty to twenty-five

cents apiece and owners of pole timber have often netted as much as \$50 per acre by supplying this demand. It is unfortunate that most of the cut-over lands and old fields of this section, because of frequent burning, do not contain a cover of young pines.

Pike County is for the most part a gently rolling country and lies entirely within the piney woods type. The eastern half of the county still contains large areas of excellent timber which is owned by a few large lumber companies. Turpentine is practiced more extensively in Pike County than in any of the other counties in southwestern Mississippi.

Western Marion County still remains heavily timbered and the timber is owned by several large lumber and realty companies. The original extensive pine forests of Lincoln County have been practically exhausted. About half the land is classed as uncleared, but only about 18 per cent of the uncleared land contains merchantable forest cover, while the remainder is chiefly unproductive stump land.

In Copiah County practically all the pure longleaf pine forest has been exploited. Most of the virgin timber is in the southeastern townships.

In Franklin County there is a great deal of extremely rough land covered with longleaf pine and hardwood timber. Until the building of the Mississippi Central Railroad there was very little lumbering in this county because of the inaccessibility of the timber and the high expense of logging it. Now, however, many mills are operated along the line of the railroad, and large companies have been buying all the available timber land. The narrow ridges and very steep slopes will, for the most part, be always unfit for farm land. In these situations lumbering should be so conducted as to insure the perpetuation of the forest. Four or five thrifty seed trees of longleaf pine should be left standing on each acre and every effort should be made to keep fires from burning over the ground and destroying young growth.

In Amite County about one-half of the longleaf pine uplands have been cut over and are now mostly stump

lands. The remaining timber land, which is located for the most part in the eastern half of the county, is being rapidly exploited.

In Wilkinson, Jefferson and Adams Counties the pure type of longleaf pine does not exist, but the mixed pine and hardwood type is found on the roughest hill lands. Much of this forest has been culled of the merchantable longleaf pine, so that loblolly and shortleaf pines often predominate in the stand.

The chief timber industries in the counties bordering the Mississippi River are those which use hardwood timber. Stave and heading mills and sawmills cut a great deal of oak and other hardwoods from the bottom-lands of the river.

FOREST MANAGEMENT.

The Approaching Exhaustion of the Timber Supply.—According to the Census Report for the fiscal year 1908, Mississippi ranks third in the production of lumber in the country. It ranks third also in the production of yellow pine lumber, being surpassed in this respect by Louisiana and Texas. In the production of hardwoods it ranks tenth in oak, second in gum, fifth in tupelo, eighth in hickory and ash, tenth in yellow poplar, and first in cottonwood.

In general the average prices received for lumber in Mississippi are higher than in other States. The average price for yellow pine, cypress and hickory lumber is higher than in any other State. For oak lumber higher average prices are received only in New York and Indiana, where oak is very scarce and therefore expensive. This indicates both that the quality of the lumber in Mississippi is better than in most States, and that the transportation and market conditions are unusually good.

The Census Reports for 1907 and 1908 further demonstrate that the great timber resources of Mississippi are being rapidly depleted. In 1907 more lumber was manufactured in the State than ever before, and Mississippi held fifth place among the States in its production. In 1908, in common with all the great lumber States, Missis-

Mississippi produced less lumber than in the preceding year, owing to the general business depression, but it advanced from fifth to third place. It is interesting to note that, while in 1907, 823 mills reported a cut of 2,094,485,000 board feet, in 1908 there were 905 mills which cut only 1,861,016 board feet. This perhaps indicates that the number of small mills in the State is increasing, which is generally the case in regions where the timber supply is being exhausted. The large mills are forced to go out of business for want of a supply, but the small isolated bodies of timber are capable of sustaining numerous small portable mills, most of them.

Most of the longleaf pine land is held by large lumber companies, many of which operate mills cutting from 35,000,000 to 200,000,000 board feet a year. Comparatively little timber land is being held by companies or individuals as investments, because it would be necessary for stumpage prices to double within the next ten years if the owners were to realize an income of even eight per cent. Usually these large mills are heavily bonded, and the interest on the bonds must be paid. This is the chief reason for the extensive exploitation of the timber.

For the past two years the average lumber prices have been so low that longleaf operators have barely met expenses. This was caused chiefly by the decrease in lumber consumption, due to the general business depression of 1907 and 1908, but partly, also, by an overstocking of the market, since the large mills, on account of their bonded indebtedness, were compelled to continue operating as long as lumber could be sold at any profit whatever. It is apparent, therefore, that the large mills will continue to log their holdings as rapidly as it can be profitably done. The majority of large lumber companies do not count on operating longer than from twelve to fifteen years. Only a few mills control enough stumpage to last twenty-five years, and in the entire longleaf pine region in Mississippi there are not more than two mills which can continue cutting at the present rate for forty years.

Problems in Forest Management.—The various problems of forest management were briefly discussed as they came up under each regional description, but a few are of particular importance and affect the whole State. The State must deal with these through legislative action and through an educational campaign. The most important problems of forest management are:

1. Forest fires.
2. Grazing.
3. Turpentine.
4. Waste in logging.
5. Establishment and care of young tree stands.
6. Assessments and taxation of timber lands.
7. Management of tax and school lands.

Forest Fires.—In Mississippi, as in other Gulf States, the belief has long been prevalent that forest fires do little damage except when buildings, fences and like property are destroyed. This general indifference to fires is probably the chief cause for the extensive annual burning of the forests. The enormous loss caused by the boll weevil is not greater than that from forest fires, nor is the extermination of the cotton pest of more vital importance to the future wealth of Mississippi than the prevention of such fires.

At least 75 per cent of the woodland in Mississippi is burned over once every year, and many localities are burned over twice or more in one year. Fires are especially prevalent in the longleaf pine belt where they are set in order to expose the tender young grass with the idea in improving the pasturage. As a matter of fact, however, annual fires have almost caused the extermination of the best forage grasses, and only the hardy wire grasses and broom sedge of little value for pasturage, have been able to survive. As long ago as 1850 Dr. Hillgard, State Geologist at that time, in discussing pasturage in the pine woods, said: "The beautiful, park-like slopes of the pine hills are being converted into a smoking desert of pine trunks on whose blackened soil the cattle seek more vainly every year the

few scattered sickly blades of grass whose roots the fire has not killed."

The forest fires, to be sure, are usually only surface fires, because there is no great accumulation of leaf and branch litter, and they rarely get into the tops of the trees and destroy them, but such fires are particularly injurious because they are the cause of the almost total absence of pine reproduction on cut-over land.

A single fire seldom seriously injures large, healthy longleaf pines because of the fire-resisting properties of the bark, but if this bark has been injured, as often happens, by insects or other causes, the fire obtains entrance and eats into the bases until the trees become so weakened that they are easily blown down. Fire, moreover, retards the growth of large pines by impoverishing the soil and heating the growing layer which is immediately beneath the bark. When trees have been boxed for turpentine, great injury is done by fire.

In hardwood forests, fires are less prevalent owing to the moist soil conditions. Wherever they do occur, they injure the large, valuable hardwood trees by burning them at the base and causing large scars. These scars open the way for the attack of insects and fungi which causes the decay and finally the death of the trees. Here again the greatest damage is the destruction of the reproduction.

Forest fires in Mississippi are mainly attributable to the general indifference to the results. In addition to the fires set for the supposed improvement of pasturage, which probably cause the most extensive burning of the woods, many are started by careless hunters and men engaged in forest occupations, while many others are due to wood and coal-burning locomotives.

If a system of forest-fire prevention had been inaugurated fifty years ago, the resulting increase in the wealth of the State would have been tremendous. In most localities where lumbering has been going on for half a century or longer, there would still be a plentiful supply of second-growth timber, and the cleared lands in most parts of the State would be vastly more valuable than they are for

agriculture because the soil would not have been impoverished by decades of annual fires.

To decrease forest fires in the State, what is needed most is a vigorous educational campaign, planned and conducted by a State Forester or a forestry commission. This campaign should be carried on through the newspapers and other periodicals which reach the mass of the people; by lectures and addresses before Farmers' Institutes and other societies, and in the schools and colleges. In all schools the children should be instructed in the care of forests and taught the vast damage which is annually done by forest fires.

Until a State-wide sentiment against forest fires has been awakened and an organized system of fire protection has been established, the railroads, to which so many fires are attributable, can not be expected to initiate plans for their prevention. Fires are the direct cause of a great deal of loss to railroads through suits for damage to private property and through the destruction of their own property such as bridges, fences, and buildings. The use of spark arresters and improved ash pans, cleaning the rights of way of all inflammable material, and an effective system of patrol during drought periods would do much to lessen the forest-fire evil.

A forestry commission should encourage the formation of associations of timber land owners for the purpose of guarding against fires. In some of the northwestern States large timber land owners have formed associations of this kind in which each member pays toward the cost of fire protection on a pro rata basis. In northern Idaho, 1,257,000 acres were protected in 1908 at a cost of \$52,000, or an average of about 4 cents per acre. The cost was divided as follows: Patrolling, 2 cents; fighting fire, 4 mills; making trails, cleaning old trails, and other items, a little more than one and one-half cents. In Mississippi the expense should be very much less because of the lower cost of labor and because very little expense would be incurred for trail building.

Grazing.—The chief injury in connection with the grazing of live stock in the forests has resulted from the fires

which are set with a short-sighted purpose of improving the pasturage. This is especially the case in the longleaf pine region, in practically all parts of which the grazing of live-stock is unrestricted by stock laws. Aside from the enormous damage to the forest through the destruction of seedlings, injury to large trees, and impoverishment of the soil, fires have steadily defeated the purpose for which they are set, the improvement of range conditions, by killing out the best forage plants and grasses.

The grazing of live stock in the forest has a greater or less influence on the reproduction of trees according to the kind and amount of stock grazed and the type and character of the forest. In the longleaf pine belt cattle and sheep do little damage to young growth. Hogs, on the other hand, do a great deal of damage by eating the pine nuts and the roots of seedlings and saplings. In the hardwood forest grazing does much less damage. Here, as in the piney woods, hogs do the greatest injury by devouring the seeds, as acorns, and by digging up the roots of seedlings and saplings. On lands where dense canebrakes exist, hog ranging is beneficial, since it reduces the cover of cane and helps the young tree growth to get established.

With the increased settlement of a region and the introduction of more intensive methods of farming, it is usually found necessary to require that live stock be kept within enclosures. In most of the older agricultural parts of the State stock laws have long been in force. At present it would be a considerable burden on the farmers of southern Mississippi to require that cattle be kept under fence, but the restriction of hogs to fenced pastures would cause less hardship and would ultimately prove a benefit as a means of eradicating infectious diseases.

Turpentineing.—Turpentineing is nowhere extensively practiced in Mississippi. Most of the companies which control the greater part of the longleaf stumpage consider it financially inadvisable for the following reasons:

1. Boxed timber suffers greatly from fire, wind storms and fungous and insect injury. In localities where all the timber has been boxed, the average stand contains about

30 per cent less timber than in places where turpentine has not been practiced.

2. The quality of the lumber obtained from boxed timber is very much poorer than that from unboxed timber. Pitch pockets, streaks and wormholes are frequent in the butt logs, from which, in unboxed timber, the best lumber is obtained.

These objections to turpentine operations are based chiefly on the effects of the common practice of chopping deep boxes in the trees. The deterioration of the quality of lumber in boxed trees is chiefly due to fires. Fires, by still further weakening the trees at the base, are, together with box cutting, the cause of a great part of the damage from wind storms. With proper protection from fire the damage would be greatly lessened. If with fire protection a cup system is used, and logging follows turpentine promptly, the present objections to turpentine would be removed and the added profits could be obtained without materially lessening those from the lumbering proper. Under a cup system the growth of the trees is scarcely influenced and the damage from fires (with proper safeguards), wind storms, insects and fungi is almost eliminated; and by shallow chipping of the trees a crop of 10,000 trees may be expected to yield an annual profit from turpentine of from \$1,500 to \$1,800, according to the market conditions and the care used in conducting the business. Under these conditions turpentine can be highly profitable on a tract for from three to five years. Logging should follow the abandonment of turpentine promptly, before there is damage by insects. By thus properly organizing the work, the highest profits from the forest as a whole can be obtained.

Under no circumstances should the box system be used, not only because of the loss of timber due to damage by the box, but also because, as has been proved, this system is much less profitable than the cup and gutter system.

One of the greatest injuries from turpentine arises from orcharding young longleaf trees too small to be

profitably logged afterwards. These young trees are checked in growth and so weakened that they soon die or are blown down. Great tracts of cut-over pine lands sparsely covered with small, pole-size trees have been converted into oak brush barrens through turpentine operations. In no instance should trees be turpented which will not be cut for lumber within four or five years after the first turpentine operation. A great many people in the State believe that a law should be enacted making it illegal to turpentine trees smaller than 15 inches in diameter, breast high.

Waste in Logging.—Waste in logging has to a certain extent been a result of economic conditions which made the complete utilization of trees unprofitable. When timber was cut at long distances from railroads and its exploitation was very expensive, only the best material from the most valuable trees could be used profitably. This has been especially true in the production of staves and heading, the industries which have been responsible for more waste in proportion to the wood consumed than any of the other timber-using industries. A vast amount of such waste, however, has been unnecessary.

Waste in logging in Mississippi consists in leaving sound material in high stumps and large tops, and in the injury and destruction of young trees and seedling growth through careless logging methods.

Except in the case of badly burned or otherwise defective trees, the best material is usually contained in the stumps. The cutting of high stumps has been and is now commonly practiced in hardwood operations. Lumber companies in all parts of the State are beginning to realize that it pays to cut low stumps, but the farmers, who own and market timber, continue almost without exception to cut stumps 3 or 4 feet high and to leave a great deal of sound, merchantable material in tops.

The lumbering operations of the large yellow pine companies in southern Mississippi seldom present examples of waste in the utilization of the trees which are cut. Except in the case of trees boxed for turpentine or other-

wise badly defective at the base, stumps are seldom cut higher than 16 inches, and the trees are utilized to small diameters in the tops. One company whose cut-over lands have had a ready sale for farming purposes has learned that cutting stumps 8 instead of 16 inches high results in a saving of almost 50 per cent in clearing the land, because of the lessened expense for powder and boring holes in the stumps.

In almost all parts of the State it is a matter of poor business management to leave large, sound tree tops to decay on the ground, for with the high values of cross-ties, poles and posts trees can usually be used well up into the tops with profit.

Young trees of the desirable species should be protected and encouraged in every possible way, in order that they may contribute to future logging operations. Care should be taken to do as little injury as possible to saplings and poles in felling, and instead of cutting young trees of the valuable species for such uses as cross-ties and skid poles, the inferior species should be used.

The Establishment and Care of Young Stands.—All the problems of management which have been discussed thus far have a greater or lesser influence on the regeneration of forests. Above all fires are destructive to forest growth, and, in Mississippi, have been the chief cause of the meagre amount of young tree stands on logged-over areas. In addition to these factors, the manner of harvesting a tree crop bears a great influence on the character and quality of the succeeding stand.

Each forest type requires certain methods of treatment to secure the best results, but, in general, certain principles of management are common to all regions:

1. Unless a new stand is to be established by planting, provision should be made for seeding up the ground by leaving a portion of the stand.

Clear cutting is usually practiced only in pine stands. In southern Mississippi most large lumber companies cut to a minimum breast high, diameter limit of about 12 inches.

In the mature longleaf forest the proportion of trees smaller than this diameter is very small, so that the tracts are cut practically clear. Clear cutting is advisable when land has a high value for farm use, but in sections where there is little or no prospect of selling stump lands because of the rough surface or poor soil, the policy of clear cutting is unwise. Small trees are generally utilized at little profit, and often at a loss, because of the high expense of handling them as compared with the value of the small amount of lumber they contain. Moreover, there is a smaller percentage of the better grades of lumber in small trees than in large ones. By raising the minimum diameter limit to about 15 inches on tracts which are not salable for farms, as a rule from 1,000 to 2,000 board feet would be left standing on each acre. With fire protection these trees would seed up the ground and would themselves form the basis for future logging operations. With the admission of a great deal of sunlight by the removal of the greater part of the stand the growth of the trees left would be greatly accelerated. The inevitably large increase in stumpage values which will accompany the exhaustion of the greater part of the timber in the region will assure owners of land of this character a good profit on their investment.

2. The species to be encouraged should be those which combine to the greatest degree the quality of valuable material and the silvicultural properties of successful regeneration on cut-over lands, and rapid growth. In the bottom-land forests the valuable oaks, yellow poplar, white ash, hickories, and cypress should be favored as against the gums, beech, maple, and sycamore. Loblolly pine combines to a remarkable degree the qualities desirable in forest management. It is found in most parts of the State and is especially desirable as a tree crop in central Mississippi. It should be encouraged on cut-over longleaf lands as well as in the moist situations near streams.

For the first few years of seedling growth after logging, the only measure needed in management is fire protection. In the sapling stage most stands are dense. Close stands

induce rapid height growth, but retard diameter growth. A light thinning in such stands, therefore, will usually prove beneficial to their development. In the pole stage the stands are likely to become dense again, and if because of this condition the trees are spindling, a thinning which will leave plenty of space for the crown development of the healthiest specimens of the desirable species, will be followed by greatly accelerated volume growth.

While this discussion of cutting methods has dealt especially with pine stands, the principles are equally applicable to hardwood stands. As was previously stated, however, each type requires individual methods of handling in order to secure the best results, and under the regional descriptions the individual recommendations for management were briefly given.

Clauses Suggested for Logging Contracts.—A great deal of logging in Mississippi is done by contractors. Naturally, they desire to clear as much money on a piece of work as possible, and they cut high stumps and leave a great deal of merchantable material in large tops. A binding contract between the timber owner and the logger is very important as a means of protection to the owner in securing not only the largest immediate profit, but also the best forest conditions practicable after logging. The following clauses are suggested for inclusion, so far as they apply in each case, in such contracts:

1. The location of the cutting area should be definitely described by relation to some well-known landmark, such as a stream, and by legal subdivisions.
2. No timber will be removed until it has been scaled, measured, or counted by the owner or one of his employees
3. All merchantable timber used in buildings, skidways, bridges, construction of roads, or other improvements will be paid for at the contract price.
4. All cutting will be done with a saw when possible.
5. No unnecessary damage will be done to young growth or to trees left standing, and no trees will be left lodged in the process of felling.

6. The approximate minimum diameter limit at a point $4\frac{1}{2}$ feet from the ground to which living trees are to be cut is _____ (limits for all species involved).

7. Stumps will not be cut higher than _____ inches—lower when possible—and will be cut so as to cause the least possible waste.

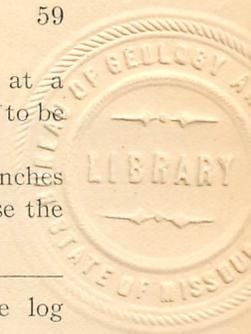
8. All trees cut will be utilized to a diameter of _____ inches in the tops—lower when possible—and the log lengths so varied as to make this possible.

9. Unless extension of time is granted, all timber will be cut and removed on or before, and none later than _____ (a definite date).

10. Timber will be scaled by (Insert the log rule to be used).

11. During the time that this agreement remains in force the contractor and all his employes, sub-contractors and employes of subcontractors will, without any charge or expense to the timber land owner, do all in their power to prevent and suppress forest fires.

Assessments and Taxation of Timber Lands.—That assessments of timber lands in Mississippi are not as a general rule burdensome, and seem to be fair, as compared with assessments on farm lands, is due to the fact that such assessments are not in any sense pushed to the strict limits called for by the Constitution, viz., that they shall be based upon the actual value of the land. Nevertheless, in some counties where there is very little farm land lumbermen complain that the taxes are burdensome, and that they find it necessary to cut as rapidly as possible in order to realize returns from the timber and thus reduce the value of the land so that the taxes will be reduced likewise. As a result of this, in some portion of the longleaf pine region, where the greater part of the merchantable timber has been cut, the loss to the counties on account of the reduced taxes has been keenly felt. Both the counties and the State would have a much more steady income if some method of timber land taxation be devised which would tend rather to encourage than discourage timberland owners in managing their property according to prin-





ciples of forestry; for wherever such taxation is administered with anything like a proximity to the principles of the general property tax, as required by the Constitution, the tendency is toward premature cutting.

The problem of timber land taxation is receiving very serious attention in many States, some of which have already taken steps to amend their Constitutions so as to permit the enactment of more just principles of taxation such as are in force in the European countries, where forest management is most highly developed. It is quite widely held now, and is strongly advocated by the United States Forest Service, that the true principles of forest taxation are (1) exemption of the growing timber from taxation; (2) annual taxation of the land upon its value apart from the timber growing thereon; and (3) a tax upon the value of the crop of timber when cut, which should be comparatively high (10 or 15 per cent) because this would be a tax on income and not on principal. (1) and (2) as thus set forth would be legal under the Mississippi Constitution, but (3) would not be legal, and until the Constitution is amended so as to remove this restriction the principles above set forth cannot be put into practice in this State. Therefore, instead of a clearly defined method of taxation, which would place investments in timber lands on an equal basis with other investments, timber land owners must continue to look for comparative justice in the greater or less leniency of the assessor when estimating this class of property.

Management of Tax and School Lands.—In order further to promote an interest in forest preservation and increase the amount of forest land under conservative management, consideration should be given to the tax and school lands of the State.

In most counties there are small bodies of land which have reverted to the State for nonpayment of taxes. A former owner of such land may, at any time during two years following the date when the taxes were due, recover title to the land by payment of the accrued taxes, together

with interest on the amount. After two years the land may be sold by the sheriff.

A forest law should be enacted which would provide for examinations of lands of this character by a State Forester, and reports regarding their suitability for forest purposes. There should be a provision in the forest law whereby certain tracts can be retained and managed as forest lands, if the report of the State Forester indicates such action to be for the best interests of the people. The counties should be reimbursed for such lands from a fund which should be established from fines and penalties originating under a forest fire law and from receipts obtained from the management of the State forests.

The Chickasaw and Choctaw school lands were given to Mississippi by the United States for school purposes. The Chickasaw lands lie north of the Chickasaw boundary. These lands were sold in fee simple in 1857, and the purchase money kept in the State Treasury. The interest, which in 1908 amounted to approximately \$61,000, is annually disbursed for school purposes in the counties included within the Chickasaw boundary. The Choctaw school lands include the sixteenth section of every township lying south of the Chickasaw boundary. These lands were never sold, but have been leased. Prior to 1890 the usual term of lease was ninety-nine years. A great deal of the lease money was lost following the war, and to diminish any further risk, it was decided, in 1890, to limit the term of lease to five and ten-year periods.

In the counties of the longleaf pine region, school lands were leased for a nominal sum for ninety-nine-year periods. Before the development of the lumbering industry, these lands were exploited for naval stores and used as pasture lands. With the invasion of the region by great lumbering concerns, and the consequent rapid rise in timber values, the leases of school lands were eagerly sought, and their holders began to exploit the timber. The State authorities claimed that the lessees of school lands had no right to cut and sell timber from the lands, and the Court of Appeals has rendered a decision upholding this opinion.

Suit is now pending in the United States Court for a sum aggregating \$1,000,000. If the United States Court upholds the decision of the Court of Appeals, further exploitation of these timber lands will be prevented.

A conservative system of management of the school lands in Mississippi is most advisable. Sixteenth sections should be carefully examined by the State Forester and an agriculturist, and classified as to their best use, whether for agriculture or for forestry. The agricultural lands should be leased to farmers. The forest lands should be managed for the purpose of making them grow successive timber crops. The returns from the sale of timber and other privileges should go to the counties for school purposes.

SUMMARY.

1. Mississippi lies almost entirely within the Coastal Plain, and though the surface is generally rolling, comparatively little of it is hilly. Its climate is mild and very favorable for agriculture and for tree growth.

2. Eight forest regions are distinguishable.

The northeastern hill region is extensively forested, though the virgin timber has been cut in most localities. There are many thousand acres of second-growth, short-leaf pine stands which have come up on old fields and cut-over lands.

The black prairie region contains comparatively little forest land, and forestry there is a matter of woodlots on the poor hill areas and the overflow bottom-lands.

The Pontotoc Ridge region was extensively cleared of forest cover many years ago for agriculture. In parts of the "red hills" the soil has washed badly, and forest planting is most desirable.

The flatwoods region is a country of poorer soils than most of the State, and is for the most part covered with forests. It is a region pre-eminently suited to forestry because pines and some hardwoods flourish there, while the land is of comparatively little agricultural value.

The north central plateau was once the richest agri-

cultural part of the State, but the silty soils of the uplands have been worn out on extensive areas which could be greatly improved by planting with forest trees.

A few counties of the south central region contain a great deal of virgin timber land, which is chiefly held by large lumber companies. In the counties traversed by the older railroads very little merchantable timber remains.

The Yazoo delta is a country of exceedingly fertile soils, and the original hardwood forest is being rapidly cleared by large lumber companies to make way for farms.

The great longleaf pine region, which was once covered with unbroken pure pine forests over vast areas, is being rapidly exploited by large lumber companies. The lumber industry has probably reached its height, and its decline will be almost as rapid as its rise.

3. In all regions of the State the timber wealth is being depleted at an astonishing rate. Little attempt has been made to manage timber lands conservatively, and, because of very frequent forest fires and clear cutting, only a small amount of young tree growth is coming up to take the place of the virgin stands on lands unfit for agriculture.

4. The following problems of forest management are of particular importance: forest fires, grazing, waste in logging, turpentine, assessments and taxation of timberlands, and management of tax and school lands.

The prevention of forest fires is by far the most important measure to be considered in a State forest policy. The general indifference to forest fires in the State is probably the chief cause for the extensive burning of the woodlands. This can be remedied through educational work conducted by a forestry commission and a State Forester, and through the enactment of wise forest fire laws.

The chief injury to the forest in connection with grazing is from the annual fires which are set for the supposed improvement of pasturage. Hogs also do a great deal of damage by digging up seedlings and eating tree seeds.

There has been an enormous amount of waste connected with logging in Mississippi. This waste is of two kinds; through sound material left in high stumps and

large tops and through clear cutting. A Forestry Commission through a State Forester and by other means should educate the people in the conservative management of timber lands.

Turpentine operations are nowhere practiced extensively in the State. The greatest damage to the forest in connection with turpentine is through fires. By the use of a cup system, turpentine would undoubtedly yield large profits when carried on in connection with lumbering operations.

The manner of harvesting tree crops has a very great influence on the character and quality of the succeeding stand. Where forest lands are more valuable for forestry than for agriculture, a portion of the stand should be left for seeding purposes, and the most valuable species should be favored as against the undesirable species.

Forest taxation has a great influence on conservative forest management. The principle that the land should be taxed annually apart from the timber growing upon it, and that the timber crop should be taxed when cut, is one which has been long recognized in the tax laws in those European countries where forest management is most highly developed. Such a law would be unconstitutional in Mississippi, and timber land owners must look for justice to the leniency of the assessor in estimating the value of this class of property.

School and tax lands should be managed conservatively, in order to yield the highest returns possible and to serve as practical object lessons in forest management to the people of the State.

LEGISLATION.

Past Legislation.—Past legislation concerning the forests was enacted at a time when economic conditions in the State were quite different from present conditions, and when the chief problems seemed to be in connection with the theft of timber. The fire law has proved to be quite inadequate, because it did not provide for a definite organ-

ization to enforce its provisions. The various laws in Mississippi relating to forest lands are briefly summarized as follows:

1. A person destroying in any manner live oak trees belonging to another shall pay to the owner for each tree thus destroyed the sum of \$50.

2. The same penalty shall be paid to an owner in the case of cypress, white oak, black oak, or other oak, pine, poplar, black walnut, cherry, pecan, hickory, chestnut, birch, ash, or beech, and for every other tree not mentioned a penalty of \$5 shall be paid.

3. A penalty of imprisonment for not more than five months or a fine of not less than \$10 nor more than \$1,000, or both such fine and imprisonment, is imposed in case a person shall cut or raft certain trees belonging to another without first securing the permission from the owner.

4. A fine of not less than \$5 nor more than \$25 is provided for each box cut in a pine tree growing on land belonging to another without the consent of the owner, or imprisonment in the county jail for a period not exceeding three months, or both such fine and imprisonment.

5. A penalty of \$5 payable to the owner for each box cut in a pine tree.

6. It is the duty of the Land Commissioner to investigate and prosecute all suits arising from trespass cases on State lands.

7. There is a penalty of \$2 per acre in every 40-acre subdivision of land in which trespass was committed, in addition to the statutory damages; but this does not apply to a person renting public lands and having license of the Land Commissioner to take trees for fuel or like purposes from contiguous land.

8. A penalty of not more than six months' imprisonment or a fine of not less than \$100 nor more than \$1,000, or both such fine and imprisonment, is fixed for cutting or rafting certain enumerated species from land belonging to the State.

9. There is a law providing that whoever shall wantonly, negligently or carelessly allow fire to get on land of

another shall be liable to the owner for the value of the timber, trees and grass destroyed, and, in addition, shall pay to the owner a penalty of \$150.

NEEDED LEGISLATION

State Forestry Commission.—Of great importance in the inauguration of a forest policy for the State is the establishment of a State Forestry Commission, and of first importance is the creation of the office of State Forester or Chief Forest Firewarden. The Forestry Commission should be composed of the following members: The Governor, the Commissioner of Agriculture, the Attorney-General, the State Geologist, the Professor of Forestry at the State Agricultural College, and a practical lumberman engaged in the manufacture of lumber in the State. The State Forester should be appointed by the Governor upon the recommendation of the State Forestry Commission.

The Forestry Commission should have general supervision of the forest interests of the State, and carry on through the State Forester and in other ways investigations of all matters pertaining to forestry within the State. A vigorous educational campaign in the interests of forest conservation should be one of the commission's most important duties. The commission should in a general way direct and supervise the work of the State Forester, who should annually prepare for it a detailed report on the progress of forestry within the State. The commission should prepare a report for each session of the Legislature, including such recommendations for improvements in the forest laws as may from time to time become necessary.

State Forestry.—The appointment of a State Forester who should also be the Chief Forest Firewarden, is of paramount importance to the State. The States in which forestry commissions have been established, but where there are no technically trained foresters who devote their entire time to promoting forestry in the State, have found that they cannot obtain the most effective results. Some of

these States have recently created the office of State Forester. Many States now employ trained foresters, some of these being the naturally treeless States where forest planting and the better management of farm woodlots are important.

There is probably no State where a trained forester is more needed than in Mississippi. The expense of maintaining this office would be small compared with the benefit to the people of the State through education in forest economy and through the better enforcement of the forest laws.

His chief duties would be as follows:

1. To carry on an educational campaign through correspondence, the publication of forestry literature of interest in the State, and lectures before farmers' institutes, various societies, lumber and other manufacturers' associations and schools and colleges.

2. As Chief Forest Firewarden, to superintend the work of the forest firewardens and deputy forest firewardens in each county.

3. To co-operate with timber land owners in the preparation of plans for the management, protection and replacement of tree growth in so far as other duties will permit.

4. To examine and report upon land given to the State by individuals for State forests.

5. To examine and report upon lands which have reverted to the State for non-payment of taxes, in order to ascertain the practicability of managing them as State forests.

6. To examine school lands and college grants, and to manage conservatively the portions best suited for forest growth.

7. To recommend the purchase of tracts of absolute forest land in various parts of the State for State forests, and to manage such tracts when purchased.

8. To examine and make expert studies relative to State forest conditions and to conduct experimental investigations pertinent to forestry.

The State Forester should be a graduate of a recognized school of forestry, and should have had experience in practical forest work. To be most effective, he should be absolutely free from political influence. He should be assured of the position as long as he continues to fulfill the duties of the office in a competent, conscientious manner. The salary of such a man should be at least \$2,000 a year, and the sum of \$1,000 should be annually available for his traveling and other expenses in connection with the office.

If the necessity of curtailing expenditures makes it advisable to create the office of State Forester and Chief Forest Firewarden at this session of the Legislature, it is suggested that, so far as possible, the State Forestry Commission attend to the duties which would devolve upon a State Forester. The Commission, through its secretary should direct the forest firewardens in their work, and should investigate and prosecute all violations of the forest laws.

State Forests.—In Europe many countries have had forest reserves for several hundred years. Most of them were established at a time when a general famine of timber was threatened through the rapid exploitation of private forests. By conservative management these forests have been made to yield remarkably high returns and at the same time, since they are located in the mountainous regions whence the larger streams originate, the effect of preserving a steady stream flow, and to a large extent preventing floods has been of incalculable benefit to the people. Several States in this country have established State Forests and the Federal Government controls and manages conservatively nearly 200,000,000 acres of national forests in the West.

The State of Mississippi inaugurates such a policy of managing certain absolute forest lands as State forests. Such lands may be obtained by the retention of lands which have reverted to the State for non-payment of taxes, and by gifts from individuals. The chief purposes of these forests would be (1) to help furnish a future supply of timber for

local needs; (2) to serve as practical object lessons in forest planting and management. Within the State forests it might be well to establish preserves for the protection and propagation of deer, wild turkey, quail, woodcock, and other game birds.

These forests should be in all parts of the State, and they should comprise absolute forest land, such as localities unfit for agriculture because they are annually inundated or are too hilly to allow of profitable permanent cultivation. Many thousand acres of such lands are held at values of from \$1 to \$5 per acre in the rough hills of north-east Mississippi and the cut-over swamp areas in all parts of the State.

The State Forester should be empowered to sell timber on terms most advantageous to the State, and the revenue derived from the forests, together with all money obtained from penalties in connection with the forest-fire law, should be placed in the State Treasury in a fund which should be drawn on only for purposes of forestry.

Forest Fire Legislation.—The chief lack of the forest-fire law in Mississippi is, that it does not provide for a fire-warden system to fight fires and to apprehend and prosecute offenders against the law. During the past few years the majority of forest laws enacted in the various States have been for protection against forest fires. A study of these laws and a knowledge of the results which have followed their enforcement, have indicated that certain provisions are essential to the successful solution of the forest fire problem.

The firewarden system should have as its head a State Forester who should also be chief forest firewarden. He should direct the county firewardens in their work and prosecute for all violations of the forest-fire laws.

In each county there should be one forest firewarden, appointed by the Governor upon the recommendation of the State Forester, who, in addition to doing all in his power to extinguish fires, should report to the State Forester as soon as possible, all fires and violations of the forest laws, together with all data which might aid in convicting

guilty persons. Firewardens should be paid by their respective counties. The plan of paying them according to an hourly rate for time spent in the discharge of their official duties has usually proved satisfactory. Since the enforcement of a fire law will cause the improvement and increase in value of property, the counties will find that the small expense of maintaining a firewarden system will be more than offset by the increased returns from taxes.

Besides the forest firewarden in each county the sheriff, deputy sheriffs, constables, marshals, justices of the peace, and other officers of the State should be declared *ex-officio* deputy firewardens, with power to enforce the laws and arrest violators.

Owners of timber land and associations of timber land owners who desire special protection of their holdings from fires should be allowed to recommend employees for appointment as deputy forest firewardens. Such officers should be paid by their employers.

APPENDIX.

Suggested Forest Law.—The following law is suggested as being applicable to conditions in Mississippi. It is based chiefly on the recommendations given under "Needed Legislation."

SECTION 1. *Be it enacted by the Legislature of Mississippi,* That there is hereby created and established a State Commission of Forestry to consist of the Governor, the Attorney-General, the Commissioner of Agriculture, the State Forester, the State Geologist, the Professor of Forestry in the Mississippi Agricultural and Mechanical College, and one practical lumberman engaged in the manufacture of lumber in this State, who shall be appointed by the Governor to serve for a term of two years. The members of said commission, with the exception of the State Forester, provided for in Section 3 of this Act, shall serve without compensation save for actual necessary expenses incurred in the performance of their official duties as members of this commission.

SEC. 2. That the Governor as *ex-officio* chairman of the Commission of Forestry shall call a meeting of said commission within thirty days after the approval of this Act. The commission shall meet at least twice in each year in the city of Jackson and at such other times and places as the Governor may designate.

SEC. 3. That there shall be appointed by the Governor a State Forester, who shall have a practical knowledge of forestry, and who shall be a graduate of a recognized school of forestry. His compensation shall be \$2,000 per annum together with reasonable traveling and field expenses incurred in the performance of his official duties. He shall act as Secretary of the State Commission of Forestry. He shall, under the general supervision of the State Commission of Forestry, have direction of all forest interests and all matters pertaining to forestry within the jurisdiction of the State. He shall have charge of all forest firewardens in the State, and aid and direct them in their work; take such action as is authorized by law to prevent and extinguish forest fires; enforce all laws pertaining to forest and woodland, and prosecute for any violation of such laws; collect data relative to forest destruction and conditions; direct the protection and improvement of State parks and State forests; and co-operate with counties, towns, corporations, and individuals in preparing plans for the protection, management, and replacement of trees, woodlots, and timber tracts under an agreement that the parties obtaining such assistance shall pay at least the field expenses of the men employed in preparing such plans. He shall carry on an educational course of lectures on forestry at the Farmers' Institutes and similar meetings within the State. He shall prepare for the State Commission of Forestry annually, a report on the progress and condition of State forest work and recommend therein plans for improving the State system of forest protection, management, and replacement.

SEC. 4. That it shall be the duty of the commission, provided for in Section 1 of this Act, to publish annually a report upon the forest conditions in Mississippi, with reference to the preservation of forests, the effects of the

destruction of forests upon the welfare of the State, and all other matters pertaining to the subject of forestry, and to promote so far as they may be able a proper appreciation in this State of the benefits to be derived from forest preservation. It shall further be their duty to report to each session of the Legislature the results of their investigations, and to recommend desirable legislation with reference to forestry, and to perform such other duties as may be imposed upon them by this or other acts relating to forest preservation.

SEC. 5. That the State Commission of Forestry shall have the power to purchase lands in the name of the State suitable for forest culture and State forests, at a price which shall not exceed \$5 per acre, using for such purposes any surplus money not otherwise appropriated which may be standing to the credit of the forestry fund; and to make all rules and regulations governing the State forests; and that the Governor of the State is authorized upon the recommendation of the State Commission of Forestry to accept gifts of land to the State, the same to be held, protected and administered by the State Commission of Forestry as State forests and to be used so as to demonstrate the practical utility of timber culture and as a breeding place for game. Such gifts must be absolute except for the reservation of all mineral and mining rights over and under such lands, and a stipulation that they shall be administered as State forests, and the Attorney-General of the State is directed to see that all deeds to the State of lands mentioned above are properly executed before the gift is accepted.

SEC. 6. That the boards of supervisors of all counties shall, as soon as may be after this Act takes effect, recommend to the State Forester the names of such persons as may, in their estimation, be fit to fill the office of forest firewarden in their respective counties. After investigation, the State Forester shall choose from the persons recommended as above prescribed, and recommend to the Governor for appointment not more than one competent person in each county to be forest firewarden for that

county, subject, however, to removal by the Governor at any time in his discretion. Upon the termination in any manner of the term of office of any forest firewarden, a successor shall be appointed in the manner hereinbefore provided for the appointment of such officers originally. Forest firewardens shall receive compensation at the rate of 30 cents an hour for all time spent in the discharge of duties connected with the office, to be paid monthly by the board of supervisors of the county in which the forest firewarden holds office; provided that in no instance shall more than \$3 be paid for work done during any one day. Forest firewardens thus appointed shall, before entering upon the duties of their office, take the proper official oath before the clerk of the court of the county in which they reside; after which they shall, while holding office, possess and exercise all the authority and power held and exercised by constables at common law under the statutes of this State, so far as arresting and prosecuting persons for all violations of any forest laws and of the laws or rules and regulations enacted or to be enacted for the protection of the State forests, or for the protection of the fish and game contained therein.

SEC. 7. That all sheriffs, deputy sheriffs, constables, marshals, justices of the peace and other officers of this State are hereby declared ex-officio deputy forest firewardens, who shall serve as such without further compensation, and who shall enforce all the forest laws of this State, and who shall have the same powers as are vested in the forest firewardens by the provisions of this Act. And the Governor may, on the recommendation of the State Forester, appoint as deputy forest firewardens any persons who may desire to act without compensation.

SEC. 8. That it shall be the duty of the forest firewardens to enforce all forest laws of this State, to protect the State forests, and to see that all forest laws, rules and regulations are enforced; to report any violations of forest laws to the State forester as soon as possible after their occurrence; to assist in apprehending and prosecuting offenders, and to make an annual report to him as to

forest conditions in their respective counties. When any forest firewarden shall see or have reported to him a forest fire, it shall be his duty to repair immediately to the scene of the fire and to summon such persons and means as in his judgment seem expedient and necessary to extinguish said fire. If any person fail to respond to the warden's call for his assistance or for the use of his property, he shall be liable to a fine of not exceeding \$10. The owners of all property which is used in the extinguishment of a forest or brush fire under requisition of a forest firewarden shall receive reasonable compensation therefor. In case the forest firewarden and the persons called to assist him or to furnish the use of property shall at any time fail to agree upon the terms of compensation therefor, the dispute shall be referred to the board of supervisors of the county in which the fire occurred for final settlement.

SEC. 9. That the expenses incurred in fighting or extinguishing any forest or brush fire under the direction of a forest firewarden shall be borne by the county in which the fire occurred, and shall be payable in full by the board of supervisors of each county immediately upon the receipt of an itemized account, provided that the total sum so expended by any county shall not exceed \$200 in any one year.

SEC. 10. That the State Forester shall furnish notices printed in large letters upon cloth calling attention to the dangers of forest fires and to forest fire and trespass laws and their penalties. Such notices shall be distributed by the forest firewardens and deputy firewardens and posted by them at the courthouses, stores and postoffices, and in conspicuous places along the highways. Any person who shall destroy, deface, remove or disfigure any sign, poster or warning notice posted under the provision of this Act, shall be guilty of a misdemeanor and punishable upon conviction by a fine of not less than \$10 nor more than \$100, or imprisonment in the county jail for a period of not less than ten days nor more than three months, or both such fine and imprisonment.

SEC. 11. That every individual or corporation that

wilfully, maliciously or with intent sets on fire or causes or procures to be set on fire any woods, brush, grass, grain or stubble on lands not their own shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than \$25 nor more than \$500, or imprisonment for not less than thirty days nor more than one year, or both such fine and imprisonment.

SEC. 12. That it shall be unlawful for any person, firm or corporation as landowner to set fire to or to procure another to set fire to any woods, logs, brush, leaves, grass or clearing upon their own land without giving adjacent landowners five days' written notice unless they shall have taken all possible care and precaution against the spread of such fires to other lands not their own by previously having cut and piled the same or carefully cleared around the land which is to be burned, so as to prevent the spread of such fire. The setting of fire contrary to the provisions of this section, or allowing it to escape to the injury of adjoining land shall be prima facie proof of wilfulness or neglect, and the landowner from whose land the fire originated shall be liable in a civil action for damages for the injury resulting from such fire, and also for the cost of fighting and extinguishing the same.

SEC. 13. That logging and railroad locomotives, donkey or threshing engines, and other engines and boilers operated in, through, or near forest or brush, which do not burn oil as fuel, shall be provided with appliances to prevent the escape of fire and sparks from the smokestacks thereof and with devices to prevent the escape of fire from ash-pans and fire-boxes. Failure to comply with these requirements shall be a misdemeanor punishable upon conviction by a fine of not less than \$10 nor more than \$100 for each and every offense thus committed.

SEC. 14. That all individuals or corporations causing fires by violations of Sections 11, 12 or 13 of this Act shall be liable to the State and to the county in which the fire occurred in an action for debt to the full amount of

all expenses incurred by the State or county in fighting and extinguishing such fires.

SEC. 15. That justices of the peace for this State in the county wherein the offense shall have been committed shall have jurisdiction to hear and determine all prosecutions for the purpose of enforcing fines and penalties collectible under the provisions of this Act not exceeding the amount of \$100, and of holding the offender under proper bail if necessary for hearing before the circuit court, committing him to the county jail until such hearing if the required bail is not furnished. It shall be the duty of the State's attorney of the several counties to prosecute all violations under Section 12 of this Act.

SEC. 16. That all money received as penalties for violations of the provisions of this Act, less the cost of collection, together with any amount obtained from the State forests, shall be paid into the State treasury to the credit of the forestry fund, which fund is hereby created; and the moneys in said fund are hereby appropriated for purposes of forest protection, management, replacement and extension, and for the purchase of lands for State forests, as provided for in Section 5 of this Act.

SEC. 17. That there is hereby appropriated the sum of three thousand dollars (\$3,000) annually for the fiscal years 1909 and 1910 for carrying out the provisions of this Act and for the payment of salaries and expenses herein provided for.

SEC. 18. That all acts or parts of acts inconsistent with the provisions of this Act are hereby repealed.

SEC. 19. That this Act shall take effect from the date of its passage.

