NORTH ATLANTIC DIVISION.

MAINE.

The forests of the Northern Pine Belt once extended over the state of Maine. Pine and spruce, with which were mingled maple, birch, and other deciduous trees, covered the entire state, with the exception of the immediate coast region between the Kennebec and the Penobscot rivers, a region of hard-wood forest; hemlock was common.

The original pine and spruce forests of the state have been practically destroyed. Pine has been cut in every township, and the largest spruce everywhere culled, except from the inaccessible region about the headwaters of the Allaguash river. Scattered bodies of the original pine, often of considerable extent and generally connected with farms, exist in the southern, and especially in the southeastern, counties, and fine hemlock of large size is still an important element of the forest in the central and southern portions of the region west of the Penobscot river. Birch, maple, and oak, too heavy for transport by raft, are still common, except in the neighborhood of manufacturing centers and the lines of railroad. Hard-wood timber is particularly fine and abundant through the central portion of the state; farther north the forest is more generally composed of coniferous trees.

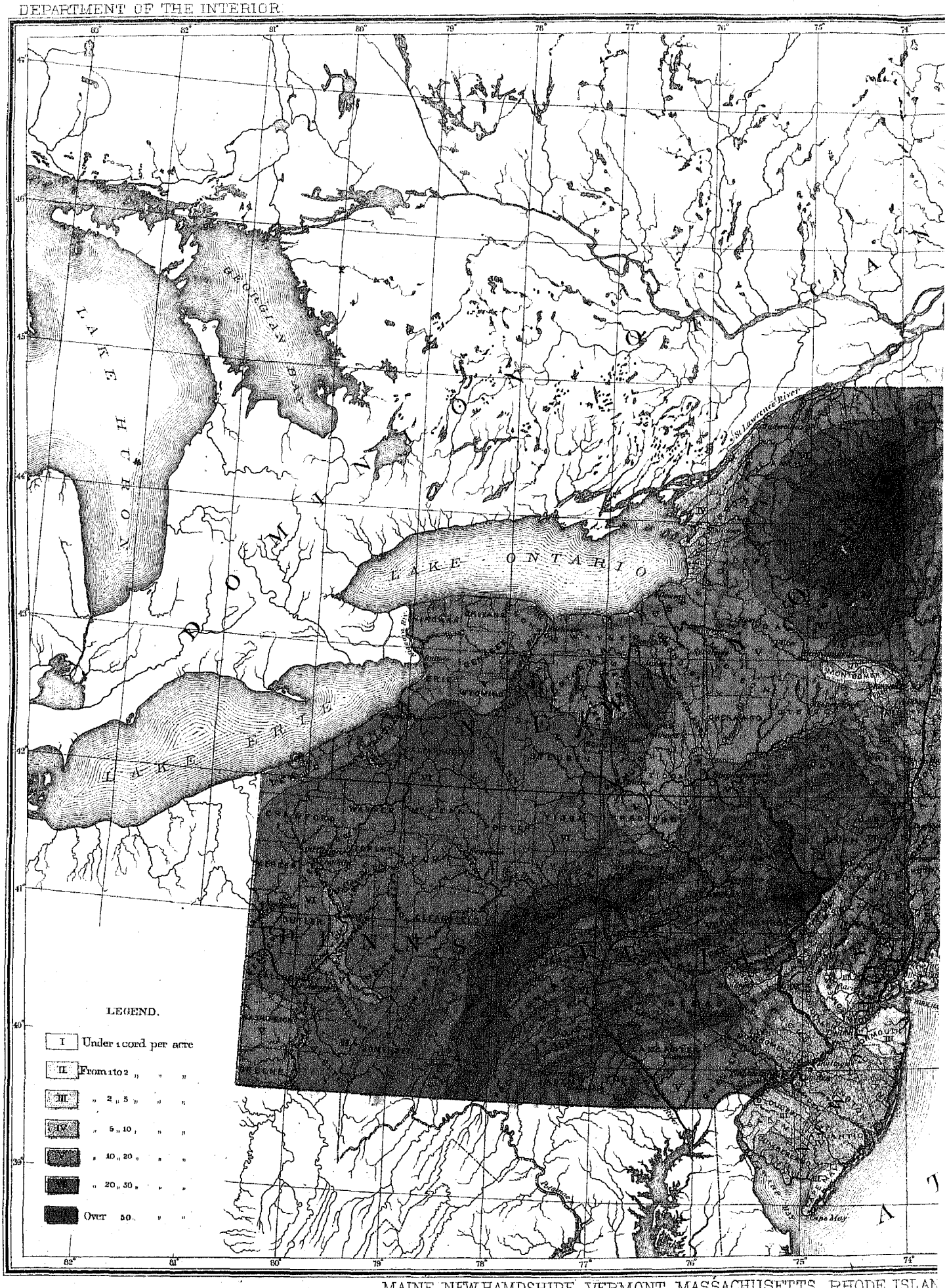
The lumber business of southern and central Maine attained its greatest importance as early as 1850. In that year spruce was for the first time driven down the Kennebec with pine, and the proportion of spruce to pine has since steadily increased, until, in the season of 1879–'80, only 20 per cent. of the lumber cut on that river was pine. The lowest point of productive capacity of the forests of Maine has probably been passed. The reckless disregard of forest property which characterized the early lumbering operations of the state has been replaced by sensible methods for preserving and perpetuating the forest. This change in public sentiment in regard to the forests has followed naturally the exhaustion of the forest wealth of the state. As this disappeared the importance of preserving some part, at least, of the tree covering, the source of the state's greatest prosperity, forced itself upon public attention; for unless the forests could be perpetuated, the state must lose forever all commercial and industrial importance. It has followed that the forests of Maine, as compared with those in other parts of the country, are now managed sensibly and economically. They are protected from fire principally through the force of public sentiment, and only trees above a certain size are allowed to be cut by loggers buying stumpage from the owners of land. In the southern counties the young pine now springing up freely on abandoned farming lands is carefully protected, and large areas are planted with pine in regions where the natural growth has not covered the soil. The coniferous forests, under the present management, may be cut over once in every fifteen or twenty years, producing at each cutting a crop of logs equivalent to 1,000 feet of lumber to the acre, of which from 5 to 7 per cent. is pine, the rest spruce.

Forest fires, which formerly inflicted every year serious damage upon the forests of the state, are now of comparatively rare occurrence. During the census year only 35,230 acres of woodland were reported destroyed by fire, with an estimated loss of $123,315. These fires were set by farmers in clearing land, by careless hunters, and by sparks from locomotives.

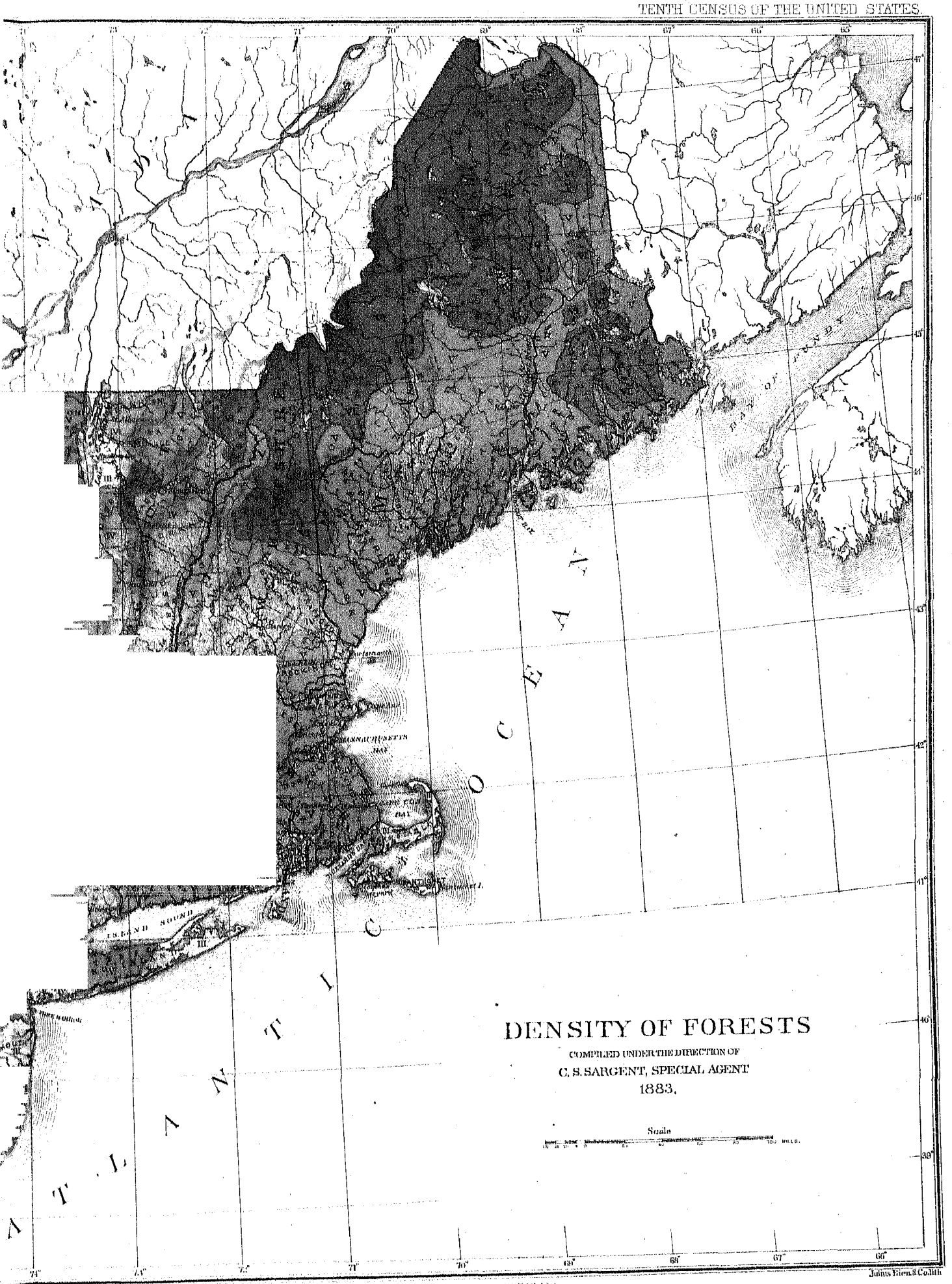
The following estimates of the amount of pine and spruce standing in the state May 31, 1880, were prepared by Mr. Cyrus A. Packard, of Augusta, land agent of the state. They were made up from the results of actual surveys, and have been reviewed by a large number of experts most familiar with the condition of the forests in different parts of the state:

Basin of—	Pine (*Pinus Strobus*).	Spruce (*Picea nigra*).
	Feet, board measure.	*Feet, board measure.*
Saint John river and tributaries	75,000,000	1,400,000,000
Penobscot river and tributaries	100,000,000	1,600,000,000
Kennebec river and tributaries	50,000,000	1,000,000,000
Androscoggin river and tributaries	50,000,000	500,000,000
Saint Croix, Machias, Narraguagus, and Union rivers and other small streams	200,000,000	500,000,000
Total	475,000,000	5,000,000,000
Cut for the census year ending May 31, 1880	138,825,000	301,020,000

DEPARTMENT OF THE INTERIOR



MAINE, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS, RHODE ISLAN


DENSITY OF FORESTS
COMPILED UNDER THE DIRECTION OF
C. S. SARGENT, SPECIAL AGENT
1883.
Scale
BAY OF FUNDY
MASSACHUSETTS BAY
LONG ISLAND SOUND
ATLANTIC OCEAN
Julius Bien & Co. lith

Quantities of logs cut in Aroostook county are driven down the Saint John river and manufactured in New Brunswick. During the season of 1879-'80 there were handled in this way 70,000,000 feet of spruce, 4,500,000 feet of pine, 2,800,000 feet of cedar, 1,500,000 feet of squared pine timber, 1,000,000 feet of squared birch timber, 110,000 feet of squared larch timber. Of this 70 per cent. of the spruce and 80 per cent. of the pine were returned to the United States manufactured into lumber, and the whole of the cedar in the form of shingles.

Important industries dependent for material upon a supply of hard wood have long flourished in the state. Large quantities of cooperage stock, woodenware, handles, spools, bobbins, etc., are manufactured, and more recently the production of wood pulp and excelsior, principally from poplar and other soft woods, has assumed important proportions. Manufacturers from nearly every part of the state report a deterioration and scarcity of the best timber, especially oak, which is now largely imported from Canada or replaced by southern hard pine. Birch, however, is still abundant, and is largely exported in the form of spool and bobbin stock. The manufacture of potash, once an important industry of the state, has been abandoned as unprofitable. Several establishments engaged in the manufacture of tanning extracts from hemlock bark are located in the state, and the numerous tanneries upon the Penobscot river consume large quantities of the same material. The demand for hemlock lumber is now good, and the logs, after being stripped of their bark, are manufactured into lumber and not allowed, as in other parts of the country, to rot upon the ground. A recently-established industry is the manufacture of kegs, barrels, and woodenware from pulp made from chips, brush, and other waste material of the forest. Partial estimates of the hoop-pole industry give a product of 5,449,200, valued at $75,612. During the year 1879 153,334 pounds of maple sugar were produced in the state.

ANDROSCOGGIN COUNTY.—One-half of this county is reported covered with woods, largely second growth; it contains, however, considerable bodies of fine first-growth white pine. Manufacturers of cooperage stock report oak exhausted, other hard woods scarce and of inferior quality, and that no second-growth timber is of sufficient size for use. A large amount of excelsior is manufactured, principally from poplar.

AROOSTOOK COUNTY.—Nine-tenths of this county is reported covered with forests, the clearings being confined to the neighborhoods of the rare settlements along the river bottoms. Logs cut in this county are largely rafted down the Saint John river, and little lumber in proportion to the cut is manufactured within its limits. The production of cooperage stock and other articles requiring hard wood in their manufacture is rapidly increasing, and with abundant material such industries seem destined to great development.

CUMBERLAND COUNTY.—One-half of this county is reported covered with woods, principally of second growth. Manufacturers of cooperage stock report a general deterioration and scarcity of material, especially hard woods, now nearly exhausted. Spruce and poplar in large quantities are manufactured into wood pulp.

FRANKLIN COUNTY.—Three-fourths of this county is reported covered with woods, principally confined to the northern portion. Staves, hoop-poles, handles, and excelsior are manufactured in large quantities.

HANCOCK COUNTY.—Seven-eighths of this county is reported covered with woods, largely composed, toward the coast, of second-growth white pine. The northern portions contain fine bodies of large hemlock. Manufacturers of cooperage stock report deterioration of material; ash especially has become scarce.

KENNEBEC COUNTY.—Four-tenths of this county is reported covered with woods, largely second growth. Merchantable spruce and pine have been everywhere removed. Considerable areas are again covered with pine, and the wooded area is increasing. Next to Penobscot this is the most important lumber manufacturing county in the state. Numerous mills located on the Kennebec river saw logs driven from its upper waters and from beyond the limits of the county. Large quantities of poplar and spruce are consumed annually in the manufacture of wood pulp, excelsior, handles, etc. The supply of hard wood is small and of inferior quality. The poplar now used is nearly all second growth.

KNOX COUNTY.—One-half of this county is reported covered with woods, generally of second growth. Heavy timber, however, still exists in the towns of Washington, Appleton, and Union. White pine is scarce, and great deterioration in timber of all kinds is reported. Scarcity in the near future is apprehended by manufacturers. A large amount of cord-wood is consumed annually in burning lime.

LINCOLN COUNTY.—About one-half of this county is reported covered with woods, nearly all second growth.

OXFORD COUNTY.—From one-half to two-thirds of this county is reported covered with woods. The northern portion still contains large areas of original forest, although pine and spruce have been culled everywhere. In the southern part of the county there are considerable bodies of second-growth white pine, and the wooded area is increasing. Cooperage stock, handles, and wood pulp are largely manufactured. Manufacturers report that timber of all kinds has deteriorated in quality and become scarce, with the exception of oak, which is still abundant and of good quality.

PENOBSCOT COUNTY.—Nine-tenths of this county is reported covered with woods. The merchantable pine and spruce have been removed from the southern portion and everywhere culled. In the northern townships hemlock is still abundant and of fine quality. Penobscot is the great lumber manufacturing county of the state, Bangor, once the principal market in the United States for pine lumber, being still the most important saw-mill center. Spruce and not pine, however, except in insignificant quantities, is now manufactured upon the Penobscot. Manufacturers using hard woods report an abundant supply of excellent material.

PISCATAQUIS COUNTY.—From eight- to nine-tenths of this county is reported covered with forests, the southern portion only being cleared of the original tree growth.

SAGADAHOC COUNTY.—One-half of this county is reported covered with woods, principally second growth. Considerable second-growth white pine is now growing up upon abandoned farm lands, and the wooded area of the county is increasing. Manufacturers report all timber of sufficient size for use scarce and of inferior quality, and apprehend early exhaustion of hard woods suitable for mechanical purposes.

SOMERSET COUNTY.—Five-sixths of this county is reported covered with woods, the southern portion only being cleared of its forests of spruce and pine. Excelsior, handles, woodenware, etc., are largely manufactured. Hard-wood timber of all sorts is abundant and of excellent quality, with the exception of black ash, now scarce and in great demand.

WALDO COUNTY.—From one-quarter to one-half of this county is reported covered with woods, generally of second growth. The wooded area is now gradually increasing by the growth of white pine on abandoned farming lands. Manufacturers report a scarcity and deterioration of timber of all kinds of sufficient size for use.

WASHINGTON COUNTY.—From eight- to nine-tenths of this county is reported covered with woods. In the southern portion considerable areas contain scattered bodies of large pine, and through the center of the county are large tracts of first-growth hemlock forests. No future scarcity of lumber is apprehended.

YORK COUNTY.—From one-third to one-half of this county is reported covered with woods; it contains large quantities of scattered pine. Second-growth pine is spreading on abandoned agricultural land, and the forest area is increasing. Wood pulp, cooperage stock, and handles are largely manufactured. Timber of all sorts is reported as depreciating in both quality and quantity. No immediate scarcity, however, is apprehended.

NEW HAMPSHIRE.

The forests of New Hampshire were originally composed of a belt of spruce, mixed with maple, birch, and other hard-wood trees, occupying all the northern part of the state and extending southward through the central portion; the southeastern part of the state and the region bordering the Connecticut river were covered with forests of white pine, through which considerable bodies of hard wood were scattered. The original white-pine forests of New Hampshire are practically exhausted, although in the northern counties of the state there still remain a few scattered bodies remote from streams and of small size; once of great extent and importance, these forests have disappeared before the ax of the settler and lumberman, or have been wasted by forest fires. Large areas, however, once covered with forests of pine, have grown up again, especially in the southern part of the state, with this tree. No estimate of the amount of this second-growth pine standing in the state has been possible; it furnished during the census year a cut of 99,400,000 feet of lumber, board measure. The remaining forests of the state, considered as a source of lumber supply, are composed of spruce, more or less mixed with hard woods, of which the sugar maple and the birch are the most valuable. In the northern part of the state large areas of the original spruce forest remain, although these bodies of timber are now only found at a considerable distance from streams.

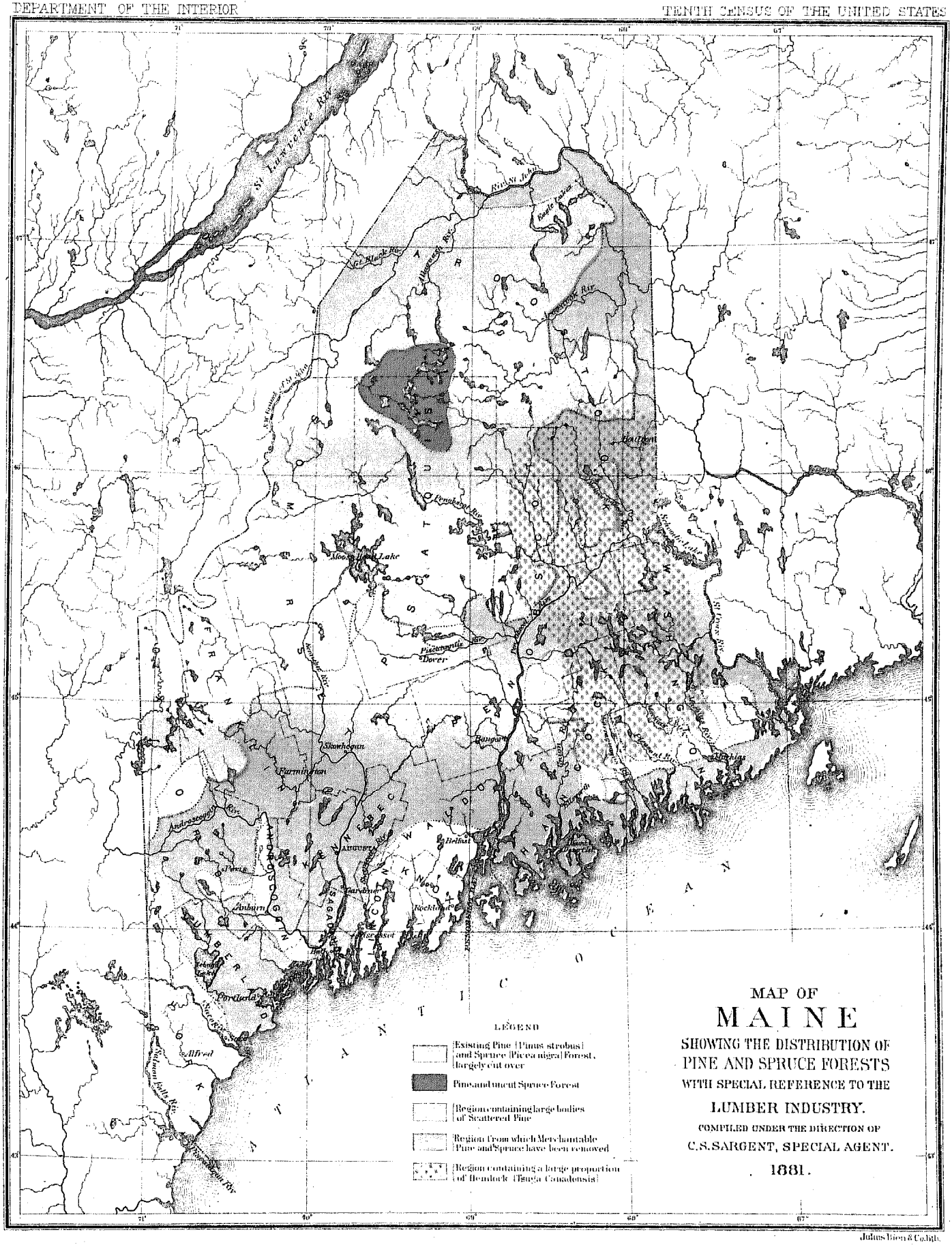
Fires, which at different times have destroyed vast areas of forest, especially in the northern part of the state, are now less frequent and destructive. During the year 1880 but 5,954 acres were reported stripped of their tree covering by fires. Of such fires twelve were set by sparks from locomotives, seven by the escape into the forest of fires originally set in clearing land for agricultural purposes, six by sportsmen, one through malice, and one by the careless use of tobacco.

The basis of the following estimate of the amount of merchantable black spruce (*Picea nigra*) lumber standing May 31, 1880, in Carroll, Coos, and Grafton counties, where alone the spruce forests of the state are now of commercial importance, was furnished by Mr. G. T. Crawford, of Boston, and verified by the testimony of other experts:

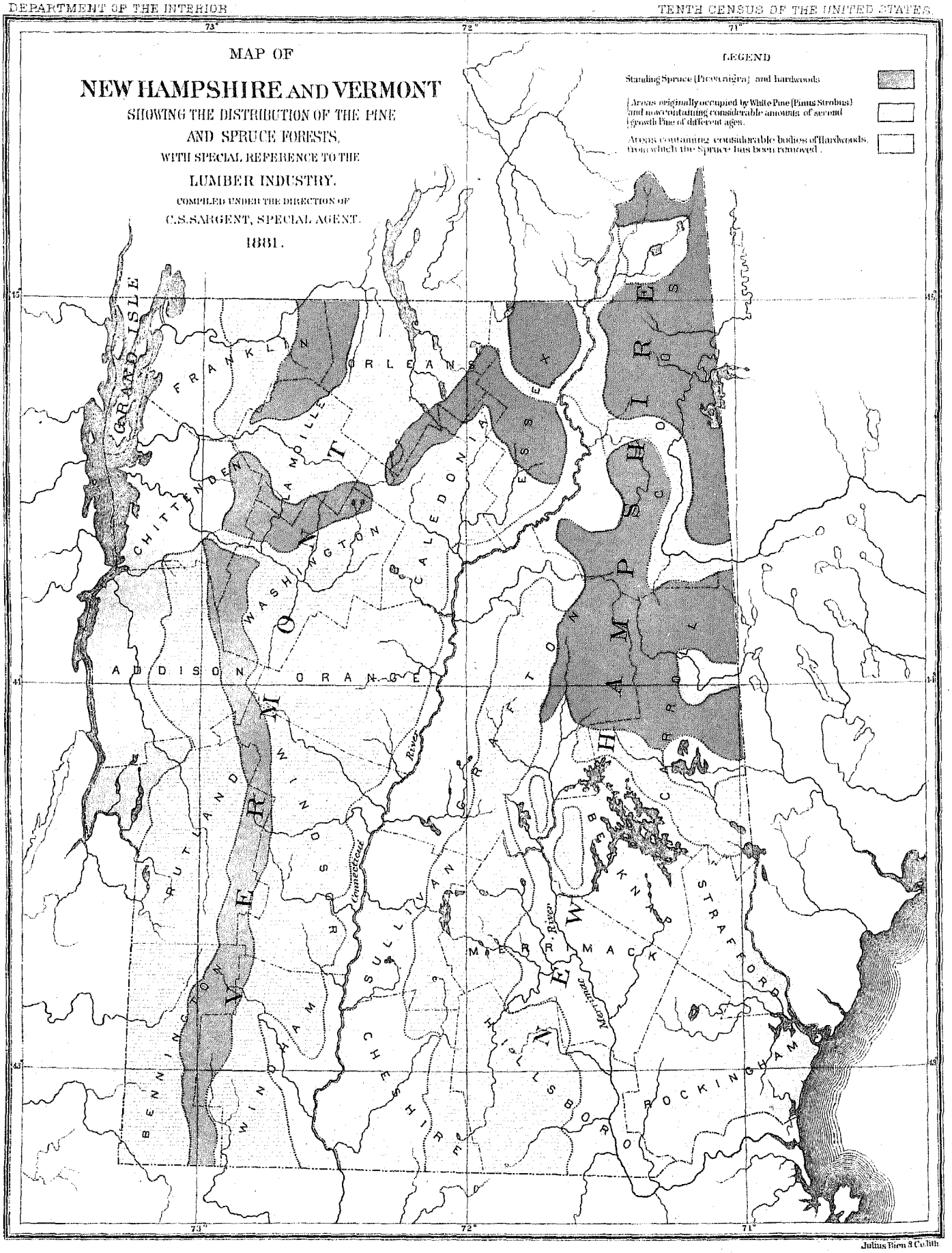
BLACK SPRUCE (*Picea nigra*).

Counties.	Feet, board measure.
Carroll	60,000,000
Coos	1,000,000,000
Grafton	450,000,000
Total	1,510,000,000
Cut for the census year ending May 31, 1880 (including 26,000,000 feet sawed on the Connecticut river, in Massachusetts).	153,175,000

It is roughly estimated that the spruce forests of the state contain over 33,750,000 cords of hard wood and 165,000,000 feet of hemlock.



Julius Bien & Co. lith.



Julius Bien & Co. lith.

Partial returns of the hoop-pole industry give a production during the census year of 4,225,000, valued at $29,280. New Hampshire is fourth among the states in the importance of its maple-sugar product. During the year 1879 it produced 2,731,945 pounds.

BELKNAP COUNTY.—From one-third to three-eighths of this county is reported covered with woods.

CARROLL COUNTY.—Five-eighths of this county is reported covered with woods. In the northern portion there are still large areas covered with an original growth of spruce. Large quantities of charcoal are manufactured in this county, and the usual method of lumbering adopted here and very generally in northern New Hampshire is first to cut the spruce large enough for saw-logs, taking all trees 6 inches in diameter 25 feet from the ground, and then cut for charcoal all the remaining growth, hard wood and soft, even the young spruce. As the land cleared is of little value for agricultural purposes, it is allowed to grow up again with wood. Deciduous trees come up at first, and these are sometimes, but not always, followed by spruce. It is necessary to exercise great care in order to prevent the newly-cleared tracts from suffering from fire, as the material for charcoal, cut into cord-wood, is often left on the ground until the second season. Mr. C. G. Pringle, who studied the forests of this region, furnishes the following notes upon the forests of Carroll county:

"The forests on the mountain sides between Crawford's and Bartlett are composed principally of the yellow and paper birch, the sugar maple, the red maple, poplars, the black spruce, and the balsam fir. About Bartlett scattering specimens of white pine make their appearance. In the more level part of North Conway the red and the pitch pine and the hemlock become common, while on the more sterile, sandy plains farther down the Saco these pines with the white birch constitute the principal arborescent growth.

"The tract known as Hart's location, lying partly in the White Mountain notch, includes 10,000 acres, 2,000 of which bear 15,000 feet per acre of spruce and hemlock—rather more of hemlock than of spruce; 10,000 acres in this tract will cut 25 cords of hard wood per acre. The town of Bartlett, partly cleared, still has 40,000 acres of woodland, which will yield an average of 5,000 feet per acre of spruce and hemlock and 15 cords of hard wood. Sargent's grant covers mount Crawford, Stair mountain, and a part of mount Washington. On this tract are 15,000 acres of timber-land, carrying 20,000 feet per acre, chiefly spruce. The Thompson and Meserve purchase comprises portions of mounts Washington, Jefferson, and Madison, and covers 12,000 acres. Two thousand acres of this will yield 30,000 feet of spruce and hemlock per acre in nearly equal proportions. The remaining 10,000 acres will cut 25 cords of hard wood per acre. The Bean purchase lies north of the town of Jackson, and covers 40,000 acres. It is occupied by a dense forest, amounting to 20,000 feet of spruce and hemlock and 20 cords of hard wood per acre. Originally there was considerable pine on the streams and sides of the mountains in this vicinity, particularly on mount Kearsarge, but now there is little left. Twelve and twenty-five years ago much of the town of Bartlett was burned over, and a different growth has come up—white birch, poplar, bird cherry, etc."

A large amount of cooperage stock, excelsior, and an average of 1,000 cords of shoe pegs (from birch and maple) are annually made in this county. Considerable damage to oak and poplar caused by the ravages of the army-worm [?] are reported. The natural increase of timber is said, however, nearly to equal the present consumption by local industries, and scarcity is not apprehended.

CHESHIRE COUNTY.—About one-half of this county is reported covered with woods.

COOS COUNTY.—Nine-tenths of this county is reported covered with forests. The following is extracted from Mr. Pringle's notes upon the forests of this county:

"Everything east of the Connecticut lakes and about the upper portions of Indian and Perry streams is original forest. Such also is the condition of the Gilmanton, Atkinson, and Dartmouth College grants and the towns of Dixville, Odell, and Kilkenny. All the eastern portions of Clarksville, Stewartstown, Colebrook, Columbia, and Stratford are forest, and nearly all of Wentworth's location, Millsfield, Errol, Dummer, Cambridge, and Success. In these forests the spruce will cut 5,000 feet and the hard wood about 50 cords per acre. There is considerable hemlock, but even less pine than in Essex county, Vermont. Not much of the region has been burned over, and spruce comes into the soil again but slowly after clearings and fires.

"In the township of Kilkenny, in the mountains east of Lancaster, there are 16,000 acres of forest still untouched, though a branch railroad from Lancaster into this forest has been surveyed, and may be constructed in a few years, for the purpose of bringing the lumber down to the mills at Lancaster. Lowe and Burbank's grant is a wilderness, three-fourths well timbered and the remainder a mountain ridge of nearly bare rock. Bean's purchase is nearly inaccessible and but little lumbered. Stark, on the upper Ammonoosuc, is badly cut over, only about one-quarter remaining in virgin forest. About one-half of Berlin is uncut; also the northern half of Randolph, the south half of Gorham, and the south quarter of Shelburne. Considerable land in Success was burned over some years ago, as well as some in Stark and in the eastern part of Berlin, but fires have not lately been very destructive in the New Hampshire forests."

A large amount of cooperage stock, handles, wood pulp, shoe pegs, etc., is manufactured in this county. Abundant material, with the exception of ash, is reported.

GRAFTON COUNTY.—One-half of this county is reported covered with woods, mostly confined to the northern and central portions. Shoe pegs, cooperage stock, wood pulp, and excelsior are largely manufactured. The amount of material is considered abundant for the present consumption.

HILLSBOROUGH COUNTY.—One-half of this county is reported covered with woods, mostly second growth. A large amount of cooperage and wheel stock is manufactured. No deterioration in the quality of material is reported, although at the present rate of consumption it must soon become exhausted.

MERRIMACK COUNTY.—One-half of this county is reported covered with woods. Cooperage stock, handles, and excelsior are largely manufactured. A slight deterioration in the quality of material is reported.

ROCKINGHAM COUNTY.—From one-quarter to five-eighths of this county is reported covered with woods, mostly second growth.

STRAFFORD COUNTY.—Four-tenths of this county is reported covered with woods, mostly second growth. Hoop-poles, cooperage stock, etc., are largely manufactured. Wood of all sorts is reported scarce and rapidly increasing in value.

VERMONT.

The forests of Vermont, as compared with those of New Hampshire and Maine, are varied in composition. About the shores of lake Champlain several western trees first appear, and throughout the state the forest is more generally composed of deciduous than coniferous species. Forests of spruce, however, spread over the high ridges of the Green mountains, their foot-hills being covered with hard-wood trees and little pine or hemlock occurring in the valleys. A forest of white pine once stretched along the banks of the Connecticut, and great bodies of this tree occurred in the northwestern part of the state, adjacent to lake Champlain. The original white-pine forests of the state are now practically exhausted. They are represented by a small amount of second-growth pine only, which furnished during the census year a cut of 6,505,000 feet of lumber, board measure.

The forests of Vermont now suffer comparatively little from fire, although at different periods during the last fifty years very serious fires have laid waste great areas of forest in the Green Mountain region. During the year 1880 3,941 acres of woodland were reported destroyed by fire, with an estimated loss of $48,466. Of such fires ten escaped from farms into the forest, five were set by locomotives, two were traced to the carelessness of hunters, and one to malice.

Large amounts of cooperage stock, woodenware, furniture, paper-pulp, excelsior, veneers, etc., are manufactured throughout the state. Material for these industries is fast disappearing, and a great deterioration in quality, especially of oak, ash, and chestnut, is reported by manufacturers.

Vermont surpasses all other states in the manufacture of maple sugar. During the year 1879 11,261,077 pounds were produced in the state.

The following estimate of the spruce standing in the state May 31, 1880, has been prepared from Mr. Pringle's report, and is based upon the statements of numerous timber-land owners and experts in different parts of the state:

BLACK SPRUCE (*Picea nigra*).

Regions.	Feet, board measure.
Green Mountain range	380, 000, 000
Valley of the Connecticut river	375, 000, 000
Total	755, 000, 000
Cut for the census year ending May 31, 1880 (excluding 16,191,000 feet imported from Canada).	199, 086, 000

Partial returns of the hoop-pole industry give a production during the census year of only 43,900, valued at $470.

ADDISON COUNTY.—About one-third of this county is reported covered with woods. Spruce and ash are scarce and rapidly disappearing. Oak of sufficient size for the manufacture of cooperage stock is exhausted.

BENNINGTON COUNTY.—Two-thirds of this county is reported covered with woods. Manufacturers of woodenware and cooperage stock consider the prospects for future local supply favorable.

CALEDONIA COUNTY.—From one-third to three-eighths of this county is reported covered with woods, mostly confined to the northern and western portions.

CHITTENDEN COUNTY.—About one-fifth of this county is reported as woodland. The following extracts are made from Mr. Pringle's note upon the forests of Vermont:

"Except on the summits of a few of the higher peaks of the Green mountains, where black spruce and balsam fir grow to the exclusion of other trees, the arboreal growth is composed of a large number of species. In the valleys and on the foot-hills, and even on the slopes of the higher mountains in their lower portions, hemlocks mingle with spruce, beech, maple, and birch (yellow birch chiefly, for there is little white birch seen in northern Vermont); basswood, butternut, the ashes, red oaks, etc., are confined to the lower elevations and are less abundant than the trees first mentioned. Between the isolated patches of spruce and fir about the summits of the mountains and the region where hemlock is found, rock maple, yellow birch, and black spruce are the predominating species.

"To estimate the area of valuable original forest still standing in the Green mountains is not an easy task. The belt extends from the Canada line to Massachusetts, and even into that state. The outlines of this belt are made very irregular by the cleared and settled valleys which run up among the mountains, and by reason of forest clearings, so that its width is constantly varying as we proceed from one end to the other.

"The woodlands of the plateau, some 10 miles broad and elevated from 200 to 300 feet above lake Champlain, lying between the foot-hills of the Green mountains and the lower plain beside the lake, occupy, for the most part, rocky hills, and are composed principally of sugar maple, beech, basswood, white ash, black birch, and red oak. Certain limestone hills offer a favorable situation for the butternut, the ironwood, the slippery elm, and the bitter hickory. The swamps and other lowlands yield the red maple, the black ash, the white elm, and the black willow. The latter, especially along streams, is associated with alders and the sheepberry. The colder, sphagnous swamps are covered with a growth, more or less dense, of yellow cedar, black spruce, balsam, and larch; sometimes in the higher portions the white pine mingles with these, scattered or in groves. When grown in such soil this wood is liable to be extremely hard and brittle. The poplars occupy hillsides and ridges where the soil is a light, cold, sandy loam; with them the bird cherry is perpetually associated. The black cherry is scattered in a diversity of soils. White oak and hickory attain their best development on clayey soil or glades of slight elevation; on the red sand-rock hills they are smaller. Certain slopes of cold clay are still here heavily wooded with hemlock, while warm clay lands are the favored site of the burr oak. In the vicinity of the lake and its tributaries low, wet shores are scattered over with the swamp white oak and the burr oak. The chestnut oak is common on the thin, poor soil of the red sand-rock hills, ranging through the valley from the lake as far back in some places as the foot-hills of the Green mountains. The red pine appears on the sandy shores of lake Champlain, and extends far up the Winooski river. The moister and more fertile portions of the sandy plain are still occupied to some extent by white pine, the poorer portions by pitch pine. The white birch occurs on cold, wet, sandy soil near the lake; and in the mountains the black spruce becomes the most common tree; with it in stronger soil are associated the yellow birch and the sugar maple.

"*Burlington.*—This place is believed to rank as third, or next to Albany, among the lumber markets of the United States. More lumber may enter some ports, as Oswego and Tonawanda, for transshipment, but all lumber brought to this market is stored and sold here. The kind is chiefly white pine brought up the lake from Canada, a little of it being cut in Michigan (perhaps one-tenth); all the rest is of Canadian growth. A few of the lumber companies here own lands of limited extent among the Green mountains, from which they obtain spruce for clapboards, etc. The general direction which the lumber sent from here takes is to the older portions of New England, Massachusetts, Rhode Island, and Connecticut, considerable pine being sent even to Maine, which once supplied to commerce so much of this material. Much lumber is dressed here and sent to Boston for shipment to foreign countries. The business still enjoys the highest prosperity, and during the census year, under the stimulus of general commercial prosperity, it was especially active. As yet no lack in the supply is felt, the loggers only having to go farther back in the Canadian forests than formerly to obtain timber enough to meet the demand. The proportion of lumber worked up here is small, there being merely a few factories producing doors, sash, blinds, packing boxes, etc."

ESSEX COUNTY.—Five-sixths of this county is reported covered with forest. The following is extracted from Mr. Pringle's report:

"Four-fifths of that part of the county of Essex lying north of Guildhall and Victory is still in virgin forest, which will yield 5,000 feet of spruce per acre. The towns of Lewis and Averill are entirely unlumbered, and so is Avery's Gore. Colton is mostly covered with forest, and so is Ferdinand. Timber-lands compose about two-thirds of Granby and East Haven, and cover the back parts of the river towns and those crossed by the Grand Trunk railroad. South of Guildhall and Victory the towns of Concord and Lunenburg are mostly cleared and settled. The proportion of hemlock in these forests is not large; there is considerable yellow cedar and a large amount of maple, birch, and beech—probably 50 cords per acre. There is but little pine in all this region, principally confined to the township of Lewis; elsewhere only occasional pine trees occur."

FRANKLIN COUNTY.—From one-fourth to three-tenths of this county is reported covered with forest, mostly confined to the hills in the northeastern and northern portions. In the village of Montgomery a large establishment for the manufacture of butter tubs is located, and at East Richford birch is largely manufactured into turned ware.

GRAND ISLE COUNTY.—About a quarter of this county is reported covered with woods.

LAMOILLE COUNTY.—About one-third to one-half of this county is reported covered with woods, very generally distributed over its entire surface.

ORANGE COUNTY.—One-quarter of this county is reported covered with forest.

ORLEANS COUNTY.—One-half of this county is reported covered with woods. The following is extracted from Mr. Pringle's notes:

"At Newport, situated at the southern extremity of lake Memphremagog, are several mills for cutting veneering from birch. The product of these mills is closely packed in boxes, so that it cannot warp, and sent to the manufactories near the large cities, to be used for chair bottoms and other purposes. Southward from Newport, in the valleys of the Barton and Black rivers, which flow northward into lake Memphremagog, and of the Passumpsic river, which runs southward and joins the Connecticut, are almost continuous swamps of yellow

cedar, black spruce, and larch, from which the cedar timber is now being largely drawn to be sawed into shingles. At Barton the hard woods are largely cut into material for furniture, which is shipped toward the sea-board before being put together.

"The valley of the Clyde river from Newport to Island Pond is cleared for the most part and improved for farms. The usual species of the northern forest occupy the summits of the low hills on either side of the valley. Eastward from Island Pond, down the Neipegan river to the Connecticut by the line of the Grand Trunk railroad, we pass through the wild region from which the lumbermen have only taken some of the spruce and pine. Here, beginning 2 or 3 miles back from the railroad, or in some places much nearer to it, a virgin and unbroken forest stretches over the slopes and summits of the hills for many miles to the northward and southward; black spruce, yellow birch, sugar maple, and beech are its chief component species. In a few places, where the soil is sandy, white pine occurs in straggling groves or isolated specimens, and the swamps, as well as those of all of northern Vermont, are occupied by the black spruce, yellow cedar, and by a few scattering pines. The pine being the kind of lumber first secured, is seldom found now in these Vermont swamps. The cedars are now cut and manufactured into shingles, fence posts, railway ties, etc., for which purposes the lasting quality of the wood makes it eminently suited. There is little hemlock in northeastern Vermont, and it is believed to indicate poor soil wherever it occurs. The soil of this entire region presents a marked contrast to that of northern New York, being fertile and in other respects well adapted to agriculture. On this account land once lumbered over is generally occupied by the farmer and not allowed to come up again to forest, except in the more hilly portions."

Staves, tubs, pails, buckets, and hoops are largely manufactured from spruce, cedar, and ash. The quality of the material used is said to have deteriorated, and manufacturers report that at the present rate of consumption it will soon be consumed.

RUTLAND COUNTY.—Four-tenths of this county is reported covered with woods, principally in the eastern portion. Elm, formerly largely used in manufacture of tubs, etc., is reported exhausted, and basswood has become scarce.

WASHINGTON COUNTY.—One-third of this county is reported covered with woods, principally situated in belts along its eastern and western borders. The following is extracted from Mr. Pringle's report:

"Reaching Montpelier from the west we have left behind the Green Mountain gneiss and entered a granitic formation. Here is an extensive burned region; the fire, in consuming the forest and vegetable mold upon the surface of the land, has exposed granite bowlders thickly embedded in the soil. To replace the forest growth thus removed there is only an occasional little spruce or balsam to be found among the thickets of bird cherry. The hilltop and hillside forests east of Montpelier show hemlocks everywhere mingled with sugar maples, yellow birches, and spruce; farther east the spruce and birch predominate. Approaching the Connecticut river, hemlocks and maples again appear and second-growth white pine and paper birches take the place of the other species."

WINDHAM COUNTY.—Three-eighths of this county is reported covered with woods, mostly confined to ridges of the Green mountains. Ash and white pine are reported very scarce.

WINDSOR COUNTY.—From one-fourth to one-third of this county is reported covered with woods, quite generally distributed over the hills. Tubs, barrels, kegs, and buckets of white and red oak, white pine, spruce, and ash are manufactured. Oak is reported by manufacturers to be already practically exhausted, spruce to be fast disappearing, and ash very scarce and in danger of speedy extermination.

MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.

The original forest which once covered these states has disappeared and been replaced by a second, and sometimes by a third and fourth growth of the trees of the Northern Pine Belt. The area covered by tree growth in these states is slowly increasing, although, with the exception of the young forests of white pine, the productive capacity of their woodlands is, in view of the heavy demands continually made upon them, especially by the railroads, rapidly diminishing. Abandoned farming land, if protected from fire and browsing animals, is now very generally, except in the immediate vicinity of the coast, soon covered with a vigorous growth of white pine. The fact is important, for this new growth of pine promises to give in the future more than local importance to the forests of this region.

These states sustain a considerable annual loss from forest fires. In Massachusetts during the year 1880 13,899 acres of woodland were reported destroyed by fire, with a loss of $102,262. Of these fires fifty-two were set by locomotives, forty by fires started on farms and escaping to the forest, thirty-seven by hunters, nineteen by the careless use of tobacco, eight through malice, and three by carelessness in the manufacture of charcoal. No returns in regard to forest fires in Rhode Island and Connecticut have been received, but it is believed that in proportion to their forest area such fires are not less destructive in these states than in Massachusetts. Numerous important industries using hard wood have been driven from these states or forced to obtain their material from beyond their limits. On the other hand, industries like the manufacture of certain sorts of woodenware, using second-growth pine, are rapidly increasing in volume. The principal forests now found in these states are situated in Berkshire, Hampden, and Worcester counties, Massachusetts.

BERKSHIRE COUNTY, MASSACHUSETTS.—From one-third to one-half of this county is reported covered with woods, largely second growth. The high ridges of the hills are still covered with forests of black spruce, their slopes and intervening valleys with hard woods or hemlock, now often replaced by a growth of young white pine. Cooperage stock, baskets, and wood pulp are largely manufactured. Spruce is reported to have deteriorated in quality; manufacturers consider the supply of material, however, abundant for all present local demands.

FRANKLIN COUNTY, MASSACHUSETTS.—One-half of this county is reported covered with woods, largely second-growth white pine.

WORCESTER COUNTY, MASSACHUSETTS.—One-half of this county is reported covered with woods, largely second-growth white pine. Winchendon, the most important point in the United States for the manufacture of woodenware, small cooperage, etc., is supplied with material from the young pine forests of this and the neighboring counties. Timber is reported to have deteriorated. The supply of pine is not equal to the demand, and is rapidly increasing in value.

In Barnstable county, Massachusetts, numerous experiments in forest planting have been made. In South Orleans and neighboring towns fully 10,000 acres of sandy, barren soil have been successfully and profitably planted with pitch pine. Similar plantations have been made upon the island of Nantucket; and many large groves of white pine planted many years ago in Bristol and Plymouth counties demonstrate the entire practicability of forest culture in this whole region.

The only important lumber manufacturing establishments found in these states are situated upon the Connecticut river, in Massachusetts and Connecticut. They are entirely supplied with material from the forests of northern New Hampshire and Vermont. Partial returns of the hoop-pole industry give a production during the census year in Massachusetts of 11,507,600, valued at $95,009; in Connecticut, of 191,000, valued at $9,660.

NEW YORK.

That portion of the state north of the forty-third degree of latitude, including within its limits the elevated Adirondack region, was once covered with a dense forest of maple, birch, basswood, and other northern deciduous trees, through which were scattered spruce and pine. The low hills bordering the Hudson and extending along the southern boundary of the state west of that river were covered with the coniferous species of the Northern Pine Belt. Over the remainder of the state the broad-leaved forests of the Mississippi basin spread almost uninterruptedly, except where an occasional sandy plain or high elevation favored the growth of pines. The original forest still covers large areas in the northern counties, and protects the hills through which the Delaware river forces its way in crossing the southern part of the state. With these exceptions, however, the forests of New York are now almost exclusively of second growth.

The forests of the state, especially in the north, have at different times suffered great damage from fire. During the census year 149,491 acres of woodland were reported destroyed by fire, with a loss of $1,210,785. Of these fires thirty-seven were set by farmers clearing land for agricultural purposes and allowing them to escape to the forest, forty-three were set by locomotives, and twenty-two by the carelessness of sportsmen.

With the exception of the spruce of the Adirondack region, the forests of the state are no longer important as a source of general lumber supply; and many industries depending upon hard woods have in late years decreased in importance, owing to the want of sufficient material, or have been forced to obtain their supply of timber from the west. White oak, largely consumed by the railroads, has become scarce, and has advanced at least 50 per cent. in value during the last twelve years. Elm, ash, hickory, and other woods are reported scarce in all parts of the state. Partial returns of the hoop-pole industry give a production during the census year of 10,948,258, valued at $155,764.

New York is only surpassed by Vermont in the amount of maple sugar produced by its forests. During the year 1879 10,693,619 pounds were manufactured in the state.

The following extracts are taken from Mr. Pringle's report upon the forests of northern New York:

"One who enters northeastern New York at Port Kent, and takes stage by way of Keeseville to the Saranac lakes, finds himself, as long as his route runs up the Au Sable river, which is as far as the Au Sable forks, passing through a region which gives evidence of having been formerly covered with pine. The white, the red, and the pitch pine are all represented here. The pitch pine is confined chiefly to the sterile sandy plains between the Au Sable and the Saranac rivers. The red pine mingles with this species, and grows on the rocky hills of the region and on the river cliffs, while the abundance of white pine in nearly all situations must have made this quarter of the state, like the region of Vermont lying opposite, a valuable pinery in former times. But fifty or seventy-five years have passed since the pine of the Champlain valley was harvested and shipped to England by way of the Saint Lawrence.

"In the valleys of the Au Sable and the Saranac rivers white pines spring up numerously whenever permitted to do so, and I am told that farmers, realizing that much of their soil is not suitable for profitable agriculture, are seriously considering whether it be not to their highest advantage to surrender much of their land to timber growing, and encourage the growth of the more valuable species, such as white pine, white oak, etc. Of non-coniferous trees

the white, red, and black oaks are conspicuous among the pines, and in the colder and wetter sands the white birch is common. But through all this region the trees are all of second growth, and lumber for building purposes is largely imported.

"The forest on the upper waters of the Au Sable and of the divide between this river and the Saranac is principally devoted to supplying fuel to numerous iron furnaces. The best butt logs only of spruce are sorted out and sent to the saw-mills as the forests are mowed down; the hemlock bark is removed for the tanneries, but everything else, young pine, spruce, and poplar, fall clean with maple and birch. Here and there, even far up on the hillsides, are seen the charcoal kilns, and around and about them, quite to the crest of the foot-hills of the Adirondacks, the woods are cut down in great swaths to feed them. Lands once cut over are left to grow up to timber again, though fires originating in the dead brushwood and consuming the sun-dried vegetable mold on the surface of the soil generally interfere with any new growth of trees.

"Little Tupper lake is situated in the heart of the Adirondack wilderness, and is surrounded by some of the most valuable timber lands to be found in all this region. The woods about the lake have never heard the lumberman's ax. The stream which connects it with Tupper lake, by way of Round pond, is not adapted to driving, and before lumber could be brought down it would be necessary to clear out the stream by blasting away much rock and building a dam with flood-gates at the foot of Round pond. The shores of this beautiful lake present a marked contrast to those of any I have as yet visited. On other shores and river banks I had seen scattering pines, but on all the points and bluffs of this lake throughout its entire circuit, and even following the ravines far back in the hills, are great groves and belts of white pine with straight and clean shafts towering high above all other trees, unless is excepted the red pine, of which a few specimens are mingled with them on the gravelly banks of the lake, vying with the white pines in height and beauty of trunk. At certain places on the shores of this lake, and particularly along the sluggish streams connecting it with Round pond below, are considerable swamps occupied chiefly by larch. It is pleasing to observe and to learn from guides that this lake region of the Adirondack woods has suffered but little from forest fires. It is only limited areas here and there on the shores of the lakes and ponds or along the rivers that have been devastated by fires originally started in hunters' camps. Seldom do these fires spread far back from the water, a fact which is to be attributed, it is believed, to the wet and mossy condition of these woods; yet, when they have been lumbered, as is the case lower down the Racket river, and a considerable proportion of the trees have been removed so as to expose the brushwood, etc., to the drying influences of the sun, much the usual liability to fire exists here.

"It is safe to assume that 2,500 square miles fairly represent the area of the virgin forests of the Adirondack wilderness. This area will average 3,000 feet of spruce (board measure) per acre, or about five billion feet in the aggregate. The amount of hemlock, variously estimated from 300 to 10,000 feet per acre, will cut at least 2,000 feet per acre, or 3,000,000,000 feet in the aggregate, or its equivalent; when the bark alone is considered, 3,000,000 cords of bark. The pine hardly, if at all, exceeds 200 feet per acre, or 320,000,000 feet in all. The hard wood growing over this entire region will fairly average 40 cords per acre, or 64,000,000 cords.

"Glens Falls is the great sawing center for the lumber cut upon the upper Hudson. This business here has passed the point of maximum prosperity and begun to decline; not that there was any necessity for a diminution of the yearly crop of logs from this field, if the forest could be protected from devastating fires. The lumberman leaves standing, as far as possible, the spruce trees too small for the ax, and these, the overshadowing growth being removed, grow with increased vigor, so that good crops of timber could be harvested from the soil every thirty or forty years, were it not that over at least one-half of the area lumbered fire follows the ax, burning deep into the woody soil and inducing an entire change of tree covering. Poplars, birches, and bird cherries, if anything, succeed the spruces and firs. From this cause alone the lumbering industry of the region must dwindle. A large area utterly unadapted to agriculture is being made desolate and nearly valueless, and its streams, the feeders of the water privileges and canals below, become every year more and more slender and fitful. These fires are largely set by reckless sportsmen and hunters, with whom this region peculiarly abounds in summer. They are careless in their smoking; they neglect to watch and properly extinguish the fires lighted for camp and cooking purposes, and sometimes they even delight to set fire to the dry brushwood of lumbered land in lawless sport. Again, to some extent, a class of petty pioneers follow the lumberman, obtaining for a trifling sum a title to a little land, or, squatting without rights, set fire to the dry brushwood left by the lumberers, and allow the fire to spread at will, devastating thousands of dollars' worth of property for the mere convenience of saving themselves the trouble of burning boundary strips around their fields, which might not cost them labor to the amount of $10. The laws of New York in respect to the setting of forest fires are totally inadequate to protect the forests. The opinion prevails in the forest region of northern New York that a growth of trees removed is followed by a similar growth, the result of young seedling trees left in the soil, except in the case of pine. 'Pine once cleared off is never renewed,' was the invariable remark. This of course presumes that fire is kept out of the clearing, for after a fire has consumed the brushwood and much of the 'duff' or vegetable mold, and with this all the young seedling trees, and even the seeds of trees that may be in the soil, an entirely different growth from the hemlock and spruce springs up. Raspberry bushes are the first to appear, the seeds of which are dropped by birds flying over the clearing. Bird cherries generally appear among the first trees, the seeds being dropped everywhere in a new country by birds;

poplars and small willows also appear early in a burned district, their downy seeds being widely distributed by the wind. It is only through the agency of the wind that the seeds of birches and conifers can be disseminated, and spruces and hemlocks must needs appear, if they return at all, as tardy stragglers.

"Not many miles above Glens Falls the Hudson flows out from among the lowest outposts of the Adirondacks and winds through a plain which reaches from near Troy to the vicinity of the southern ends of lakes George and Champlain. The soil of this plain is sand deposited by the waters of former periods. The hills which bound this plain on the northwest are piles of sand, gravel, and bowlders, evidently the moraines of a glacier which once flowed through the course of the Hudson. All this region, from Troy to Luzerne, among the foot-hills of the Adirondacks, must formerly have been covered with pine; among the hills and near the streams white pine, and in the more sterile central portions of the plain, red and pitch pine. To-day there exists of these species scarcely more than a scanty and scattered second growth.

"Thirty or forty years ago it was thought that all the accessible spruce in the valley of the upper Hudson had been harvested, but there is to-day nearly as much sawed at Glens Falls as there was at that time. At that time nearly all the timber standing near this river and its larger tributaries had been cut. Such as stood 5 or 10 miles back from these streams and all that was growing in the valleys of the smaller streams, or higher up the mountain slopes, would not pay the cost of hauling to the larger streams; but it is this timber which now furnishes the present supply. Logs are now driven out of streams which were then thought incapable of being driven. By damming streams so small that they may almost dry up in midsummer, throwing the logs into their courses during the winter, either above or below the dams, and in spring-time, when the dams are pouring with the floods resulting from the melting of deep mountain snows, tipping the planks of the dams and letting loose the torrents, the logs from remote places are got out to the large rivers where they can be driven. All the rivers of this region, however, are steep and rocky. The logs come down with their ends badly battered, and often with gravel and fragments of rock driven into the ends in a manner to injure the saws. They must, therefore, be 'butted' before being sawed; that is, a thin section is cut from each end, and on this account the logs are cut in the woods 4 inches or, for the worst streams, 6 or more inches longer than the standard length. The standard length for all logs brought down the Hudson is 13 feet. The character of these streams is such that long logs, for spars or other purposes, cannot safely be driven through them. Such sticks are certain to get fastened among rocks and cause bad jams. As already stated, the lumber business upon the upper Hudson is well advanced in its decline, and a score of years hence it must become insignificant under the practices now pursued, and the future of this valley gives little promise of prosperity; the soil is inferior in quality and not adapted to agriculture, while the timber, once the chief source of its prosperity, is nearly exhausted.

"As a lumber market Albany ranks second in the United States, or next to Chicago. White pine is the variety of lumber most largely handled here, and two-thirds of it comes from Michigan by way of the Erie canal, the remaining one-third coming from Canada through lake Champlain, the white pine contributed by New York being an inappreciable quantity. Most of the lumber firms here are merely commission dealers, although in two large mills considerable lumber is dressed before being shipped. The region supplied by this market includes the banks of the Hudson, New York city, New Jersey, and the shores of Long Island sound. A little reaches Philadelphia, and much is shipped to foreign ports from the city of New York. A great deal of the lumber handled by Albany dealers, however, does not go to Albany at all, but, sold by runners, is sent direct by railroad from the Michigan mills to points south of New York. The lumber trade here is still in full prosperity.

"Leaving the beautiful Mohawk valley at Rome, the traveler by the Rome and Watertown railroad soon notes a less improved region, and one, indeed, less capable of improvement. For a long time the road stretches over a sandy plain; in the higher portions of this plain, not far from Rome, the red and pitch pines are seen, and in the wetter places hemlocks and black spruces appear, with white birch, black ash, etc. On the higher, undulating lands, 20 or 30 miles north of Rome, white pine and hemlock seem once to have been the most abundant species of the forest; they now exist only in broken and scattered ranks, although numerous stumps give evidence of a former heavy growth of these two species. Northward from Albion the country gradually rises, hard wood becoming more and more common until on the limestone banks of the Black river at Watertown the patches of woodland are mainly composed of birch and maple. Yet the soil continues sandy, and at a little distance from the river is favorable to the growth of pine, and I can readily believe that all this sandy tract east of lake Ontario was originally covered with a heavy growth, principally of pine and hemlock. The pine was long since harvested, and now the mills and tanneries are consuming the hemlock. On each of the small streams that flow into lake Ontario are established saw-mills which cut quantities of hemlock yearly. Little, however, is sawed at Watertown, although a limited amount of logs is driven down to Dexter at the mouth of the Black river, and there sawed; yet once the neighborhood of Watertown and Dexter was a great center for the production of pine lumber. This region (chiefly its swamps) still yields a little black spruce. The lumber sawed along the Rome and Watertown railroad at Williamstown, Richmond, etc., is mostly sent southward to Syracuse and other places to meet the demand there for coarse lumber. The lumber yards at Watertown are mostly filled with Canadian pine.

"Carthage, in Jefferson county, was once an important lumber center. The 'Long falls' of the Black river furnished unlimited water-power. Immense quantities of pine and hemlock lined the banks of the river and covered

the plains of the vicinity; northward lay a heavy pinery. Canal-boats laden with lumber were towed through the river to Lyon's falls and thence by canal to Utica. Now the pine is nearly all gone from this region, the saw-mills are rotting down and only a little hemlock is sawed here.

"That portion of the state which lies along the Saint Lawrence river as far east as the vicinity of Malone, and extending some 25 miles back from the river, seldom exceeds 250 feet above the sea-level and is, for the most part, clayey loam, flat and well adapted to agriculture. This tract is now pretty well settled. Proceeding to the southeastward and rising to an altitude of 250 feet a wide region of sandy soil is entered, cold, damp, and unfit for agricultural purposes. This is the region of forest lying northwestward of the mountains in the southern portions of Saint Lawrence and Franklin counties, and has not yet been badly encroached upon by the ax and fire. The destruction of this forest would be a public calamity, so useless is the soil for any other purpose than the production of timber, and so harmful to the settled country below would be the consequences resulting from clearing it. This forest is, no doubt, capable of yielding, perpetually, an annual crop double that now drawn from it. This estimate, of course, is based upon the supposition that fires are prevented. But this side of the forest is less invaded by fires than the valley of the Hudson river, and fires do not burn so deeply into the soil nor consume so much of the vegetable matter; they are, consequently, less fatal to the continuance of timber growth.

"At Canton, in Saint Lawrence county, and in its vicinity as far down as Buck's bridge, below Morley, is sawed all the lumber cut on the Grass river. From this point the lumber is shipped principally to Massachusetts and Connecticut by rail, both via Rome and via Plattsburgh and Rouse's Point.

"Colonel Colton, of Norwood upon the Racket river, explained to me at length the methods employed by him in the lumber business, and, as nearly the same methods are pursued throughout this region, I give his account. Several weeks of the summer he devotes to exploring the lands of his company, to decide from what tract the stock of logs for the following year shall be drawn. In the settlements near the margin of the forest are men whose business it is to cut and haul onto the ice of the river during winter the timber desired by the lumber companies. Contracts are made with these men to harvest the timber above a certain diameter on certain specified tracts belonging to the company. The contractors go to their respective fields of labor as soon as the snow is of sufficient depth, taking into the woods a force of men, horses, and supplies, and building camps in the vicinity of their work. When a full stock of logs is placed on the river, and the spring floods break up the ice and set the logs going, other contracts are made with the same or other men to drive the logs into the booms of the different mills at a stipulated price per log. If, as is usually the case, logs of several different companies are on the same river, all are driven down in common, and the drive is called a 'union drive'. Arrived at the uppermost boom—formed by chaining together logs floating on the surface of the water and held in place by occasional piers, strong but rude structures of logs filled in with rocks, located above the first sawing station—the logs belonging to these mills are sorted out and turned into the different booms, while those belonging below are sent on their way down the channel. Once within the boom of the mills to which they belong, they are again assorted; the pine, hemlock, and the spruce are separated, and the different grades are floated into separate booms or pockets which lead down to the different mills or saws which are to cut up each separate class. At the mills inclined planes lead down to the water from each gang of saws, up which, chains being attached to the logs, they are drawn by the machinery into the mill. After sawing, the sorting of the lumber into different grades is completed with care. The boards are run through planing-mills which smooth both sides, then through other machines which tongue and groove their edges, and finally fine saws neatly trim their ends. This dressing of the lumber at the mills makes a saving in freight when it is shipped, besides greatly facilitating sales. Colonel Colton invited me to accompany him 20 or 30 miles up the river to see the 'drive' which was just coming out of the woods. The highway by which we drove led near the river, and we could see the logs everywhere coming down, advancing endwise with the current. In many places of still water the entire breadth of the river for some distance was closely covered with them. These were not so small as those usually seen in the Maine rivers, but were from full-grown trees of the original forest—spruce from 1 foot to 2 feet in diameter. With the spruce logs were a few hemlocks, usually of larger size; a few pine logs, sometimes 2 or 3 feet in diameter, floated with the others. As the water was lowering, stranded logs were seen everywhere along the shore. They covered gravel banks and bars in the middle of the river, and were piled in disorder on the rocks of the rapids, or, pushing over the waterfalls, stood on end in the midst of the white, pouring torrent.

"A few miles above Potsdam we entered upon a sandy soil; the farms appeared less productive and the farm buildings and fences gave evidence of less thrift. As we advanced toward Colton, a region near the borders of the forest some twenty years settled, less and less prosperity among the settlers was manifest. The tilled fields appeared incapable of yielding even passably good crops; some of them could do no more than give a small crop of rye once in three years. The grass lands were red with sorrel, which comes up everywhere over this region as soon as the forest is cleared and the ground burned over. The sandy soil is cold and sour, in some places so light as to be blown about by the wind. Above South Colton we drove over sandy plains utterly incapable of sustaining the meager population, which ekes out a wretched existence by means of fishing and lumbering. My companion affirmed that settlements had been pushed farther into the forest than they can be maintained, and that they must in most places be abandoned and the land given up to forest again. All along our way the woodlands were

straggling and sadly ravaged by the ax, fire, and wind. The spruce and pine had been culled out and most of the hemlock had been cut down and barked. Half-burned stumps and logs and gaunt and blackened trunks still standing disfigured the landscape on every side.

"The species of trees observed embraced all those common in northern woodlands. In one locality black cherry was remarkably abundant. Formerly the saw-mills of Colton cut pine, as there was a larger proportion of this lumber upon the Racket than is usually found in northern New York; now they do little busness in any lumber.

"As we passed up along the river I saw small squads of 'drivers' stationed in a few places where the character of the river was such that it was liable to become obstructed with logs. By assisting the logs to pass such places great jams are prevented. The main body of the men, however, worked at the rear of the drive, scrambling over the disordered piles of logs which accumulate upon the shore or lodge against the rocks in the midst of the current. With their cant-hooks the men pry and roll the logs into the current, springing about on the pile as the logs roll from under their feet. Not unfrequently logs are left by the subsiding waters among the rocks at some distance from the main channel of the river. Files of men on each side then seize them with their cant-hooks and, splashing through the shallow water, bring them by main force into the channel. Sometimes logs become fastened among the rocks where the current is so swift that they cannot be reached by a boat or in any other way. Then hooks attached to ropes are thrown out from the shore; the logs are grappled and thus hauled off into the current. The drivers work Sundays and week days, fair weather or foul; their occupation is full of peril, and men are lost every year. Such are usually, as a driver assured me, 'men who do not know where it is safe to go.' But sometimes the most careful men become mixed with the rolling logs or seized by the current of the waterfalls and are swept away.

"Franklin county contains 995,279 acres, and 347,500 acres are still believed to be timbered. The timbered portion lies in the south end of the county, and because it is not watered through much of its area by streams of sufficient size for driving out the logs, much of the timber is inaccessible, or rather, the prices of lumber do not yet warrant hauling the logs long distances. The country across the line of the Ogdensburg and Lake Champlain railroad appears exhausted of its spruce and hemlock. Some tracts of hard wood are still standing, but the poplars, whose young growth often conceals the stumps and prostrate trunks of dead hemlocks, really seem in many places the most common species. But little timber land remains in Clinton county and, until the present season, lumbering on the Saranac had been for several years nearly suspended. This year, however, a company was cutting a few million feet of lumber drawn from the woods of Essex and Franklin counties. The lumber of the eastern side of the Adirondack wilderness mostly comes out by the way of the Saranac and the Hudson rivers. The mountain sides about lake George are being denuded of their spruce, which is sawed in the vicinity of Ticonderoga, and here, as elsewhere, fires follow the ax in their usual fashion."

The forests of the Adirondack region have suffered severe loss at different times, particularly in 1878, by the sudden death of great blocks of black spruce. Mr. Pringle carefully studied the extent of this destruction and the causes which produced it. In regard to these, great diversity of opinion exists among woodsmen and others familiar with the Adirondack forests. It has been generally supposed that the trees were killed by an unusually severe summer drought, or by the attacks of a boring insect working under the bark; but the testimony gathered by Mr. Pringle points to other causes of destruction. The spruce occupies dry mountain slopes and ridges and deep wet swamps never greatly affected by drought. It is noticed that as many trees have died in the swamps as upon the dry slopes. It is evidently not drought, then, which has caused them to perish. The opinion, too, is firmly held by the most intelligent observers that insects do not attack the trees until they are dead or nearly dead, and are never found in vigorous living specimens.

The black spruce is not a long-lived tree, and this dying out may indicate that the old trees of this forest, probably all of nearly the same age, had so nearly reached the limits of their natural existence as to be unable to withstand some unusual or severe climatic state, such as a period of intense winter cold or late spring frost. The following extracts from Mr. Pringle's report will indicate the opinions of those best able perhaps to form an opinion upon this subject:

"Mr. Mark Moody, residing at the foot of Tupper lake, a hunter and woodsman who has passed his life in the forest, testifies as follows: 'The spruce died fearfully in his vicinity about two years ago; he tried to learn the cause. Sixteen years ago the spruce had died out much in the same way as it has been doing lately. It is the older trees which die. They seem to die by crops, successively. Under the large trees were always springing up small trees to take the places of those that perish. There seems to be a narrower limit to the life of the spruce than to that of any other species. Other trees do not die in the same manner, by crops. The spruce does not seem to enjoy the same green old age, long drawn out, as other trees do, but when it has reached its full growth seems to relinquish its vitality without any apparent or sufficient cause, and before giving evidence of decay or any diminution of vigor.'

"Mr. Wardner, of Bloomingdale, Essex county, an old hunter, woodsman, and guide, testified as follows: 'The spruce timber on this side of the forest has failed clear through to its northern borders, in the same manner and during the same seasons as in other portions of the region.' Mr. Wardner first noticed the leaves falling and covering the ground in 1878; the destruction was continued through 1879, but during the past season he had met

with very few trees that were dying. Spruce timber had perished in this manner before, and he pointed out a broad valley in which most of the trees were dead and falling when he came into this region, twenty-five years before. He had carefully endeavored to ascertain the cause; was positive that insects either under the bark or upon the leaves had nothing to do with the death of the spruce trees, and he is sure that it is not due to drought, as he has seen the greatest destruction on the northern slopes. No active destructive agent being apparent, he inclines to the opinion that the spruce trees die because they have reached the limit of their life, and that it is some peculiarity of the winter rather than the summer that turns the scale against them; for this reason they perish in quantities, sometimes in sections. He has counted the rings of many trees, and considers 100 to 150 years the average lifetime of the spruce."

Whatever has caused the destruction of these forests, the damage thus occasioned, both in the loss of valuable timber and in the increased danger of forest fires from the presence of such a body of dead wood is enormous. It is believed by Mr. Pringle that from one-third to one-half of the fully-grown spruce timber left in the Adirondack region is dead.

NEW JERSEY.

The original forests of New Jersey have disappeared, except from some of the highest and most inaccessible ridges situated in the northwestern part of the state, and these, with the increased demands of the railroads for ties and other material, are now fast losing their forest covering. The forests of New Jersey are insufficient to supply the wants of the population of the state, and nearly all the lumber it consumes is brought from beyond its limits. The forests of pitch pine, which once covered large areas in the southern counties, have now generally been replaced by a stunted growth of oaks and other broad-leaved trees.

The forests of New Jersey, especially those on the dry sandy soil of the southern part of the state, have long suffered from destructive fires. During the census year 71,074 acres of forest were reported destroyed by fire, causing a loss of $252,240. Of these fires twenty-eight were set by locomotives, seven through malice, seven by fires set on farms escaping to the forest, and six each by the carelessness of hunters and charcoal-burners.

The manufacture of cooperage stock and other industries using hard woods have been largely abandoned, owing to the decrease of the local supply of timber.

PENNSYLVANIA.

Pennsylvania once possessed vast forests of white pine and hemlock stretching over both flanks of the Alleghany mountains and extending from the northern boundaries of the state to its southern limits. East and west of the Alleghany region the whole country was covered with a heavy growth of broad-leaved trees mixed with hemlocks and occasional groves of pines. Merchantable pine has now almost disappeared from the state, and the forests of hard wood have been either replaced by a second growth or have been so generally culled of their best trees that comparatively little valuable hard-wood timber now remains. Large and valuable growths of hemlock, however, are still standing in northwestern Pennsylvania. From all parts of the state manufacturers using hard wood report great deterioration and scarcity of material, and Pennsylvania, which during the census year was only surpassed by Michigan in the value of its forest crop, must soon lose, with its rapidly disappearing forests, its position as one of the great lumber-producing states.

The following estimates of merchantable pine and hemlock standing in Pennsylvania May 31, 1880, have been prepared by Mr. H. C. Putnam. They are based upon the reports of a large number of timber-land owners and experts familiar with the forests of the state:

WHITE PINE (*Pinus Strobus*).

Regions.	Feet, board measure.
Alleghany river and tributaries	500,000,000
West Branch of the Susquehanna river and tributaries	1,300,000,000
Total	1,800,000,000
Estimated amount cut for the census year ending May 31, 1880	380,000,000

HEMLOCK (*Tsuga Canadensis*).

Estimated amount of hemlock standing May 31, 1880	4,500,000,000
Estimated amount cut for the census year, exclusive of trees cut for their bark alone.	300,000,000

Of lumber of all kinds 1,848,304,000 feet, including 288,561,000 shingles and 183,740,000 laths, were manufactured in the state during the census year; the nature of the returns, however, prevents anything beyond an estimate, based upon extended correspondence, of the amount of pine and hemlock sawed.

Julius Bien & Co. lith.

Numerous bodies of pine too small to be indicated on the map, of no great commercial importance and not included in these estimates, still remain scattered over the region originally occupied by pine forest.

The forests of Pennsylvania, especially through the mountain regions, have long suffered from destructive fires. During the census year 685,738 acres of forest were reported destroyed by fire, with a loss of $3,043,723. Of these fires a large proportion were traced to locomotives and the escape of fires from farms to the forest.

The forests of Pennsylvania produced during the year 1879 2,866,010 pounds of maple sugar.

The following extracts are made from Mr. Pringle's report upon the principal lumber-producing regions of the state:

"Originally the broad pine belt of northern Pennsylvania, occupying the region drained by the numerous streams constituting the headwaters of the Susquehanna, extended from Susquehanna county, in the northeastern corner of the state, westward through Bradford and Tioga counties to Potter county, although this county never had as much pine as the others, and thence southwestward over Cameron, Elk, and Clearfield counties. The heaviest growth of pine in all this region was on Pine creek, in the southwest part of Tioga county. Now there is but little pine left in Susquehanna and Bradford counties, these counties being thickly settled; and in Tioga county, from which one firm alone has cut four billion feet, there now remain standing but little over one billion feet. The greatest part of the pine now standing in the Pennsylvania forests is on the upper waters of the West Branch of the Susquehanna, in Cameron, Elk, and Clearfield counties. In some of the counties adjoining these, as McKean, there was once, and still may be, a little pine timber.

"Active lumbering operations on the West Branch of the Susquehanna were begun in 1850, when the boom of the Susquehanna Boom Company was constructed at Williamsport. At this place the greatest part of the lumber on the West Branch is sawed. At Lock Haven, 25 miles above, on the same river, advantage was taken of the feeder-dam of a canal to construct another boom, and a few companies operating in lumber are now located there, about one-tenth as much lumber being sawed as is handled at Williamsport. Some of the companies, however, are removing from Lock Haven to the larger center of Williamsport. Below Williamsport no logs are driven, but a little timber squared by the ax in the woods and left at full length is made into rafts and taken down the main Susquehanna. Some of this is sawed in the towns on the river, and the remainder is taken to the large markets to supply the demand for squared timber for ship-building, etc.

"Williamsport is situated on the north or left bank of the West Branch of the Susquehanna, and for 2 or 3 miles along the river side are ranged the mills and lumber-yards of the thirty-four lumber companies operating here. We visited a large number of mills and found much the same methods employed in all. The logs are first slit up by gang-saws; then each board or plank is put through an edger, where two circular saws cut a strip from each side to give the board a square and straight edge; the boards are then assorted into two or more grades, loaded on trucks, and moved over tramways which ramify through the lumber-yards adjacent to each mill. The fragments of boards and better portions of the edgings are made into fence pickets and other portions into laths, and the fragments and strips which will not even make laths are carried to one side and added to a burning pile. The fragments thus burned (rather than thrown into the river) constitute the only waste, for the sawdust supplies the engines with fuel. This being cut chiefly from heart-wood makes better and more easily handled fuel than the sap-wood strips. Even these are, however, often cut and put up into bundles of kindling-wood for city use.

"In the woods the trees are sawed into logs 12, 16, or 18 feet in length, as can be done to the best advantage and the least waste of timber.

"The West Branch of the Susquehanna must be an exceptionally fine river to drive, judging from the comparatively unbattered condition of the logs seen about the mills. The smaller streams in the woods are furnished with flood-dams, and from these extend throughout the timber belt numerous narrow-gauge railroads, tramways, and slides for bringing down the logs. Little hauling is done upon wagons or sleds, the ground in the woods being too rough, it is said, for hauling logs with teams. It is probable that snow does not fill up the depressions and smooth the surfaces to the same extent as in the northern woods.

"The lumbermen of this place at first were content to send their lumber to market in the simplest shape, but of late, as the supply diminishes more and more, mills and shops are being built for the manufacture of doors, sashes, blinds, packing-boxes, furniture, etc. Some companies have so exhausted their pine lands that they can in future only carry on business in this way, buying the rough timber from their neighbors. As the pine lands of one firm after another are exhausted the pine remaining comes to be held by a very few parties, who know its value. Not all of these are operators, but, living at a distance, sell stumpage to manufacturers.

"The following table, giving the amounts of lumber rafted out of the Susquehanna boom at Williamsport since the record has been kept, may be of interest as showing something of the rise and decline of the lumber business at this important center. The greatest prosperity or fullest development of the business was attained, as will be seen, in 1873. After that year, with the steady decrease of the supply of pine and the consequent increase of expense in securing logs, the annual stock steadily diminished until 1877. During the past three years the increasing demand for lumber has stimulated the operators to greater activity, but more than to this cause the recent gain in the yearly stocks is due to the substitution of hemlock for pine, the ratio of hemlock to pine

being at present as 1 to 4, although the average for the last seven years is but as 1 to 10. As the supply of pine timber is exhausted, hemlock will be more and more handled until it will become the most important timber of this region. The summary is made for the last eight years only:

Years.	Number logs.	Feet, board measure.	Years.	Number logs.	Feet, board measure.
1862	196, 953	37, 853, 621	1875	1, 096, 897	210, 746, 956
1863	405, 175	76, 475, 826	1876	715, 087	134, 396, 293
1864	511, 549	96, 595, 681	1877	589, 827	106, 944, 257
1865	379, 392	72, 421, 468	1878	617, 552	112, 069, 602
1866	615, 373	118, 831, 494	1879	1, 040, 278	190, 549, 111
1867	833, 388	163, 196, 511	1880 (to November 21)	763, 768	128, 558, 959
1868	853, 663	165, 338, 389	1873 to 1880 (eight years)	7,395,455	1, 382, 342, 272
1869	1, 080, 511	223, 060, 305	Logs remaining in river November 21, 1880		25, 000, 000
1870	1, 099, 777	225, 180, 973			1, 407, 342, 272
1871	842, 129	116, 661, 181	Deduct hemlock		140, 734, 227
1872	1, 484, 103	297, 185, 652	Williamsport pine, 1873-1880		1, 266, 608, 045
1873	1, 582, 460	318, 342, 712			
1874	989, 586	180, 734, 382			

"It is proper to add that the variations in the yearly stock of logs shown above are in some measure due to a greater or less proportion of each annual cut being left behind in the woods or in the streams, from varying supplies of water or from other peculiarities of the season.

"The lumber manufactured at Lock Haven and Williamsport is shipped by railroad and canal to Baltimore and Philadelphia and to intermediate cities and stations.

"I found it more difficult to obtain information of the extent and limits of the hemlock woods of Pennsylvania, and of the amount of the standing timber and the annual crop of hemlock, than I did to get the same facts respecting the pine. Lumbermen agree that there was originally far more hemlock in this state than pine, and they speak of it now as inexhaustible, which is not strictly true, for it is doubtful if it holds out to supply the increasing drain made upon it by tanneries and saw-mills for more than twenty-five years to come. Large quantities of hemlock have been wasted. Much that grew intermingled with the pine has died after the pine has been removed, partly from exposure to fuller sunlight and summer drought, and partly to forest fires induced by and following lumber operations. In the early days of the tanning industry of this region, when hemlock lumber was esteemed of little value, and whenever of late years the lumber trade has been so dull as to offer no inducement to send to market the trunks of the trees felled for their bark, large quantities of these have been left in the woods to decay. Now, however, with a good market for hemlock lumber, tanning companies owning hemlock lands, or the contractors who furnish the tanneries with bark, buying for this purpose stumpage from the proprietors of the timber-lands, often own saw-mills in the timber region, and cut and ship this lumber to market by railroad.

"Inasmuch as hemlock, besides mingling more or less with pine throughout the pine belt, seems to have formed a border entirely around the pine, the extent of the hemlock woods, as well as the quantity of hemlock timber, has always been much greater than of pine. Beginning in Wayne county, in the extreme northeastern corner of the state, the original hemlock forest extended westward through the northern tier of counties as far as Warren county, in the vicinity of lake Erie. Thence its bounds may be traced southward through Forest, Clarion, and Jefferson, and thence eastward through Clearfield, Center, Clinton, Lycoming, and Sullivan counties. Now the northeastern counties are for the most part cleared, and not only have the outskirts of these woods been cut off on all sides, but their continuity has been completely broken up throughout its whole extent by countless clearings and settlements. Yet, however much the hemlock forest has suffered, it possesses to-day greater value than did all the pine standing in 1850. Quite neglected a few years ago, hemlock is appreciating rapidly in value and importance, and ere many years shall have passed it will be almost the only kind of lumber known in the Williamsport market. The best grades of hemlock bring as high a price as scrub pine, the product of the shorter and more knotty trees grown on high land. Although as a rule Pennsylvania hemlock is of superior quality, much of it being nearly as good as spruce, yet here, as well as elsewhere, considerable variation in quality is noticed. Lumbermen classify hemlock into two kinds, red and white, according to the character of the wood, but the more intelligent among them attribute the difference to soil and situation. White hemlock, being sounder, firmer, and straighter grained, constitutes the highest grade. Red hemlock is more brittle, more inclined to splinter, and liable to be found more or less decayed when the trees have gained full size. In this condition trees are said to be 'shaky'. Such timber is generally found on bottom lands, while the hemlock of high hillsides is apt to be short and scrubby. The quality of the hemlock seems to deteriorate west from the center of the state. The Pine Creek hemlock is considered better than that of the Sinnamahoning, and this better than that on the Alleghany. Seldom more than two good logs can be obtained from a trunk, the third and fourth logs being generally inferior and knotty; 8,000 feet per acre is here considered a good yield of hemlock, and 10,000 feet a large yield.

"From Williamsport to Lock Haven the valley of the West Branch of the Susquehanna is usually less than a mile in width, being bounded by abrupt and rocky ridges a few hundred feet in height. At Lock Haven we

ascended the ridge on the south side of the river, some 800 feet in altitude, in order to examine the moderate forest growth with which it was covered. In favorable places scattering specimens of white pine indicated the crop these hills have yielded the lumberman in former years. Hemlock, also, was scattered over the hillsides, but even as late as the present year most of the trees in this immediate neighborhood had been felled for their bark; their peeled trunks lay strewn over the hillsides, being left to decay within a mile or two of the saw-mills of Lock Haven. The summit of the ridge afforded a good view of the surrounding country. Parallel ridges of a similar altitude, and which appeared more heavily timbered, lay back of the one on which we stood; between them were seen narrow valleys occupied by farms. On the north or opposite side of the river successive ridges rose higher and higher as they receded from the river, and in the distance seemed to lose themselves in a plateau whose altitude was equal to that of the ground on which we were standing. The gentle slopes and rounded summits immediately above the river showed smooth, cultivated fields interspersed among woodlands of deciduous trees. The more distant heights displayed a darker forest growth where hemlock and pines predominated.

"From Lock Haven to Warren, the county-seat of Warren county, even on the hillsides overlooking the river, close to the banks of which the railroad crept, but especially where we were able to look into the deep runs coming down to the river by a gradual descent from the table-lands of the divides, seldom more than a few miles back above the river, we saw much original forest still standing and principally composed of hemlock. Some white pine appeared as scattering trees or in groves, and some hard wood. The proportion of hard wood increased as we ascended the divide between the waters of the Susquehanna and those of the Alleghany river.

"On the summit of this divide the forest had a truly northern aspect, except that we missed the spruce, not seen in Pennsylvania. The dark foliage of the hemlock mingled with sugar maples, beeches, and birches. For many miles above Lock Haven it was a second growth which occupied the hillsides, a thin growth of white oak, chestnut, locust, etc., which had followed the lumberman and forest fires. Considerable second-growth white pine was seen in a few places, but on this none of the present generation seem to set much value, and I have yet to meet any one in the state who gives a thought to encouraging and preserving such growth. To consume the forests as speedily as possible, satisfied with what can be realized from them in the operation, appears to be the spirit which rules this region. Alternating here and there with the original forest mentioned above were seen all along the railroad leading through this timber belt, but especially in the vicinity of the settlements and lumbered districts, tracts which have been ranged by fire. Sometimes the fires had spread from the clearings into unculled timber, killing everything, large and small. Sometimes 'hemlock slashes' had burned over after the trees had been cut and 'peeled'. Always the charred stumps thickly dotted the ground, and the blackened, half-consumed trunks strewn over the soil in confusion gave to the landscape an aspect of complete desolation. The bird cherries and poplars, which in the forests farther north soon cover and hide from view such wastes of ruin, are wanting here.

"I learned that the best hemlock grows on the steep sides of the deep runs, and that upon the summits of the divides were considerable barrens, the soil of which was sometimes too poor to support any arboreal growth. Farther to the west the summits of the dividing ridges are occupied by hard wood chiefly, although hemlocks mingle with the beeches and maples.

"Arrived at Warren, we find that we have passed through the woods and are in a long-settled and well-improved country, and, judging from the scattered patches of woodlands occupying the low hills within view, the region of hard-wood forest has been reached. The coniferous forest belt only extends into the southeastern quarter of Warren county; the northern and western portions, lying beyond the Alleghany river, yield oak, chestnut, hickory, etc. Originally there was a little pine scattered over the southeastern portion of Warren county, but this has been mostly cut, and hemlock remains, as it ever has been, the most important timber in this part of the county. In Forest county, next south of Warren, pine is local, being scattered in small quantities throughout the county. On the highlands there is much hard wood, beech, maple, and white wood existing in belts between the streams. This, however, may be called a hemlock county. In McKean county a central table-land is covered principally by a growth of maple, beech, etc. In the remaining portions of the county the timber is chiefly hemlock. The valley of the Alleghany river, in the eastern part of McKean county, is mostly cleared and improved. Elk county is one of the best counties for hemlock. Through Elk, the southwestern corner of McKean, and the southeastern corner of Warren runs the Philadelphia and Erie railroad. Along the line of this road, as it passes through this portion of the timber belt, are located the largest tanneries of the United States. These are consuming the hemlock of this region at an enormous rate, and, in addition to the vast amount of bark which they consume, large quantities are shipped out of the region by railroad. The first important tanneries of Warren county were established 12 or 15 years ago, and at the present rate of consumption the hemlock of this county can hardly hold out 20 years longer. The land, after the forest has been removed, is excellent for agricultural purposes throughout this region, and on all sides pioneers are making themselves farms. These men prefer to begin in the undisturbed forest rather than locate on the slashes, because they can pay for their land with the hemlock bark which it yields; and from a radius of 15 miles bark is drawn and sold at from $4 50 to $5 a cord to the tanneries. On an average, four trees yield a cord or ton of bark, the equivalent of 1,000 feet of lumber, board measure. In Warren county from 5,000 to 6,000 acres of hemlock were cut down in 1880, and there is no possibility of this growth being renewed, for every foot of slashed land is eventually burned over, and sometimes the burnings are repeated until the soil is nearly ruined for agricultural purposes. From the dry slashes the fires extend to a greater or less distance through the living

woods, ruining not only heavy bodies of hemlock, but also destroying the belts of hard wood intermixed with the hemlock. Notwithstanding stringent legislation in this state upon the subject of forest fires, they seem inevitable, and especially so in the slashes. They spread from the clearings constantly made throughout this timber belt by the settlers, and, as the forest abounds in deer and its streams are stocked with fish, hunters and fishermen are always in the woods, and from their camp fires spread many conflagrations. Many fires here also are set by a tribe of half-civilized Indians residing in this region, to burn over the huckleberry fields in order that the bushes may renew themselves and yield fuller crops; or, where it is so easy to start a fire and conceal its origin, many doubtless arise from malice.

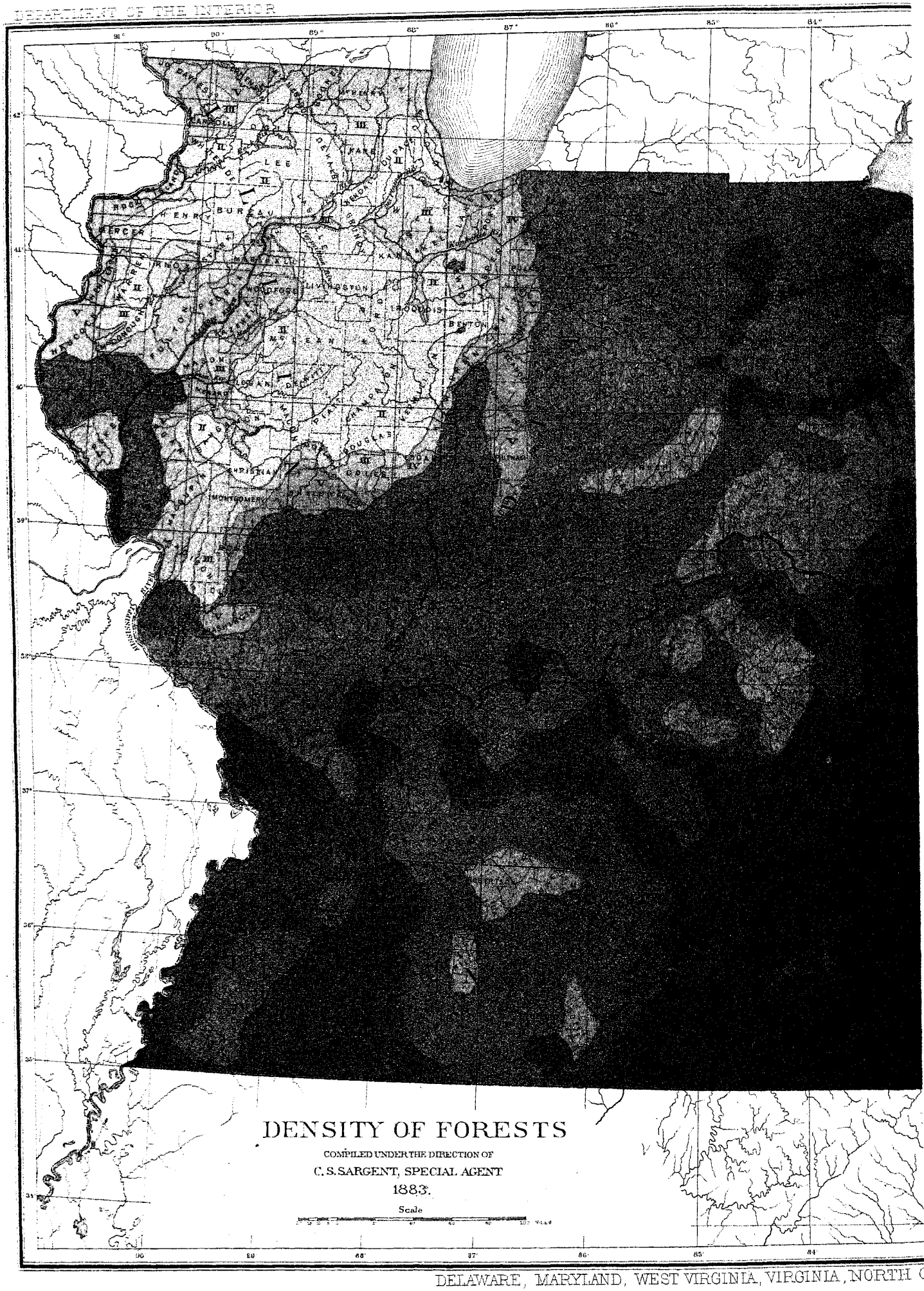
"In this region the aspen springs up on land upon which the hemlock has been destroyed, but this tree manifestly does not thrive as it does in northern woods. Yellow and black birch, bird cherry, beech, maple, white oak, chestnut, black cherry, etc., are the trees which spring up slowly among the briers, and cover burned land with a rather meager second growth. If a few pines have been left on the hilltops they may scatter a few seeds and give rise to some saplings, but as regards hemlock, fires kill it out clean, seedlings and seed; and if the 'peelers' and the fires happen to leave any scattering trees standing, these, being more sensitive to changed conditions than pines, are seldom able long to survive as seed bearers. The bird cherry only thrives on cold, wet soils here. There is another phase of the slaughter of the hemlock forest: As the pine forest gives out, large numbers of laborers turn to the hemlock woods and find employment as bark peelers. In the pine woods work is mostly suspended when spring arrives; then larger numbers of men come into the hemlock woods than can find work at satisfactory wages, and these sometimes set fires in the slashes, which spread into the living woods and kill large quantities of hemlock. To save the bark it must be peeled at once, or before it adheres to the wood and becomes injured by worms, and thus employment is given to a larger force of men.

"The pine now remaining in Clearfield county is mostly found in the northern and the southwestern portions of the county. The eastern and southeastern portions are now principally cleared and improved, as the entire county is destined to be, the soil being principally a strong, clayey loam, excellent for farming purposes. Already four-fifths of the pine timber originally standing in the county has been removed; most of the hemlock, which orginally about equaled in amount the pine, remains. There are no tanneries in this region, and after the pine is cut the hemlock is next harvested, the bark being saved and shipped to the tanneries below to the amount of from 5,000 to 6,000 cords annually. Fires are here sometimes started by hunters in order to clear away the young second growth, that they may be able better to see the deer. One important reason which lumbermen have for planting their saw-mills near the woods, in preference to driving all their logs to the sawing centers below, is that they can then work into shingles, etc., many trees which, being defective by reason of rotten spots or other blemishes, would not be worth driving down the river. Such trees are seen standing here and there all through the woods, having been left behind by the lumbermen. Sometimes persons buy this culled timber and erect shingle-mills, etc., to work it up.

"With respect to the maximum yield of pine per acre, it would seem that 10,000 feet was a good yield for tracts of 400 or 500 acres in extent, although smaller tracts of 50 acres and upward will often cut 25,000 feet to the acre, and even a yield of 100,000 feet to the acre has been reported. The rough nature of the surface in all this region often necessitates the use of slides to bring the logs from the forest to the streams. They are constructed by pinning to ties of hemlock some 3 feet in length hemlock logs about a foot in diameter placed side by side, their inner sides above the point of contact being hewn with care to form a broad V-shaped trough along which the logs may be slid. Except where there is considerable descent logs cannot be slid unless the weather is frosty, when the slide can be kept icy by means of water sprinkled over it from time to time. Slides sometimes are built for 6 or 8 miles back into the woods, usually following up some run so as to get an even and gentle grade. By this means the greatest part of the logs come down to the streams, for sleds are not used in this country. Most of the hazard of lumbering depends upon the lumberman's ability to slide his logs successfully. They can be cut at any time in the woods, and almost any year can be driven to the mills when once in the water, but mild weather interrupts sliding and deep snows impede the operation; so that in open winters lumbermen are sometimes compelled to do their sliding in the night time, when ice will form on the slide. The logs, stripped of their bark, are drawn singly, by horses with chains, from the places where they have fallen to the upper end of the slide. When a sufficient number—from 6 to 40, according to the grade and the size of the logs—have been placed end to end in the slide, the hook of a chain is driven into the rear log near its forward end, and horses are attached which walk a tow-path formed on one side of the slide, and push ahead of them the 'trail' of logs, thus bringing them down to the stream.

"Only in the late autumn and in the winter is it thought expedient in Pennsylvania to fell pine; if cut in summer, when the bark will part from the wood, the sap-wood soon assumes a blackish appearance and disfigures the lumber. As a rule hemlock is here cut and peeled in summer, at the time when operations in pine are suspended; thus by alternating operations in pine and hemlock the hands are kept employed throughout the whole year. In cutting trees the several parts of the work are allotted to different men; some merely fell the trees, others measure them off into suitable lengths and cut away the limbs as far as the upper end of the last log taken, where they sever the top of the tree from the trunk by means of the ax; others follow in pairs with cross-cut saws and cut the trunk into logs."

DEPARTMENT OF THE INTERIOR



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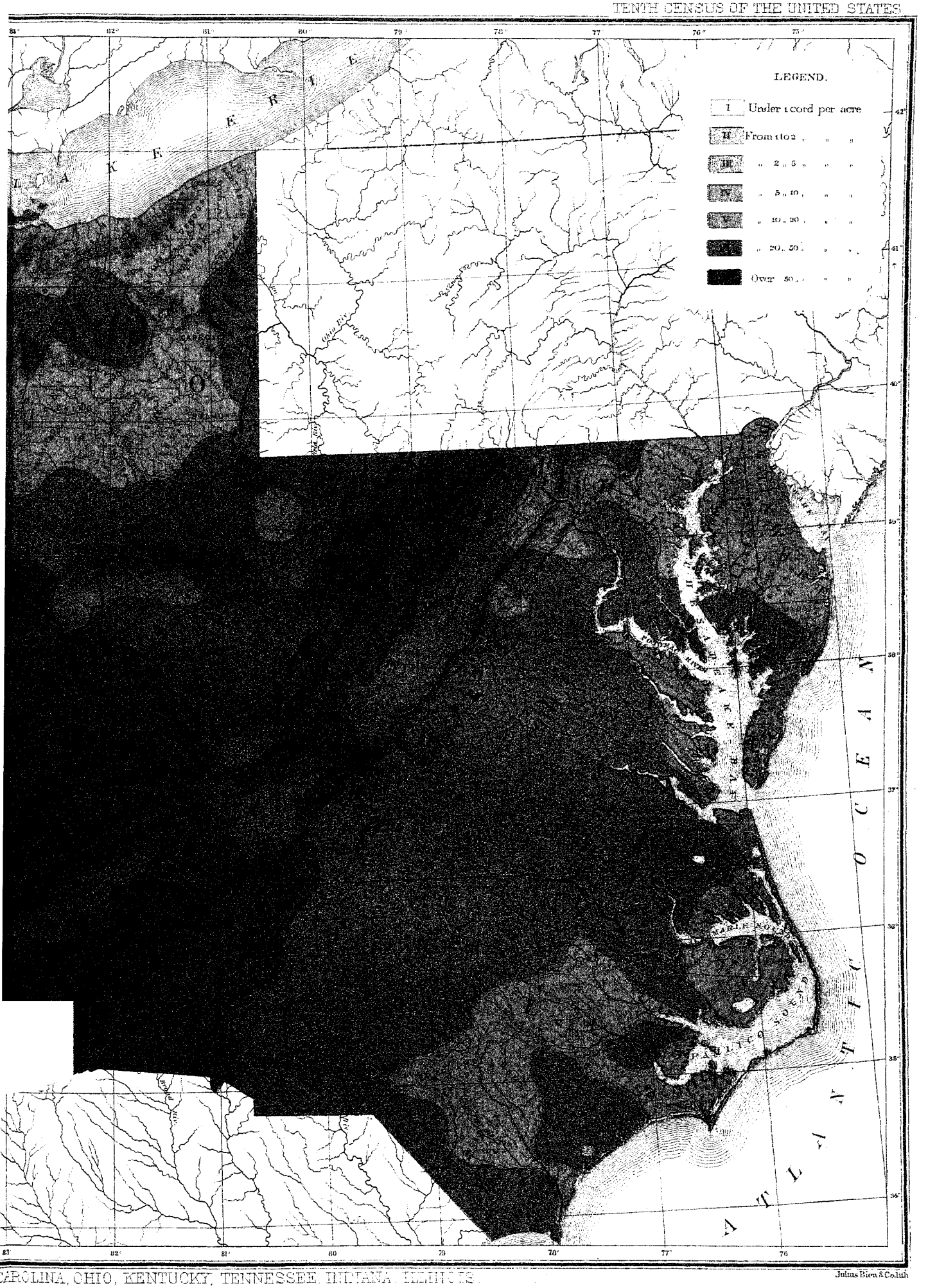

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