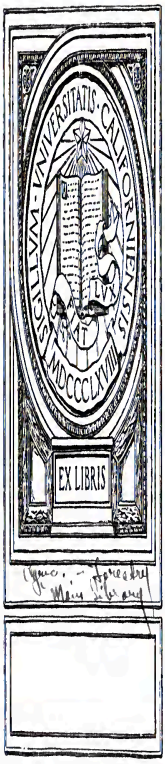
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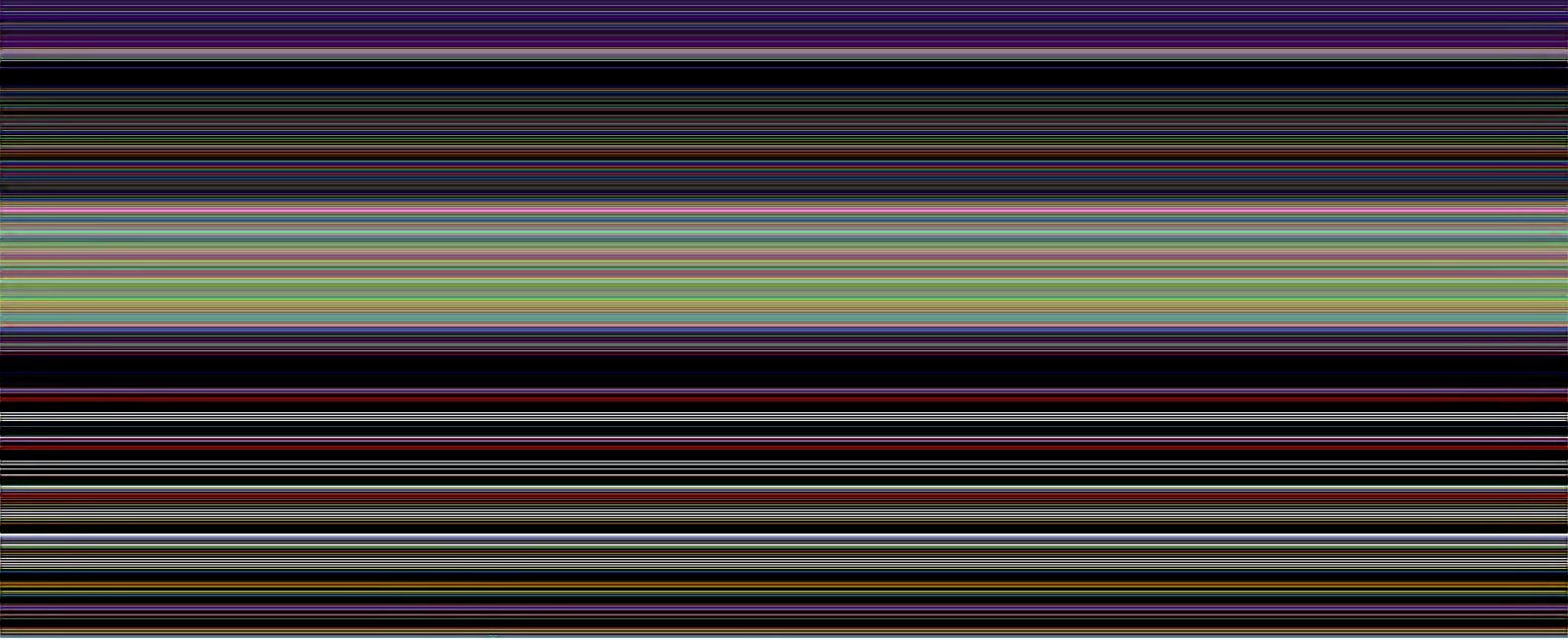

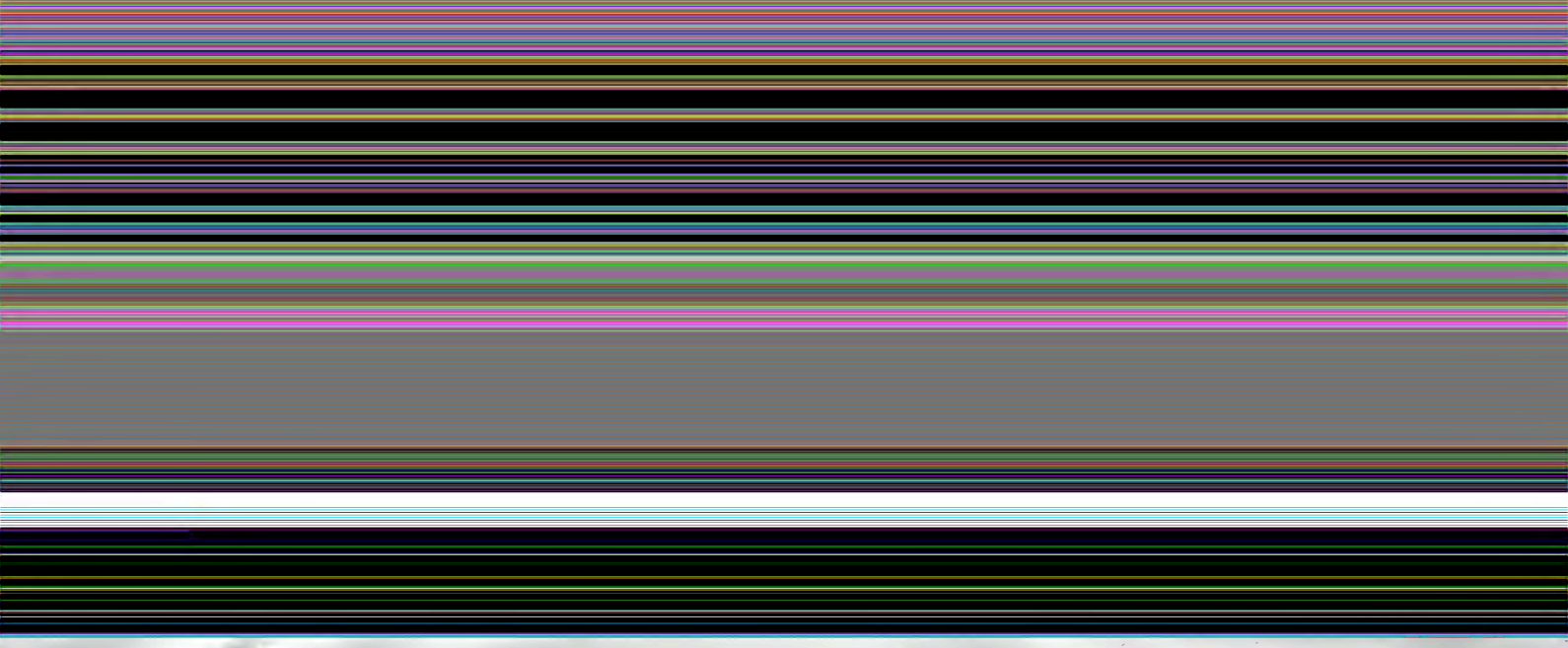

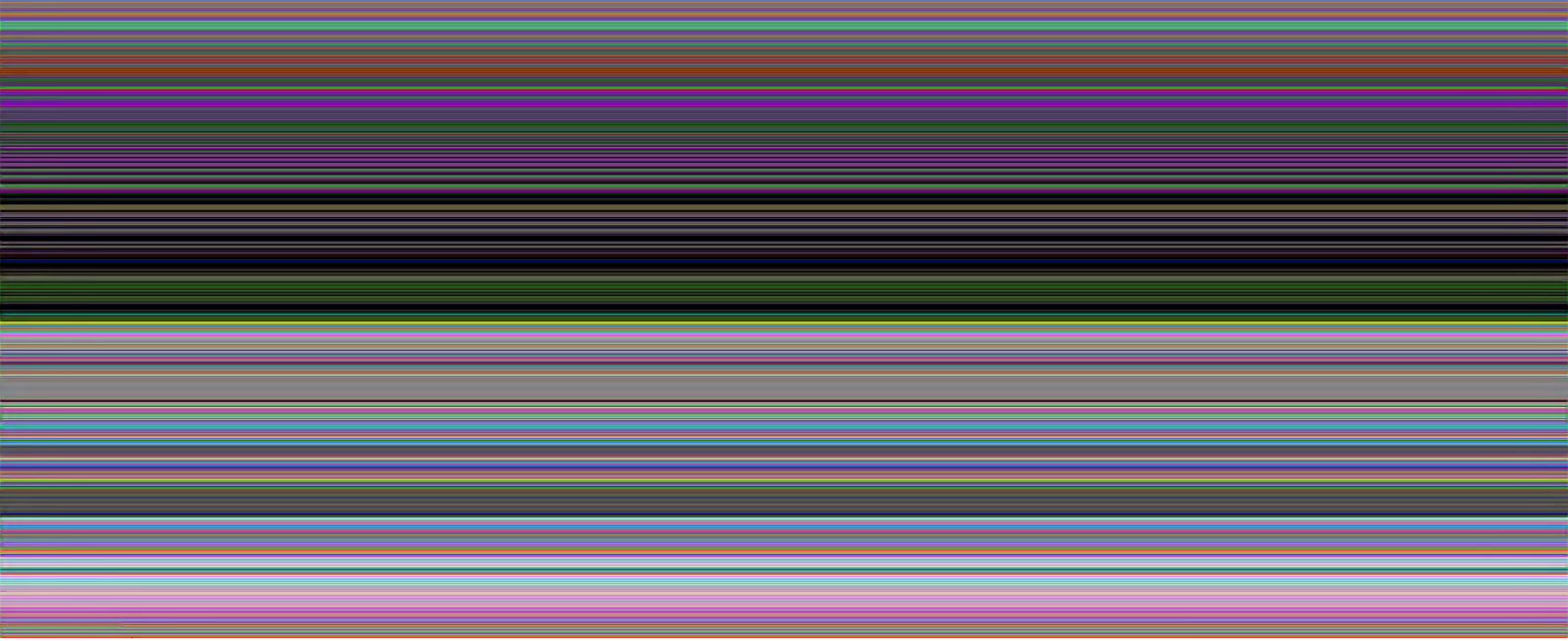

MARYLAND FORESTRY

PAMPHLETS

VOL. 2.

1 Report of the Maryland State Board of Forestry for 1912 and 1913.

2 The Fauna and Flora, The Life Zones and Areas of Allegany County. The Summer Birds of Western Maryland. By C. Hart Merriam and Edward A. Preble.

3 The Forests of Allegany County. By Geo. E. Sudworth. 1910.

4 The Forests of Cecil County. By H. M. Curran, with an Introduction by Geo. B. Sudworth. 1912.

5 The Forests of Garrett County. By H. M. Curran, with an Introduction by Geo. B. Sudworth. 1912.

6 The Wood-Using Industries of Maryland. By Hu Maxwell, Expert U. S. Forest Service with a chapter on, Maryland's Lumber and Timber Cut and the Timber Supply. By F. W. Besley. 1910.

HUNTING CREEK, FREDERICK COUNTY
(Mountain Stream from a Forested Watershed)

REPORT

OF THE

MARYLAND
STATE BOARD OF FORESTRY

FOR

1912 and 1913

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F. W. BESLEY . . . . . State Forester

BALTIMORE, MD.

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INTRODUCTION

The work of the State Board of Forestry for the past two years has followed along much the same lines as in former years, but with the increase in the number of technical assistants it has been possible for the State Forester to carry on a much more intensive work than has been done hitherto. The powers of the Board were increased by the last Legislature by an act authorizing the purchase of lands along the Patapsco river for a State Forest Reservation. The examination, survey and acquisition of these lands have consumed much of the time of the field and office force for the past year.

The system of forest fire protection has been extended and improved, with the result that the fire damage has been greatly reduced.

The forest survey of the State, which was begun shortly after the Board was created in 1906, was completed in 1912. This survey has been of inestimable value in obtaining first-hand information of our forest resources and enabling the Board to conduct its work along lines that promise the greatest usefulness to the people of the State.

More assistance has been given to private owners in the handling of their woodlands than ever before. In the past year 6,000 acres of woodland, mostly in small woodlots, have been examined and plans of management prepared for the owners.

The educational work, through addresses and illustrated lectures, has been conducted over the entire State, so that the knowledge of forestry and its application to our local conditions has been greatly extended.

A scientific study of our important timber trees, including their rate of growth and important uses, has been nearly completed. The results will be published in special bulletins.

Improvement work has been conducted on the State reserves with the object of providing the best fire protection and placing them in the most productive condition.

This report covers the main administrative activities of the Board for the past two years, as conducted by the State Forester.

Educational Work.

A study of the forest conditions in the State such as has been conducted for the past seven years through the various lines of investigation, enumerated under Forest Investigations in the later pages of this report, has clearly demonstrated that the practice of forestry in Maryland is not only thoroughly feasible but it is being realized to an increasing extent. That this is so is due to certain favorable conditions for timber growing, such as:

A moderate climate with an abundance of rainfall, conducive to the rapid growth of timber.

Suitable soil conditions in sufficient variety to encourage the growth of many species of commercial value. This variety of soil conditions and altitude gives to the State a variety of tree species that is probably unknown in any other area of equal size in the country; and, furthermore, the species that are most common are those of the greatest commercial value.

All parts of the State are within comparatively easy reach of large centers of distribution, and with the excellent transportation facilities available, both by rail and by water, there is a good market for forest products of all kinds. The city of Baltimore is a lumber center of importance and carries on an extensive export trade.

The rapid increase in the stumpage value of timber has emphasized the importance of timber growing on a commercial scale, and, with the other favorable conditions that exist, those who own forest land are beginning to realize the possibility of large revenues from this source.

The Board feels, therefore, that the practice of forestry in the State is largely a matter of educating the present owners of woodlands to a realization of the possibilities in timber growing. To this

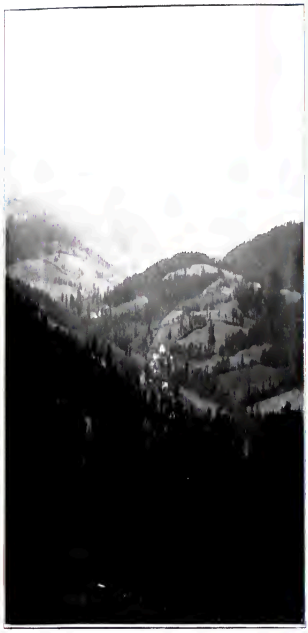

Fig. 1. Catoctin mountains, an important watershed in Frederick county

Fig. 2. Swallow falls on the Youghiogheny river, Garrett county

end various agencies have been used for disseminating information and in getting in direct touch with the woodlot and timber land owners for the purpose of showing just what can be done under the best systems of forest management that are now being practiced with success in this and other States.

The State forest reservations upon which the State can practice forestry in a scientific manner are relatively small as compared to the 2,000,000 acres of woodland in the State, and, therefore, the main problem is to educate the private owner to a point where he will practice forestry on his own land by the most approved methods.

Co-operation with Woodland Owners.

Under Section 4 of the Forest Law, the State Forester is authorized to examine, upon request, the woodlands of private owners for the purpose of advising them as to the best methods of management and preparing plans for carrying out the work. This is one of the best ways of getting in direct touch with the owner, learning his peculiar problems on the ground, and devising a plan that will suit his local conditions and at the same time provide for forestry improvement that will not only benefit him directly in increased yields from his woodland but will furnish an object-lesson to his neighbors, showing what practical forestry is and what it will accomplish. During the past two years thirty woodlots and timber tracts have been examined and advice given to the owners. On page 10 will be found a list of such examinations. It will be noted that these different properties are scattered over the State, giving them greater value for demonstration purposes.

List of Woodlot Examinations Made in 1912-1913.

Name.	Address.	No. of Acres.	Date.
James Baker	Easton	100	Nov. 7, 1913
F. H. Bailliere	Columbia	250	Sept. 26, 1913
W. T. Brown	Cliff's Landing	10	Mch. 15, 1912
Elwood Balderson	Colora	20	Mch. 1, 1913
Jas. W. Beecham	Westminster	40	Sept. 3, 1912
Miss Emily Bishop	Smithsburg	20	Apr. 1, 1912
H. B. Claggett	Upper Marlboro	150	May 14, 1912
Miss Esther L. Cox	Union Bridge	60	May 1, 1912
Marion Duckett	Mitchellville	40	Sept. 22, 1913
Chas. H. Crasty	Rogers	30	Sept. 23, 1913
A. P. Gorman	Laurel	34	Feb. 6, 1913
Greenmount Cemetery	Baltimore	10	Apr. 10, 1912
Jos. F. Johnson	Joppa	40	Dec. 5, 1913
Wm. M. Isaac's Est.	Harrisonville	100	Oct. 3, 1913
W. N. Jolliffe	St. Mary's City	173	June 3, 1913
A. H. Johnson	Sassafras	15	Apr. 5, 1913
John E. Hurst	Woodbrook	10	Sept. 30, 1912
James Lake	Forest Hill	10	July 4, 1912
W. A. Larner	Oldtown	3,500	Apr. 18, 1912
Miss Katherine McLane	Cecilton	60	Dec. 14, 1912
Maryland School for Deaf.	Frederick	3	Oct. 24, 1913
Marshall Marbury	Upper Marlboro	30	June 12, 1912
Potomac Valley Orchard Co.	Pearre	800	Apr. 3, 1912
Rudolph Reimer, Jr.	Seaford	110	Dec. 18, 1913
T. H. Renwick	Easton	50	Nov. 15, 1913
Dwight Serpening	McDaniel	30	Mch. 25, 1913
Robert Symons	Easton	30	Apr. 23, 1913
Dr. E. A. Scott	Galena	10	Apr. 4, 1913
John E. Street	Rocks	30	Aug. 27, 1912
P. K. Wright	Easton	63	Nov. 7, 1913
Washington Grove Asso'n.	Washington Grove	150	Aug. 2, 1913
Charles Pelts	Westminster	5	Sept. 3, 1912

Demonstration Forests.

The plan inaugurated two years ago of securing forest areas in different parts of the State upon which the owners would give the State Forester an opportunity to demonstrate certain phases of forestry practice has been continued. Work is in progress on the

different demonstration forests, and as examples of the good results being accomplished, two of them may be particularly noted.

The demonstration forest on the lands of Mr. DeCourcy W. Thom, near Queenstown, comprising about 150 acres, is being cut over under a detailed plan worked out by the State Forester. The purpose of the work here is to change a mature hardwood forest, with a mixture of loblolly pine, to a forest in which the pine will predominate as being the most valuable tree adapted to this particular tract. In doing this, a model plan of logging is being carried out, and is demonstrating very conclusively that under this plan the owner, who has mature timber that should be cut and who at the same time wants to protect his young growth and provide for a new crop, can do so with the greatest safety and assurance. This will go a long way toward solving one of the most difficult problems that the timberland owner has had to face. The contract under which the work is being done is fair to the buyer of the timber and at the same time fully protects the interests of the landowner.*

Another operation which has demonstrated its value is on the lands of Dr. E. E. Tull near Loretta, a field of 40 acres, lying less than 16 feet above tidewater and too poorly drained for agricultural use and yet excellent land for growing loblolly pine. The field had been partially seeded in loblolly pine from the seed trees in the nearby woods, but after five years, since the field was cultivated, it was found that not more than 25 per cent. of the area was fully stocked with young trees. Thrifty trees of suitable size were dug up from the edge of the field near the woods where they had seeded in thickly and transplanted to the open places to secure a spacing of approximately 6x6 feet, which would produce a normally stocked stand. This work was done at a cost of about $1.50 per acre and has produced a splendid, pure stand of loblolly pine, the best timber tree in this section of the State. If natural seeding had been entirely depended upon, there would have been a loss in time in seeding of not less than

*A copy of the contract is given in Leaflet No. 13, which may be had upon request.

fifteen years, and the results would have been unsatisfactory because of the great variation in the sizes of the trees and the consequent lower value of the product due to delayed natural pruning.

Exhibits.

An educational exhibit consisting of maps, charts, photographs and specimens of native woods was shown at a number of the county fairs during the past summer. The exhibit attracted much attention, and has been the means of bringing many, who did not know what the State was doing in forestry, in direct touch with the forestry work.

For the past four years a large exhibit has been shown at the annual meeting of the State Horticultural Society and allied organizations in the Fifth Regiment Armory. New material has been shown each year illustrating the different products and uses of the forest as an important natural resource. The exhibits have been the means of calling the attention of the people of the city and the State to the work that is being done by the State Board of Forestry, and showing them how they can be directly benefited by the co-operation and assistance that is offered in handling their particular forest problems. The last exhibit presented in November, 1913, was for the purpose of showing the products derived from the forest other than lumber, and included a large number of manufactured articles. The two pictures on page — show the appearance of two of these exhibits.

Lectures.

One of the principal reasons why forestry is not more generally practiced is that people have so many erroneous ideas as to what is really involved. The idea in the minds of many people is that forestry in practice means a large investment in improvement work and a long time to wait for returns, and is, therefore, impracticable for the man of small means. In order to correct this general impression and to spread a knowledge of the principles of forestry, the State Forester has visited all sections of the State during the

Fig. 1. Forestry Exhibit in Baltimore during "Maryland Week," December, 1911

Fig. 2. Forestry Exhibit in Baltimore during "Maryland Week," November, 1911

past two years, giving illustrated talks on the subject of handling woodlands. Since the subject is one that is so well adapted for illustration with a stereopticon, it has been possible in this way to interest a large number of people in the forestry work. These lectures have been given before granges, farmers' clubs, colleges, schools and various other organizations, which have requested them. The usual arrangement has been to give the lecture in the evening and on the following day to give a demonstration in the woods to show how to make thinnings, improvement cuttings, and to illustrate other forest problems of the community.

The lecture course in Farm Forestry by the State Forester at the State Agricultural College has been continued. It is the object of the course to fit the young men studying agriculture to handle the woodlots upon the farms, with which they may be connected, with the scientific care that they should receive.

It has been the aim to secure accurate and reliable information upon the subjects relative to forestry within the State, and a large amount of valuable information has been acquired. Requests for information and advice are constantly coming in and it is gratifying, not only to this office, but to those who make inquiry, to have this first-hand knowledge upon such a variety of subjects. Such inquiries have more than doubled in the past two years and it is the purpose of the Board to develop the work along the lines which will best supply the needs of the woodland owner, the wood user and those interested in forestry generally. Many articles have been written for the county press, and other publications and bulletins relative to forestry are published from time to time on subjects of special interest.

ADDRESSES AND ILLUSTRATED LECTURES GIVEN BY THE STATE FORESTER AND THE ASSISTANT STATE FORESTER IN 1912-1913.

(These are in addition to the lectures given at the State Agricultural College and at Farmers' Institutes.)

1912.

January 12—Pratt Branch Library No. 15.
February 2—Forest Hill Farmers' Club.
February 19—Teachers' Training School, Baltimore.
February 19—Gilman Country School, Roland Park.
February 23—Bel Air Country Club, Bel Air.
March 12—House of Delegates, Annapolis.
April 26—Eastern High School, Baltimore.
July 12—Boy Scouts' Camp, Harper's Ferry.
August 6—Coopstown Farmers' Picnic, Sharon.
August 9—Elkneck Farmers' Picnic, Elkton.
August 14—Granger Picnic, Claiborne.
August 24—Arcadia Farmers' Picnic, Arcadia.
August 31—Deer Creek Farmers' Club, Darlington.
November 1—Teachers' Institute, Cumberland.
November 11—Peabody Heights Improvement Association, Baltimore.

1913.

January 17—Catonsville Presbyterian Church, Catonsville.
February 14—Pratt Branch Library, Park Heights avenue, Baltimore.
March 18—Cumberland Public High School, Cumberland.
March 19—Oakland High School, Oakland.
March 20—Swanton Grange, Swanton.
March 25—Royal Oak Grange, Royal Oak.
March 26—Patrons' Club of Public School, Cordova.
March 26—Easton Grange, Easton.
March 27—Grange, Hurlock.
March 28—Nanticoke Grange, Federalsburg.
March 29—Grange, Costen.
April 1—Kennedysville Grange, Kennedysville.
April 2—Still Pond Farmers' Club, Still Pond.
April 2—Washington College, Chestertown.
April 3—Chestertown High School, Chestertown.
April 4—Sassafras Grange, No. 272, Sassafras.
April 5—Galena Grange, Galena.
April 5—George Biddle High School, Cecilton.
April 8—Mount St. Joseph's College, Baltimore.

April 8—Liberty Grove Grange, Burtonsville.
April 9—Brighton Grange, Brighton.
April 10—Men's Club, Central Presbyterian Church, Baltimore.
April 10—Agricultural High School, Sandy Spring.
April 14—Grange at Silver Run.
April 15—Grange at Taneytown.
April 16—Grange at Medford.
April 17—Blue Ridge College, New Windsor.
April 18—Westminster High School, Westminster.
April 23—St. Michael's Grange, St. Michael's.
April 24—Stockton High School, Stockton.
April 25—Willards Grange, Willards.
May 1—Mt. Airy High School, Mt. Airy.
May 2—Male High School, Frederick.
May 2—Frederick County Farmers' Association, Frederick.
May 2—Woman's College, Frederick.
May 2—Farmers' Club of Goshen, Laytonsville.
May 6—Men's Bible Class, Berwyn.
May 14—Leonard Hall, Leonardtown.
May 15—Charlotte Hall School, Charlotte Hall.
May 16—Grange, Grayton.
May 24—Grange, Hampstead.
August 12—Farmers' Picnic, Taneytown.
November 11—Beltsville Grange, Beltsville.

Forest Fire Protection.

In Maryland, as in nearly all of the States where organized forest work is being done, the fire protection problem is of the first importance. It has been clearly demonstrated that where the woodlands are free from fires there is no difficulty in securing good reproduction and satisfactory growth conditions. Where fires occur it is just the opposite. The loss from forest fires is more than twice the amount annually reported when all of the factors of fire damage are considered, including the merchantable timber destroyed, the young growth killed or seriously damaged, and the destruction of the forest humus, rendering the woodlands so affected incapable of producing more than one-half of a full yield.

The past two years have been average ones so far as forest fires are concerned, but, while the number of fires has been almost double that reported for the two previous years, the amount of damage has

been but little less than one-third as large. The actual number of fires that may have occurred was probably no greater than in previous years, but because of the larger number of forest wardens and the fact that nearly all of the fires were reported to them, a larger proportion has been reported to headquarters. The forest wardens have rendered a splendid public service. These men receive no salary and are allowed only small pay for the time actually engaged. The work of fire-fighting is very trying, and the warden is often called upon for service at night as well as during the day when it means a real sacrifice. These men have often accepted the position of forest warden because of the opportunity to do good public service without regard for the remuneration offered. The Board feels that in the present force of forest wardens the State has conscientious, efficient and faithful workers whose efforts in preventing forest fires have accomplished so much in conserving our forest wealth. As long as people are careless there will be forest fires, and where such have occurred the forest wardens have done splendid service in reducing the amount of damage. There is no doubt that the whole cost of the forestry work of the State has been saved many times over by the efficient work of the forest wardens on the fire line, but the forest wardens must have the full support of the community in order to make their work the most effective. In some sections of the State the sentiment for forest protection is well developed, but in some other sections there is a feeling that any attempt to stop forest fires is useless because they have always existed. It is gratifying to know, however, that this feeling is gradually giving way to one of hopefulness and a real desire to co-operate with the forces now at work to prevent forest fires.

The forest fire record for the past two years as shown by Table I gives a total of 113 fires in 1912 and 185 fires in 1913, but the amount of damage in 1913 was slightly less than that in 1912.

TABLE I.

Forest Fires, by Counties, 1912-1913.

Counties.	No. Fires. 1912.	No. Fires. 1913.	Acres Burned. 1912.	Acres Burned. 1913.	Estimated Loss. 1912.	Estimated Loss. 1913.	Expense. 1912.	Expense. 1913.
Allegany	29	55	9,279	5,920	$23,229	$7,536	$354.90	$267.35
Anne Arundel	..	3	....	351	....	350	....	....
Baltimore	5	4	20	365	255	530	10.20	....
Cecil	1	..	10	....	100	....	1.50	....
Charles	1	5	13	143	200	1,485	7.00	29.00
Dorchester	1	1	....	3	....	....	....	....
Frederick	14	33	1,158	9,823	2,176	9,836	64.40	425.45
Garrett	27	64	3,356	6,382	8,935	18,905	81.25	472.50
Harford	1	2	3	45	10	250	....	5.00
Howard	..	1	....	8	....	10	....	....
Pr. George	12	6	253	152	2,697	520	26.75	26.50
Somerset	1	..	50	....	300	....	....	....
St. Mary's	3	3	127	7	570	450	17.20	26.50
Washington	12	7	565	369	3,720	1,326	27.60	54.80
Wicomico	6	1	149	90	710	500	....	....
Worcester	1	..	150	....	400	....	....	....
The State	113	185	15,083	25,458	$48,212	$42,448	$593.80	$1,309.00

TABLE II.

Forest Fires by Counties.

Counties.	Per Cent. of Fires in State. 1912.	Per Cent. of Fires in State. 1913.	Per Cent. of Total Wooded Area Burned. 1912.	Per Cent. of Total Wooded Area Burned. 1913.
Allegany	26	30	5.5	3.6
Anne Arundel	0	1	.0	.4
Baltimore	4	2	.02	.3
Calvert	0	0	.0	.0
Caroline	0	0	.0	.0
Carroll	0	0	.0	.0
Charles	1	3	.01	.1
Cecil	1	0	.01	.0
Dorchester	0	1	.0	.0
Frederick	12	18	2.2	18.8
Garrett	24	35	1.1	3.0
Harford	1	1	.0	.05
Howard	0	1	.0	.02
Kent	0	0	.0	.0

Counties (Continued.)	Per Cent. of Fires in State. 1912.	1913.	Per Cent. of Total Wooded Area Burned. 1912.	1913.
Montgomery	0	0	.0	.0
Prince George's	10	3	.2	.1
Queen Anne	0	0	.0	.0
St. Mary's	3	1	.1	.0
Somerset	1	0	.1	.0
Talbot	0	0	.0	.0
Washington	10	3	.8	.5
Wicomico	6	1	.1	.03
Worcester	1	0	.1	.0
The State	100	100	.69	1.1

Forest Fires by Counties.

The climatic and soil conditions in different parts of the State vary so much that there is a marked difference in the fire risk. A larger per cent. of the forest fires occur in Garrett county than in any other county in the State, followed closely by Allegany, Frederick county being third in this regard, while a number of the counties of the State, including Calvert, Carroll, Caroline, Kent, Montgomery, Queen Anne and Talbot had no fires reported for either 1912 or 1913. What are known as the Eastern Shore counties are less subject to forest fires than any other section, because of the humid climate and moister soil.

Perhaps of greater importance is the per cent. of the woodlands of each county burned over by forest fires. By reference to Table II, page 17, it will be observed that in 1912 5⅓ per cent. of the forest area of Allegany county was burned over. Of this over 6,500 acres were burned over by one fire on Dan's Mountain. The forest warden in the district was sick at the time of the fire, which accounts in a measure for the extent to which it burned.

The wooded area burned over in 1912 represents a little less than ⅔ per cent., while in 1913 a little over 1 per cent. of the total wooded area of the State was burned over.

The total sum expended in preventive measures and in extinguishing forest fires in 1912 amounted to $1,474.90, and in 1913

to $4,163.20, which latter sum includes the construction of an observation tower, telephone lines, etc. This means that the cost of fire protection has amounted to $.0007 per acre in 1912 and $.002 in 1913 for all the woodlands of the State. Our fire protection system is less effective than it should be for several reasons: The lack of support of the public generally in forest fire protection; the difficulty in getting suitable men for forest wardens in every community; and the delays in paying the wardens.

An amendment has been proposed to the present law, which if adopted will increase the number of forest wardens that may be appointed, and thereby greatly increase the efficiency of the system. Public sentiment in favor of fire protection has increased very much in the last few years, since the present system of fire protection was inaugurated, and it is believed that the present campaign of education along this line, which has been carried into every county of the State, will go a long way toward removing the difficulties that have been standing in the way. The law requires that each account for expenses for fighting fires shall be paid by the County Commissioners of the county in which the expense was incurred, after such accounts are approved by the State Forester. In some of the counties there has often been a delay of several months or even a year in paying these accounts, which has made it increasingly difficult to secure men for service in extinguishing fires. It is the hardest kind of work and the pay is small, so that in order to make it possible for the forest warden to secure help when it is much needed it is necessary that these men should be paid with reasonable promptness. There has been during the past two years a better co-operation on the part of the County Commissioners in this respect, and it is hoped that as the fire protection system is extended and proves its effectiveness in reducing the fire damage it will receive better recognition on the part of those who should be most directly concerned.

TABLE III.

Causes of Forest Fires—1911-1913.

Counties	Railroads			Brush-burning			Hunters and Fishermen			Incend.			Traction and Log. Eng.			Unknown			Totals		
	1911	1912	1913	1911	1912	1913	1911	1912	1913	1911	1912	1913	1912		1913	1911	1912	1913	1911	1912	1913
Allegany	4	8	6	4	12	12	....	2		1		11	4	10	20	55					
Anne Arundel		1					1									1	....	3			
Baltimore	2	2		....	3		....									2	5	4			
Cecil				1													1	....			
Charles		1					1									4	1	5			
Dorchester																1	....	1			
Frederick	5	4		....	2	1	1	14		1	1	5	13	14	20						
Garrett	6	5	1	6	4	2	6	15		3	2	7	58	27	64						
Harford			1			1								1	1	2					
Howard		1																1			
Prince George's	4	4	2			2							6	....	22	6					
Somerset													1	....	1						
St. Mary's			1			1			1				1	1	3	3					
Washington	2	3	6	1	2	2	....	1					2	....	22	7					
Wicomico	3												3	1	6	1					
Worcester													1	....	1	....					
The State	26	29	18	11	23	21	9	32		5	15	36	77	118	326						
% Total	29	15	16	6	20	11	6	17		4	8	29	42								
% Known Fires	32	27	22	10	29	19	11	30		6	14										

Protective Measures.

Forest Wardens.—In administering the Forest law it has been the aim to develop in each county of the State where forest fires are prevalent a system that will afford the greatest protection to forest lands. To that end forest wardens have been commissioned by the Governor in sections where the fire danger was greatest and where suitable men could be found. These men were given authority to employ assistance, and to take all measures that may be necessary in controlling forest fires that they may see or that may be reported to them.

The efficiency of the forest wardens is greatly increased where the public sentiment in the community is strongly in favor of fire protection. Under such favorable conditions fires are reported to the forest wardens and measures taken for extinguishing them before they have done much damage. In other sections where the needs of fire protection are not so fully appreciated, it is often a considerable time after a fire is first discovered before the forest warden hears about it and can take measures for suppressing it. Under such conditions fires burn over the largest areas and do the greatest amount of damage. Unfortunately public sentiment favoring fire protection is less developed in the mountain counties of the State, where are found the largest areas of woodland and where the fires do the greatest amount of damage. This is clearly shown by reference to the table on page 17, showing that in the mountain counties (Garrett, Allegany, Washington and Frederick) there are the greatest number of fires, the most acres burned over, and the largest amount of damage.

Forest Wardens' conferences were held in the four western counties of the State during March, 1913, for the purpose of promoting a better understanding of the importance of fire protection work and methods of handling fires. Each conference was attended by the State Forester, the Assistant State Forester, and from fifteen to twenty forest wardens, patrolmen, and lookout watchmen. The chief topics for discussion were the duties, responsibilities and powers of the forest wardens, and how their work could be most effectively done and the greatest measure of co-operation secured. The meetings were notable for the interest manifested by the wardens and a real desire to do effective work. As a result, each went back to his post feeling that he was part of an organization having a tremendous responsibility and pledged to a greater public service.

Forest Patrolmen.—In the western part of the State, where there are large continuous areas of woodland and where fires travel rapidly, it has been found necessary to supplement the work of the forest wardens by men whose duty it is to travel over the country and to be constantly on the lookout for fires during the dangerous season. A forest patrol has, therefore, been organized in co-operation with the

Federal Government, which for the past two years has paid the salaries of these patrolmen from an appropriation for co-operating with the States in protecting the watersheds of navigable streams. These patrolmen are mounted on horseback, and each is assigned a district covering from 75,000 to 100,000 acres, for which he is responsible. This has been found a most effective means for reducing the fire damage. In addition, the fact that he is constantly on the move and observing the country from vantage points as he passes over the mountains makes people who might otherwise be careless or even disposed to set fires maliciously the more careful. He is also a powerful factor in creating public sentiment in favor of fire protection by meeting with the people, calling attention to the dangers from forest fires, and to the provisions of the forest laws which carry severe penalties for those who intentionally set out fires, and liability for damages for those who are careless. During the spring of 1912 there were 6 patrolmen on duty in the four western counties between April 5th and May 22d. During the fall fire season there were 10 patrolmen on duty, who patrolled the woodlands on all days between November 3d and December 11th, when it was dry enough for the woods to burn. These patrolmen discovered 42 fires in the patrol work, of which 39 were extinguished without assistance. In 1913, 11 patrolmen were on duty in the spring and 13 in the fall. During these two periods they discovered 81 fires, 46 of which they were able to extinguish without assistance.

The educational value of the patrol work is one of its most important features. There is a disposition on the part of many people to let the woods burn unless buildings or fences are threatened on account of a lack of appreciation of the damage done to the woods themselves, and also to a certain extent on account of a feeling of helplessness, an idea that the woods are sure to burn over in any case in dry seasons. To counteract this impression the patrolmen were provided with printed matter relating to the forest fire laws and the necessity and value of fire protection, and they were instructed to avail themselves of every opportunity to place this literature in the hands of land owners, sawmill and traction-engine operators, and

Fig. 1. Protected woodland near Hampstead, Carroll County

Fig. 2. Pine forest destroyed by fire in Anne Arundel County

hunters in their districts, and to talk with them on the subject of fire protection.

While it is difficult to estimate the effect of such work, it has certainly been instrumental in giving residents of the wooded sections quite a different view of fire protection, and in almost every case when their attention has been called to the forest laws and the determination on the part of the State and Federal Government to aid them in securing fire protection, they have expressed their willingness to co-operate and their hope that the work would be pushed as vigorously as possible. It is just such work as this which was required to crystallize the sentiment and make it effective. The patrolmen not only visited the land owners in their districts, posted warning notices, and warned the careless, but also visited the schoolhouses and got the teachers interested. The forest laws in Maryland are sufficiently comprehensive to cover the situation and meet any emergency that might arise, but such an agency as the patrol is needed to create public sentiment in favor of the enforcement of the laws. The fact that the Federal Government is paying men to patrol the woods and enforce the forest fire laws carries with it a dignity and force which cannot fail to arouse the admiration and good will of the people and impress them with the importance of fire protection. It is certain that these results have been secured to as great an extent as could be expected, since the work has been carried on for such a short time and over such a comparatively small territory.

Lookout Stations.—A third adjunct of the fire protection work is the establishment of lookout stations at commanding points in the mountains where the observer can see a large stretch of wooded country. At two of these points towers have been erected and men are stationed constantly during the dry season to watch for forest fires. Each has a telephone at hand by which he can communicate with the forest warden who is located nearest the place of the fire, and upon notification from the watchman he gets together a force of men to extinguish it. At four other points men are employed to make regular observations not less than three times daily, but are not required to remain constantly on duty. This has greatly supple-

mented the work of the wardens and patrolmen in that many fires have been reported and extinguished before they had a chance to become large ones and do much damage. The efficiency of the look-out stations has been such as to justify an extension of the work, and within the next year other stations will be established.

Fires in 1912.

As usual, the fires were confined to two rather distinct seasons, the spring season from about April 10th to May 20th, and the fall season from about November 5th to December 15th. There were 113 fires reported during the year. An average of 138 acres was burned over for each fire, with an average loss of $426.65. The average loss per acre was $3.30. Of the fires of 1912, 28 per cent. occurred in April, 11 per cent. in May, 2 per cent. in June, 2 per cent. in October, 48 per cent. in November and 9 per cent. in December. In the table below is given a list of fires by counties, their location, date, acres burned, estimate of damage, cause of each fire, and the warden who reported it.

TABLE IV.—FIRES IN 1912.

ALLEGANY COUNTY.

Location.	Date.	Acres Burned.	Estimated Damage.	Cause.	Warden.
Green Ridge.....	Apr. 6	300	$50.00	Brush Burning.	Krumbine, H. S.
Gilpin.....	" 9	2	2.00	Log. Engine.	"
Twiggtown.....	" 9	150	300.00	Unknown.	Krumbine, Thos.
Morantown.....	" 10	10	35.00	R. R. Laborers.	Mayer.
Neri.....	" 11	50	75.00	Brush B.	Krumbine, H. S.
Clarysville.....	" 12	12	125.00	R. R.	Mayer.
Green Ridge.....	May 3	1	...	B. B.	Krumbine, H. S.
Gilpin.....	" 4	2	4.00	"	"
Gilpin.....	" 4-5	200	400.00	"	"
Gilpin.....	" 5	50	100.00	Unknown.	"
Barton.....	June 13	1	10.00	"	Llewellyn.
Clarysville.....	Nov. 5	12	50.00	R. R.	Mayer.
Vale Summit.....	" 6	2	65.00	Hunters.	"
Neri.....	" 6	3	1.00	B. B.	Krumbine, H. S.
Twiggtown.....	" 6	75	100.00	Hunters.	Wentling.
Keyser.....	" 9	50	300.00	"	Llewellyn.

Location.	Date.	Acres Burned.	Estimated Damage.	Cause.	Warden.
Vale Summit.....	Nov. 19-20	250	$2,265.00	Hunters	Mayer.
Eckhart.....	" 20	6	150.00	"	"
Dan's Mt.....	" 21-23	6,500	20,000.00	"	"
Cumberland.....	" 22	225	500.00	"	McElfish.
Westernport.....	" 22	1,200	3,000.00	Unknown.	Llewellyn.
Cumberland.....	" 22	150	35.00	Hunters.	Helmstetter.
Moscow.....	" 23	1	...	Boys.	Mayer.
Cumberland.....	" 23	10	1.50	R. R.	Helmstetter.
Twiggtown.....	" 29	1	...	Unknown.	Wentling.
Cumberland.....	" 29	1	...	Hunters.	Krumbine, Thos.
Cumberland.....	" 29	¼	.25	Hunters.	Helmstetter.
Barton.....	Dec. 1	10	30.00	Unknown.	Llewellyn.
Clarysville.....	" 10	5	20.00	R. R.	Mayer.
		9,378¼	$28,228.75		

BALTIMORE COUNTY.

Orange Grove....	Oct. 31	1½	$50.00	R. R.	Wurtzer.
Cockeysville.....	Nov. 18	3	20.00	Hunters.	Shipley.
Orange Grove....	" 25	2	75.00	"	Wurtzer.
Ashland.....	Dec. 9	10	50.00	"	Shipley.
Orange Grove....	" 10	3	60.00	R. R.	Wurtzer.
		19½	$355.00		

CECIL COUNTY.

Liberty Grove....	Apr. 4	10	$100.50	B. R.	Balderston.

CHARLES COUNTY.

Charlotte Hall...	Apr. 4-5	13	$200.50	Incendiary.	Davis.

FREDERICK COUNTY.

Thurmont.....	Apr. 24	8	$20.00	Traction Eng.	Fraley.
Thurmont.....	" 25	10	25.00	Incendiary.	"
Yellow Springs...	May 4	10	10.00	Unknown.	"
Catoctin.....	Nov. 5	6	9.00	R. R.	"
Thurmont.....	" 7	8	20.00	"	"
Thurmont.....	" 14	3	4.50	"	"
Thurmont.....	" 15	8	16.00	"	"
Braddock.....	" 15	25	1,045.00	Hunters.	Klein.
Lewistown.....	" 16	10	40.00	"	Smith, V. T.
Foxville.....	" 22	50	300.00	Unknown.	Fraley.
Smithsburg.....	" 29	8	25.00	"	"
Catoctin.....	Dec. 13-14	750	450.00	"	"
Thurmont.....	" 15	250	200.00	"	"
Thurmont.....	" 23	12	12.00	R. R.	Creager.
		1,158	$2,176.00		

GARRETT COUNTY.

Location.	Date.	Acres Burned.	Estimated Damage.	Cause.	Warden.
Friendsville.....	Apr. 12	1	...	Log. Engine.	Browning.
Swanton.....	" 21	6	$20.00	R. R.	Friend.
Swanton.....	" 25	½	...	Unknown.	"
Hoop Pole Ridge.	May 3	40	40.00	Hunters.	Sines, W. T.
Wilson.....	" 4	10	5.00	Log. Engine.	Wilson.
Oakland.....	" 4	2	30.00	B. B.	Janoske.
Swallow Falls....	" 4	40	25.00	Fishermen.	Sines.
Deer Park.....	" 23	5	50.00	Unknown.	Kimmell.
Wilson.....	" 21	35	10.00	Log. Engine.	Wilson.
Barton.....	Oct. 30-31	200	100.00	Unknown.	Michael.
Swanton.....	Nov. 4-5	75	110.00	"	Friend.
Swanton.....	" 11	30	90.00	R. R.	"
Swanton.....	" 11	½	...	"	"
Swanton.....	" 11	100	25.00	Incendiary.	Turner.
Swanton.....	" 11-12	1,500	7,500.00	"	"
Swanton.....	" 13	3	...	R. R.	Friend.
Swanton.....	" 18	½	...	Hunters.	Turner.
Swanton.....	" 19-20	400	415.00	Incendiary.	Friend.
Swanton.....	" 21	50	50.00	"	"
Grantsville.....	" 21	8	...	Unknown.	Hetrick.
McHenry.....	" 21	200	100.00	Incendiary.	Sines, W. T.
Marsh Hill.....	" 21	15	5.00	Boys.	"
Swanton.....	" 22	75	75.00	Incendiary.	Friend.
Bittinger.....	" 22	100	25.00	Unknown.	Ellithorp.
Swanton.....	" 23	120	60.00	R. R.	Friend.
Swanton.....	" 23	50	50.00	"	"
Bittinger.....	Dec. 16	200	50.00	Unknown.	Ellithorp.
		3,258¾	$8,535.00		

HARFORD COUNTY.

Cardiff.....	Fall.	3	$10.00	B. B.	MacNabb.

PRINCE GEORGE'S COUNTY.

Ardmore.....	Apr. 6-7	82	$2,100.00	B. B.	Benton.
Berwyn.....	" 26	4	20.00	Unknown.	Bewley.
College Park.....	May 29	¼	...	R. R.	"
College Park.....	Nov. 13	8	40.00	"	"
Hyattsville.....	" 14	103	115.00	Unknown.	Benton.
East Hyattsville..	" 14	60	300.00	"	Bewley.
Lakeland.....	" 15	7	35.00	R. R.	"
Branchville.....	" 17	8	40.00	"	"
College Park.....	" 29	¼	2.00	Unknown.	"
College Park.....	" 30	1	5.00	"	"
College Park.....	Dec. 1	2	10.00	"	"
Lakeland.....	" 16	7	30.00	B. B.	"
		283¼	$2,697.00		

SOMERSET COUNTY.

Location.	Date.	Acres Burned.	Estimated Damage.	Cause.	Warden.
Oriole.....	Summer.	50	$300.00	Unknown.	...

ST. MARY'S COUNTY.

Charlotte Hall...	Apr. 6	2	$25.00	Incendiary.	Davis.
Drayden.....	" 10	25	250.00	B. B.	Armsworthy.
Drayden.....	June 5	100	285.00	Unknown.	"
		127	$570.00		

WASHINGTON COUNTY.

Pearre.....	Apr. 10	½	...	R. R.	Reel.
Pearre.....	" 10	3	...	B. B.	"
Orleans.....	" 11	10	...	"	"
Orleans.....	" 12	20	$5.00	"	"
Town Hill.....	" 12	5	...	"	"
Nr. Blue Mt. House	" 24	100	50.00	R. R.	...
Hancock.....	May 21	5	...	B. B.	Bishop.
Smithsburg.....	Nov. 21	30	300.00	"	Oswald.
Chewsville.....	" 23	300	3,000.00	Unknown.	"
Smithsburg.....	" 26	30	175.00	Hunters.	"
Sideling Hill....	" 28	1	...	"	Reel.
Weverton.....	" 28	60	200.00	Unknown.	Phillips.
		564½	$3,730.00		

WICOMICO COUNTY.

Parsonsburg.....	Spring.	50	$50.00	R. R.	...
Parsonsburg.....	"	5	10.00	"	...
Delmar.....	"	4	10.00	"	...
Pittsville.....	"	60	600.00	Unknown.	...
Tyaskin.....	"	10	20.00	"	...
——.....	"	20	20.00	"	...
		149	$710.00		

WORCESTER COUNTY.

Fruitland.....	Spring.	150	$400.00	Unknown.	...

Fires in 1913.

While fires were reported during every month of the year except January, making an unusual record, the spring fires were almost entirely confined to the period between March 1st and May 15th, and practically all of the fall fires occurred between November 5th and December 15th. Of the 185 fires reported 2 per cent. occurred in February, 7 per cent. in March, 27 per cent. in April, 39 per cent. in May, 2 per cent. in June, 2 per cent. in July, 1 per cent. in August, 1 per cent. in September, 1 per cent. in October, 12 per cent. in November and 6 per cent. in December; 152 of the fires were in the three mountain counties, Garrett, Allegany and Frederick; 86 per cent. of them occurred during the long, dry spring season. The average area burned over by each fire was 138 acres and the average damage was $220.42, or a loss of $1.66 per acre. A tabulated list of the fires of 1913 is given in the following table:

TABLE V—FIRES IN 1913.

ALLEGANY COUNTY.

Location.	Date.	Acres Burned.	Estimated Damage.	Cause.	Warden.
Corriganville...	Feb. 23	3	$11.00	R. R.	Helmstetter.
North Branch...	Mar. 2	4	20.00	"	Wentling.
North Branch....	" 4	200	400.00	Log. Eng.	"
Twiggtown.....	" 6	100	200.00	Saw Mill.	"
Song.....	" 9	4	4.00	Hunters.	Helmstetter.
Collins Mt.....	" 9	400	800.00	Log. Eng.	Wentling.
Lonaconing.....	" 23	40	40.00	Unknown.	Llewellyn.
Pinto.....	" 23	1	1.00	R. R.	Helmstetter.
Frostburg.....	" 30	8	14.00	"	Mayer.
Corriganville....	Apr. 8	75	200.00	Steam Roller.	Helmstetter.
Frostburg.....	" 8	10	70.00	R. R.	Mayer.
Midlothian.....	" 9	50	45.00	Boys.	"
Piney Grove.....	" 9	80.	50.00	Incendiary.	Fletcher.
North Branch....	" 10	12	20.00	Log. Eng.	Wentling.
Oldtown.....	" 13	60	35.00	Saw Mill.	Twigg.
Twiggtown.....	" 18	100	200.00	Log. Eng.	Wentling.
Frostburg.....	" 18	10	15.00	R. R.	Mayer.
Barton.....	" 19	45	45.00	B. R.	Llewellyn.
Frostburg.....	" 20	15	110.00	"	Mayer.
Gilmore.....	" 21	55	54.00	R. R.	"
Frostburg.....	" 22	20	40.00	Unknown.	"

Location.	Date.	Acres Burned.	Estimated Damage.	Cause.	Warden.
Song.....	Apr. 22	175	$150.00	Unknown	Helmstetter.
Oldtown.....	" 22-5	650	1,750.00	B. B.	Twigg.
Midlothian.....	" 22-3	280	245.00	Unknown.	Mayer.
Oldtown.....	" 22	9	25.00	Trac. Eng.	Twigg.
Flintstone.....	" 24	6	1.00	B. B.	Krumbine.
Spring Gap.....	" 24	600	900.00	Unknown.	Wentling.
Oldtown.....	" 24-5	200	100.00	B. B.	Krumbine.
Frostburg.....	" 26	1	...	Unknown.	Mayer.
Frostburg.....	" 26	1	...	"	"
Frostburg.....	" 30	1	...	"	"
Clareysville.....	May 2-3	10	10.00	"	"
Song.....	" 2	15	30.00	Hunters.	Helmstetter.
Frostburg.....	" 3	1	...	Unknown.	Mayer.
Gilpin.....	" 3	1	...	"	Krumbine.
Ekhart Mines...	" 3-6	100	50.00	"	Mayer.
Lonaconing.....	" 5-6	400	200.00	"	"
Frostburg.....	" 5-6	500	250.00	"	"
Cumberland.....	" 5	150	325.00	"	Helmstetter.
North Branch...	" 9	50	75.00	Incendiary.	Wentling.
Barton.....	" 9	6	50.00	Unknown.	Llewellyn.
Twigstown.....	" 9	75	100.00	Log. Eng.	Wentling.
Twigstown.....	" 9	33	63.00	Saw Mill.	"
Gilpin.....	" 12	75	125.00	Chimney.	Krumbine.
Barton.....	" 12	4	25.00	R. R.	Llewellyn.
Barton.....	" 13	45	90.00	Unknown.	"
Oldtown.....	Sept. 12	100	100.00	Hunters.	Twigg.
Rawlings.....	" 22	30	125.00	"	Helmstetter.
Colliers Mt....	Nov. 18	½	...	"	Wentling.
Clareysville.....	" 22	5	3.00	Boys.	Mayer.
Oldtown.....	" 25-6	800	50.00	Unknown.	Twigg.
Cumberland.....	" 25	150	150.00	Hunters.	Helmstetter.
North Branch...	Dec. 16	10	20.00	"	Wentling.
Cresaptown.....	" 18	125	160.00	"	Helmstetter.
Cumberland.....	" 20	40	50.00	"	"
		5,820½	$7,396.00		

ANNE ARUNDEL COUNTY.

Odenton.....	July.	50	$50.00	R. R.	...
Glenburnie.....	Oct.	300	300.00	Unknown.	...
Edgewater.....	Nov. 30	½	...	Hunters.	Shenkel.
		350½	$350.00		

BALTIMORE COUNTY.

Location.	Date.	Acres Burned.	Estimated Damage.	Cause.	Warden.
Shamburg.....	June 9-10	200	$200.00	Unknown.	Carey.
Shamburg.....	Nov. 25	¼	...	R. R.	"
Thistle Mills....	Dec. 13	15	20.00	"	"
Texas.....	" 20	150	300.00	Unknown.	Shipley.
		365¼	$520.00		

CHARLES COUNTY.

Charlotte Hall...	Apr. 22-23	40	$450.00	Unknown.	Davis, J. L.
Charlotte Hall...	Nov. 24	3	35.00	"	"
Pope's Creek.....	Fall.	50	500.00	R. R.	Wilmer.
Newbury.....	"	25	250.00	Unknown.	"
Wayside.....	"	25	250.00	"	"
		143	$1,485.00		

DORCHESTER COUNTY.

East New Market.	Fall.	3	...	Unknown.	Patten.

FREDERICK COUNTY.

Thurmont.....	Mar. 25	300	$1,200.00	Incendiary.	Fraley.
Lantz.....	May 3	50	250.00	R. R.	Bussard.
Hauvers.....	" 4	40	120.00	"	"
Catoctin.....	" 5	¼	...	Unknown.	Fraley.
Smithsburg.....	" 6	200	330.00	Incendiary.	Sauter, Dr.
Thurmont.....	" 6-10	3,000	3,000.00	Incendiary.	Smith, V. T.
Smithsburg.....	" 7	30	60.00	Incendiary.	Delauter.
Thurmont.....	" 7	400	725.00	Incendiary.	Fraley.
Catoctin.....	" 7	1	...	Unknown.	"
Smithsburg.....	" 8	99	150.00	Incendiary.	Delauter.
Thurmont.....	" 8	600	300.00	Unknown.	Creager.
Smithsburg.....	" 8	500	1,000.00	Incendiary.	Fraley.
Smithsburg.....	" 9	150	100.00	From other fire.	Delauter.
Catoctin.....	" 9	1	1.00	Unknown.	Fraley.
Catoctin.....	" 9	1	1.00	Unknown.	"
Catoctin.....	" 9	1	1.00	Unknown.	"
Catoctin.....	" 10	1	1.00	Unknown.	"
Catoctin.....	" 10	1	1.00	Unknown.	"
Catoctin.....	" 10	1	1.00	Unknown.	"
Lantz.....	" 10	8	196.00	R. R.	Bussard.
Thurmont.....	" 10	500	600.00	Incendiary.	Creager.
Thurmont.....	" 11	40	150.00	Unknown.	Fraley.
Smithsburg.....	" 12	75	175.00	Incendiary.	"
Smithsburg.....	" 13	25	50.00	Incendiary.	"

Location.	Date.	Acres Burned.	Estimated Damage.	Cause.	Warden.
Thurmont	May 13	2	$5.00	Incendiary.	Bussard.
Yellow Springs	July 13	¼	...	Mill Eng.	Klein.
Smithsburg	Nov. 4-5	300	150.00	Unknown.	Delauter.
Lantz	" 5	¼	...	Hunters.	Bussard.
Thurmont	" 7	5	5.00	Unknown.	Creager.
Thurmont	" 25	200	400.00	R. R.	"
Smithsburg	Dec. 13	500	325.00	Incendiary.	Delauter.
Garfield	" 13	¼	1.00	Unknown.	Bussard.
Thurmont	" 1945	3,000	1,500.00	Incendiary.	Fraley.
		9,623	$9,893.00		

GARRETT COUNTY.

Friendsville	Mar. 19	16	$32.00	R. R.	Frantz.
Swallow Falls	" 23	150	75.00	Incendiary.	Sines, A. L.
Swanton	Apr. 7	1	3.00	R. R.	Bray.
Swanton	" 9	1	1.00	Unknown.	Oester-Friend.
Bittinger	" 18	100	250.00	Incendiary.	Ellithorp.
Swanton	" 22	350	750.00	Unknown.	Bray.
Buckel	" 22	10	10.00	"	Oester-Ellithorp.
Sang Run	" 23	400	400.00	Incendiary.	Sines, A. L.
Bittinger	" 23	50	50.00	"	Ellithorp.
White Rock Run	" 23-24	25	25.00	Unknown	Bishoff.
Wilson	" 23-25	100	400.00	"	Wilson, D. W.
Laurel Run	" 24	5	5.00	"	Bishoff.
Franklyn	" 24	1	1.00	"	Oester-Friend.
Oakland	" 24	1	1.00	"	Sines, A. L.
Oakland	" 24	1	1.00	"	"
Oakland	" 24	1	1.00	"	"
Oakland	" 24	1	1.00	"	"
Grantsville	" 24	600	4,500.00	Incendiary.	Bolden.
Frostburg	" 24	20	18.00	Unknown.	Mayer.
Friendsville	" 24	50	300.00	Incendiary.	Frantz.
Westernport	" 24	600	300.00	Fishermen.	Michael.
New Germany	" 25	...	...	Unknown.	Broadwater.
Bond	" 25	...	...	"	"
Wilson	" 25	100	500.00	Brush Burning.	Wilson.
Swanton	" 25	200	800.00	Incendiary.	Bray.
Accident	" 26	1	1.00	Unknown.	Hetrick.
Oakland	May 1-2	100	150.00	Incendiary.	Sines, A. L.
Oakland	" 2	¼	...	Unknown.	"
Bloomington	" 2	400	2,000.00	"	Bray.
Sang Run	" 2-3	300	300.00	Incendiary.	Browning.
Franklyn	" 3	½	...	R. R.	Friend.
Swanton	" 3	½	...	"	"

Location.	Date.		Acres Burned.	Estimated Damage.	Cause.	Warden.
Friendsville.....	May	4	200	$1,000.00	Unknown.	Frantz.
Swanton.....	"	4	100	400.00	"	Bray.
Swanton.....	"	4	500	500.00	R. R.	"
Swanton.....	"	5	2	4.00	Unknown.	"
Big Savage Mt..	"	6-8	1,000	1,000.00	"	Jones.
Felk Hill.....	"	9	1	1.00	"	Bishoff-Browning.
Oakland.....	"	10	100	200.00	Incendiary.	Sines, A. L.
Oakland.....	"	10	200	100.00	Saw Mill.	Bittinger.
Friendsville.....	"	12	400	400.00	Incendiary.	Frantz.
Sines.....	"	12	...	...	Unknown.	Sines, A. L.
Deer Park.....	"	12	96	300.00	Incendiary.	"
Oakland.....	"	12	¼	...	Brush Burning.	"
White Rock Run.	"	12	1	1.00	Unknown.	Bishoff.
White Rock Run.	"	12-13	10	10.00	"	Browning.
Barton.....	"	12-13	300	300.00	"	Michael.
Sang Run.....	"	13	600	1,200.00	"	Savage.
Selbysport.....	"	13	21	266.00	B. B.	Frantz.
Friendsville.....	"	13	150	1,500.00	Unknown.	"
Sines.....	"	13	3	5.00	B. B.	Sines.
Swanton.....	"	13	25	35.00	"	Bray.
Wilson.....	"	13	100	500.00	Fishermen.	Wilson.
White Rock Run.	"	13	10	10.00	Unknown.	Bishoff-Sines.
Swanton.....	"	13	1	1.00	"	Oester-O'Brien.
Bittinger.....	"	13	1	1.00	"	Oester-Ellithorp.
Sines.....	June	3	50	100.00	Incendiary.	Sines.
Swanton.....	"	5	30	...	B. B.	O'Brien.
Sines.....	Oct.	15	100	200.00	Unknown.	Sines.
Kitzmiller.....	Nov.	6	60	10.00	"	Bray.
Swanton.....	"	7	1	5.00	"	"
Green Glade....	"	7	40	104.00	Incendiary.	O'Brien.
Swanton.....	"	8	30	...	"	"
McHenry.....	Fall.		8	20.00	Potash Eng.	Savage.
			3,383	$13,908.00		

HARFORD COUNTY.

Perryman.....	Mar.	24	25	$50.00	Fishermen.	Michael.
Perryman.....	May	2	20	200.00	Unknown.	"
			45	$250.00		

HOWARD COUNTY.

Ellicott City....	Dec.	1	3	$10.00	R. R.	Carey.

PRINCE GEORGE'S COUNTY.

Location.	Date.	Acres Burned.	Estimated Damage.	Cause.	Warden.
Branchville.....	Feb. 6	5	...	R. R.	Barton.
Lakeland.....	" 13	3	...	"	"
College Park.....	Mar. 20	10	$50.00	Tramps.	"
Berwyn.....	" 23	24	220.00	R. R.	"
Berwyn.....	May 23	60	150.00	Boys.	"
Springfield.....	Spring.	50	500.00	R. R.	Belt.
		152	$920.00		

ST. MARY'S COUNTY.

Charlotte Hall...	Apr. 7	3	$25.00	Unknown.	Davis.
Oraville.....	July 7	...	375.00	Thresh. Eng.	Reeder.
Leonardtown.....	Aug. 2	4	50.00	Unknown.	Raley.
		7	$456.00		

WASHINGTON COUNTY.

Bell Grove.....	Apr. 25-26	200	$1,000.00	B. B.	Reel.
Bell Grove.....	May 6-7	20	20.00	Fishermen.	"
Hancock.....	" 10	21	5.00	Boys.	"
Gapland.....	Nov. 3	40	80.00	Incendiary.	Phillips.
Weverton.....	" 4-5	60	120.00	R. R.	"
Edgemont.....	" 25	40	80.00	"	Bussard.
Edgemont.....	Dec. 14	7	21.00	"	"
		388	$1,326.00		

WICOMICO COUNTY.

Pittsville.....	Aug.	90	$800.00	Unknown.	...

STATE FOREST RESERVES.

When the present forest law was adopted in 1906, there came to the State by gift from Messrs. Robert and John W. Garrett three tracts of land in Garrett county to be held and managed as forest reservations. In 1907 another small tract located along the Patapsco River in Baltimore County was given to the State by Mr. John M. Glenn. The Garrett county reserves have not been added to since their acquisition, but under an appropriation from the State the Patapsco reservation has been very much enlarged. In addition, the

State has appropriated to the State Board of Forestry the sum of $8,500 to acquire Fort Frederick and the farm upon which it is located in the western part of Washington County, which, when acquired, will constitute a separate forest reservation.

The extension of the forest reservations is very much needed, as there are large areas of woodland, particularly in the mountain section, on the watersheds of important streams. The merchantable timber growth has been cut from nearly all of these lands, which with destructive fires and the constant fire danger make them of little value to the present owners, so they could be acquired by the State at a very reasonable price.

The development of water power on our rivers and streams is directly dependent on the maintenance of a good forest cover on the watersheds, and where lands so located have been denuded of their merchantable timber growth and are frequented by forest fires it does not pay the present owners to hold them. The State, however, can afford to hold these lands for a long period without revenue, and with adequate fire protection and proper management they would immediately serve the purpose of watershed protection in a much more efficient manner than could be expected under private ownership, and they would in time be important factors in timber production. In addition, such lands, well distributed and managed by the State, would demonstrate to the private owner the importance of fire protection and the principles of timber production in regions where the practice of forestry is so much needed.

Skipnish Reserve.

The Skipnish Reserve is the northernmost of the three in Garrett County and contains 888 acres. It lies west of the Youghiogheny River about six miles northwest of Oakland. The Oakland-Cranesville road passes through the southern half of the reserve. There was a considerable amount of white pine on this tract prior to the first cutting about 40 years ago. A subsequent cutting about 10 years ago, just prior to the transfer of the land to the State, removed the last of the white pine, so that now it consists of a small seedling

and sprout growth of hardwoods, principally white oak, red oak, scarlet oak and chestnut. This young stand is in a thrifty growing condition, and has the promise of producing an excellent forest if it can be protected from fires. Extensive improvement work has been conducted on this tract during the past two years, consisting of either cutting or killing by girdling the large, spreading, defective trees that were not considered worth cutting when the land was logged 10 years ago. The young growth had reached a height where these large trees were seriously interfering with its proper development, so that a liberation cutting was required. Such a cutting has been made on about two-thirds of the tract, and the remainder is being treated in the same manner. In addition, a number of fire lines have been established, usually consisting of the clearing out of old wood roads, so that fires if they do occur may be more easily controlled.

Swallow Falls Reserve.

This Reserve lies about one mile south of the Skipnish Reserve and contains 893 acres. About three years ago a liberation cutting, such as that described on the Skipnish Reserve, was made on about 50 acres of the land. This cutting has brought about such a marked improvement in the condition of the young growth that similar cuttings over the entire tract are fully justified, and will be undertaken as soon as suitable arrangements can be made.

Kindness Reserve.

This is the southernmost of the three Garrett County Reserves and lies about three miles south of the Swallow Falls Reserve and about three miles west of Oakland. It is the smallest of the three, containing but 206 acres, and since it was located nearer the railroad the cutting was much closer than that on the other reserves. Like the other reservations, this one is well stocked with a young growth, which is being impeded in its development by a few large, worthless trees, but a liberation cutting is being made at the present time, which will place it in a much better condition.

Patapsco Reserve.

The Legislature of 1912 appropriated to the State Board of Forestry $50,000 for the purchase of land bordering the Patapsco River between Relay and Hollofield. Since this appropriation became available, in the latter part of 1912, the State Board of Forestry has been proceeding with the purchase of land and acquiring the rights in this region that will best carry out the provisions of the act. The purposes of the reservation are:

(1) To preserve the scenic beauty of this region, which is recognized as one of the most beautiful in the country. Under State control, the lands will be maintained perpetually as a natural forest and the stripping of hillsides by cutting will be prevented. Where the steep slopes have been cleared and are now washing badly they will be planted in trees. Forest fires, which have done so much damage hitherto, will be reduced to a minimum by careful State control.

(2) The Patapsco River is exceedingly important for the water power it affords. There are nine different power developments between Relay and Hollofield, a distance of 10 miles, all within the limits of the forest reservation area, and seven of them are now in operation. This use of the river will be maintained as fully as possible by protecting the forests on the watersheds which now are to a considerable extent under State control.

(3) Not only is water-power development of prime importance, but since the water in the river is used for domestic purposes it is essential that the watershed from which it is derived shall be maintained in the most healthful condition, under State control.

(4) The woodlands are typical of those found in a large portion of the State, and scientific forest management as applied here will furnish valuable object-lessons to those who wish to handle their lands according to the most approved plans of modern forestry. The open fields that are being acquired by the State will be planted with different tree species adapted to the soil and climate, serving as valuable demonstrations of practical tree planting. The large

Fig. 1. View along the Patapsco River, below Ilchester

Fig. 2. Woodland border along the Patapsco River

number of native tree species found in this region, together with the species that will be introduced by planting, will make a forest arboretum not only of interest to the botanist but of great educational value to the general public.

(5) One of the ways in which this natural park will serve the people best is as a recreation ground near large centers of population, where the people may enjoy nature at its best in a region of so many natural attractions. It is proposed to offer camping sites to those who wish to take an outing here, and who probably could not afford a vacation trip to more distant sections. The idea is to make it a place where everyone in the State may realize that it is his pleasure ground.

In carrying out the purposes of this act, the State Board of Forestry has at the present time acquired 268 acres of land, and the purchase of three other tracts aggregating 177 acres has been agreed upon, and the State will take possession as soon as the titles can be examined and surveys completed. Mr. William L. Glenn has offered to donate to the State for the Patapsco Reservation about 85 acres, and Messrs. Richard C. and Rollin Norris have offered to give 35 acres. Both of these gifts have been accepted, and this, with the 42-acre tract given to the State by Mr. John M. Glenn several years ago, makes 162 acres in the Patapsco valley to be acquired by gift.

There are several tracts of land bordering on the Patapsco river owned by different companies, who hold them for water rights. While it has not been possible to buy any of these lands, the companies owning them have in almost all cases agreed to allow the State Board of Forestry to use them for park purposes under a mutual agreement by which the State will protect them from fire and trespass and handle them in such a way as to conserve the water interests. Under this agreement W. J. Dickey & Sons, Inc., have allowed the use of 800 acres of their land; the Thistle Mills Company, about 85 acres; the Consolidated Gas and Electric Company, 95 acres, and the C. A. Gambrill Manufacturing Company, 55 acres. The remaining companies in the valley are considering the same prop-

osition for about 200 acres of their land. The Board, therefore, has under management at the present time 1,665 acres along the Patapsco river. Other tracts are now being considered for purchase, and it is the intention of the Board to proceed with the acquisition of lands that can be purchased at a reasonable price on the Patapsco watershed.

The State Board of Forestry now maintains a patrolman to protect them from fire and trespassers, and has cut a number of trails through the woods for the use of the public. In co-operation with the Baltimore and Ohio Railroad Company, a fire line 100 feet wide, in which the undergrowth has been cut out and all inflammable material raked up, piled and burned, has been constructed along the exposed portions of the woodlands between Orange Grove and Hollofield.

A field party was employed almost the entire summer in surveys for the purpose of preparing an accurate, large-scale topographic map (200 feet to the inch) to be used as a base for locating property lines and all topographic features, and to serve as a working map for the entire Patapsco area.

In accordance with the objects stated above, the plan of management for these lands covers three important points:

(*a*) To put them in the best condition by removing dead and defective trees and in planting the open lands.

(*b*) To make the area thoroughly accessible by construction of roads and trails.

(*c*) To give the greatest measure of protection by maintaining a patrol to look out for fires and any depredations by the public, and the construction of fire lines to reduce the danger from railroad fires.

Forest Investigations.

The Board of Forestry has from its organization, in 1906, carried on extensive investigations to determine the forest conditions in the State, and to devise methods for their improvement, believing

that such investigations must necessarily be the basis for any well-developed system of forestry.

Beginning in 1906, forest surveys were carried on systematically in the different counties to determine the area of the woodland, the stand, the condition and the value of the timber, and to secure other information that should furnish a careful inventory of our natural forest resources. This work was completed in 1912, resulting in an inventory of the forest resources of the State by counties. Individual forest reports, accompanied by large-scale forest maps, have been published for four counties, and reports for five other counties are in preparation. While the large mass of data that has been collected is not fully in published form, it is nevertheless available, and furnishes the information so useful not only to the land owner but to the timber buyer as well. Subjects of particular importance have been taken up and careful studies made. Some of the specific problems now being worked out are here indicated.

Chestnut Bark Disease.

The investigation made by the State Forester in 1911 to determine the extent of the chestnut bark disease and the amount of damage occasioned showed that it had spread very generally over the northwestern part of the State and was spreading southward and westward. During the past summer, in connection with other work, parts of the same areas were examined to determine how rapidly the blight had spread during the past two years. In one large tract of approximately 10,000 acres in Cecil County, containing a large per cent. of chestnut, where less than 10 per cent. of the trees were reported as dead or diseased in 1911, it was found in 1913 on the same area that approximately 90 per cent. had been killed or were infected by the chestnut blight. This is indicative of the rapid spread of the disease in the northeastern section of the State.

Another large tract in the Catoctin Mountains in Frederick County, which in 1911 marked approximately the southern limit of infection, was then found to have only a small per cent. of diseased trees, less than 3 per cent. When this same area was examined again during

the latter part of 1912 it was found that approximately 50 per cent. of the chestnut trees had either been killed or were infected by the blight, and that the infected area had moved much farther south.

In 1911 no indication of the disease was found west of the Blue Ridge Mountains, but in 1913 a few scattered trees infected with the chestnut blight were found in the vicinity of Fairview Mountain along the east front of the Alleghenies. The progress westward has been much slower than southward, but it is nevertheless spreading, and unless there is a decided change in the situation very soon one of our most valuable timber trees will be doomed.

Efforts made by Pennsylvania and other States to stop the spread of this disease have failed, and there appears to be no hope of saving the chestnut by any means that is known, and therefore the main problem today is to utilize the material now dead or diseased to the best advantage before it becomes a total loss. The chestnut blight does not damage the trees for timber, provided they can be used before the natural decay sets in, and under ordinary conditions the wood does not begin to deteriorate seriously for about two years. Where only green trees are accepted, such as for telephone poles and railroad ties, it is necessary to cut the trees soon after they show infection and before the bark is entirely dead. The State Forester has carried on some investigations in the areas where there are large quantities of blight-killed timber with a view to devising means for close utilization and developing a market for the product. These investigations have not reached the point where results can be shown, largely due to a failure to secure satisfactory co-operation on the part of the owners of large quantities of blight-killed material. The investigation has shown, however, that unless this blight-killed material is utilized soon after the death of the trees it will become a total loss to the owners.

Second-Growth Hardwood Studies.

Probably less than 1 per cent. of the total wooded area of the State is still in virgin timber. This means that practically all of the woodland has been cut over at least once and some of it several

Fig. 1. Sugar grove in Garrett County
(This county produces about 250,000 pounds of maple sugar and 3,000 gallons of maple syrup annually)

Fig. 2. Well-managed woodlot in Baltimore County

times. The forest problems of the State are, therefore, those dealing with the second growth, and it is to this work that the State Forester has devoted a large part of each field season for the past four years.

Each summer field parties have been engaged in taking measurements in even aged stands of the different types of hardwood in order to determine the yield of such stands of different ages under different soil conditions. Such studies will furnish a basis for predicting the yield of woodlands of certain types and for different periods, so that the woodland owner who is growing timber may know with some certainty what he may reasonably expect in the way of yield in a given time and also what the principal elements of cost are. The growing of timber is just as much the production of a crop as the growing of wheat or corn, the difference being the length of time required to produce that crop. The length of time that must elapse before harvest, and the lack of exact information as to what the revenue from the crop will likely be, introduces an element of uncertainty that has prevented many a land owner from engaging in the growing of timber in a commercial way, whereas if he had more complete and convincing information he would be less reluctant to engage in the business.

Most of the forest area of the State is in the hardwood region, so that the investigation of the growth of hardwoods is of special importance. During the past four field seasons 364 sample plots, averaging one-half acre each, have been carefully measured and complete records taken in Washington, Garrett, Frederick, Cecil, Harford, Prince George's and Charles Counties as representative of the hardwood section of the State.

Scrub Pine Study.

This species of pine, also called the spruce pine, is native in the central and southern parts of the State, but most common in Prince George's, Anne Arundel, Charles and St. Mary's Counties. Up to 10 years ago this species was regarded as of very little importance, because it seldom attained suitable size for saw timber, and since cordwood, for which it was best adapted, was a low-priced product,

it occupied a very unimportant place. Since then, however, this tree has been used extensively for wood pulp and has come into favor. The annual cut of scrub pine pulpwood in the counties named is about 200,000 cords. It is a tree that comes up abundantly in abandoned fields and occupies land that would otherwise be waste. This illustrates in a striking way the changing conditions of the timber market, showing that some of the species of trees that have held a very important place in the past are coming into prominence now as a result of the increased demand for wood, the decreased supply and new uses for wood. During the past summer a field party was engaged for several months in collecting data relative to the yield and uses of scrub pine; 133 sample plots, averaging about one-third of an acre, were measured and the yield of fully stocked, even aged pine stands for the different age classes was determined. As a result, it will be possible to predict with considerable certainty the yield of pine in the form of cordwood, pulpwood, or other products for given periods, under given soil conditions. This data is now being worked up for publication.

Red Gum Study.

Another important timber tree in the State is the red or sweet gum, which is found in swampy sections. This is one of our rapid-growing species and adapted to overflow lands not suited for agricultural use. This species, like the scrub pine, was formerly considered of little value, but has come into very general use of late years for cutting into veneer for making berry baskets and vegetable baskets, and also for pulpwood. It is a tree common only in the coastal plain section of the State, but its importance is sufficient to justify a careful study to determine its rate of growth and adaptability to certain soils and the uses for which it is best fitted. During the past summer 65 sample plots were taken in even aged stands under varying conditions. The study will be continued another season in order to complete the work.

Basket Willow Culture.

Maryland for many years has been an important producer of willow for basket making. The industry is centered in the vicinity of Baltimore, with Lansdowne, Elkridge, Laurel, Patapsco and Crownsville as the chief plantation areas. The States which are most prominent in the willow industry are New York, Pennsylvania, Maryland, Kentucky, Indiana, Ohio and Illinois, but for certain purposes, such as willow furniture, the Maryland stock is considered of superior quality. This is due to the fact that we have a milder climate and a longer growing season than prevail in the other willow-growing States. At the same time, the warm, humid climate prevailing here encourages certain fungus diseases and insect pests to an extent not realized in the other States. In fact, this handicap has become so serious that many of the growers are being driven out of business. It is believed that these difficulties are not insuperable and that a more thorough study of conditions would enable the growers to successfully carry on the business and develop it to a much greater extent than has been the case hitherto. To that end an investigation was made last summer of different plantations and the results of the study are now being worked up for publication.

Relation of Forests to Water-Power Development.

The importance of forests in regulating the flow of water and its conservation is becoming more universally recognized. The numerous rivers and streams in all except the tidewater sections of the State, reaching in their ramifications nearly every farm, have a vast potential value as power producers. It is by protecting and conserving the forests which feed the streams that water power can be made most effective. The principal coal fields are becoming rapidly exhausted of the more accessible supplies, and in consequence the price of coal is advancing. This emphasizes the need of some other means of generating power, and it is natural to turn to the immense amount of power that goes to waste in our rivers and streams. With improved methods of electrical generation and transmission, the ques-

tion of generating electric power by stream flow and transmitting it economically to distant points is the important problem for the immediate future. It is quite probable that in a few years electricity generated by our water powers will be utilized on many of the large farms. It is at this point that the forest performs an important function. One of the essentials of a good water power is that it must be constant. The water falling as rain on the watershed of a stream used for power purposes must be so conserved as to feed it evenly into that stream. This can only be done in an economical and effective way by having the watershed covered with forests, which are the best natural reservoirs known. Without forests on the watersheds of our streams there will be the usual calamity of floods following heavy rains, and extremely low water following periods of drouth, such as are common where watersheds are not protected by a forest cover. This emphasizes the importance of protecting our forests from reckless methods of cutting and destruction by forest fires. To do this properly the State should acquire considerable areas of mountain slopes to be held as forest reservations, not only for the protection they would afford to stream flow, but for the production of timber, which is already becoming scarce in many localities.

Not only are the forests essential in controlling the flow of water in streams, but it has been clearly demonstrated by a study of conditions in different counties that in any considerable area where the forests constitute less than 20 per cent. of the land area, injurious effects are sure to follow. The forests exercise a very beneficial effect in the distribution of rainfall over the areas in which they are located. It has been found that in forest areas the rainfall may be 25 per cent. greater than that existing in unforested areas. This subject is of such far-reaching importance as to deserve the closest study. In this connection, the conclusion reached by a committee of foresters and weather bureau experts, presented to the Fifth National Conservation Congress in November, 1913, is of special significance and will be found on page 53 of the Appendix to this report.

Taxing Woodlands.

The taxation problem has received much attention during the past year, the tax on woodlands coming in for a small share. When it is recognized that more than one-third of the total area of the State is wooded, and that this class of land will be required to bear a large part of the burdens of increased taxation, the importance of devising a better system of taxation is apparent to anyone who has given the matter a careful study. The present system of taxing woodlands under the general property tax is discouraging to conservative management. Forest property is different from other property in that it does not produce an annual revenue. It takes many years to produce a crop of timber, and in the meantime taxes and interest accumulate rapidly without an income with which to pay them. Under the general property tax not only the land but the timber crop upon it is taxed annually, which is not the case in any other kind of crop. Except where the assessments are very low, this makes an exorbitant tax and amounts in many cases to confiscation. The forest is recognized as a public necessity, and while it is not necessary to grant special favors in the matter of taxation, it is highly important that it at least should not be taxed out of existence. In this State practically all of the original growth has been cut, so that our forest lands are those upon which a second, third or even a fourth growth is being produced. In order to properly encourage the production of timber crops it is necessary that a more equable method of adjusting the taxes be devised to place the growing of timber upon a satisfactory basis. With the uncertainties that exist under the present system, there is little encouragement for an investor to buy land, or for an owner to hold his land for the purpose of growing a crop of timber, when he knows that as soon as the trees get large enough to have any merchantable value the assessment will be raised, and this increase in the assessment will be increased with the growth of the timber. By the time the forest has become mature the chances are that the taxes and interest paid on his investment will exceed the value of the timber that is cut. This is unjust and can have no other effect than placing a penalty upon forest conservation. The present agitation in

tax reform makes this subject of particular importance and is sufficient justification for treating it at some length. So far as producing a new crop of timber is concerned,

"All sound authorities agree that the forest crop should not be taxed until harvested. They disagree somewhat as to the degree to which the land tax also should be deferred in order to insure the desired result, as to the extent to which reform should be based on conditions under which the forest owner contracts certain performance, and as to concessions of theory to expediency generally. A consensus of opinions, however, is that the following objects should be sought:

1. The perpetuation of forests in private hands by wise use.
2. Greater permanent revenue to State and county than is possible under the present system of destroying the taxable source.
3. Assurance that the total burden of taxation will have a fair relation to the income obtained, making the tax burden on forest growing as nearly as possible proportional to the burden borne by other kinds of useful industry.
4. Assurance that the owner will do his share to make and keep the land productive.
5. Assurance to the owner that future action by the community will not confiscate any property resulting from his effort.
6. Division of risk, so both owner and community will seek highest production and safety from fire.
7. Simplicity in adoption and operation.*

In order to carry out this purpose, probably the best plan would be a combination of a land tax and a yield tax, the land to be assessed for about one-half of the prevailing rate for denuded land, and a yield tax of about 10 per cent. on the net value of the timber when it is cut. This would help to stabilize local revenues, and the yield tax, to be paid in a lump sum, would come at a time when the owner is best able to pay it. The total tax realized would probably be about the same as under the present system, but as a yield tax there would be less hardship to the man who is holding his land for timber production with the revenue long deferred.

New York, Pennsylvania, Connecticut and Louisana have already enacted laws upon this subject and other States are seriously considering it. Under conditions existing in Maryland this form of

*Report of Committee on Forest Taxation of the Fifth National Conservation Congress.

Fig. 1. Original growth of hemlock in Garrett County

Fig. 2. Virgin forest of beech and sugar maple, Garrett County

(These magnificent first-growth forests that once covered fully 50 per cent. of Maryland now represent less than 1 per cent. of its total forest cover)

taxation would be especially applicable. The present tax on cut over lands for timber production would be a decided advantage. The plan that has been worked out for Eastern conditions, such as in Maryland, by the Committee of the Fifth National Conservation Congress is such a clear, concise presentation of the subject that it is printed on page 49 of the Appendix to this report.

FINANCIAL STATEMENT.

Balance, October 1, 1911		$810.61
App. for 1912 (Chap. 428, Acts of 1910)		4,000.00
App. from Apr. 15 to Sept. 30, 1912 (Chap. 348, Acts of 1912)		4,533.33
Special app. for publications (Chap. 348, Acts of 1912)		6,000.00
Sale of wood and timber on State reserves		44.00
		$15,537.94
Expended as per vouchers:		
October, 1911, to April 1, 1912—		
Salaries	$1,176.77	
Field expenses and travel	115.97	
Office supplies	209.97	
Miscellaneous services	344.29	
	1,827.20	
Balance, April 1, 1912		$13,710.74
April 1, 1912, to October 1, 1912—		
Salaries	$1,541.95	
Field expenses and travel	631.27	
Office supplies	745.92	
Miscellaneous services	147.48	
Fire accounts	127.21	
Printing	464.19	
	3,657.12	
Balance, October 1, 1912		$9,053.62
App. for fiscal year 1913		10,000.00
Receipts from fines imposed (Chap. 294, Acts of 1910)		25.00
		$19,078.62

Expended as per vouchers:

October 1, 1912, to April 1, 1913—

Salaries	$1,935.29	
Field exp. and travel	413.66	
Office supplies	432.27	
Miscellaneous services	309.24	
Fire accounts	158.32	
Printing	51.50	
		3,348.48
Balance, April 1, 1913		$15,530.14

April 1, 1913, to October 1, 1913—

Salaries	$3,691.16	
Field exp. and travel	1,666.70	
Office supplies	741.93	
Miscellaneous services	350.29	
Fire accounts	656.33	
Printing	764.20	
		8,550.36
Balance, October 1, 1913		$3,979.63
App. for purchase of Fort Frederick (Chap. 794, Acts of 1912)		3,500.00
App. for Patapsco Reservation (proceeds of $25,000 bond sale)		24,325.06
Total balance, October 1, 1913		$41,804.94

APPENDIX.

*PLAN OF FOREST TAXATION FOR EASTERN STATES WHERE MATURE VIRGIN TIMBER IS NOT THE DOMINATING TYPE.

1. *Lands Subject to Special Taxation.*—The special forest tax should apply to all lands on which forests are growing and which are handled and protected in accordance with the methods of practical forestry as defined in general in the law, which should be administered by the commission, board or officer entrusted with the direction of State forest work.

Lands subject to the special tax shall be valued at not over——dollars per acre. (This value should be fixed so low as to exclude lands better suited for other uses than forestry.) Lands shall be separately classified and brought under the system at the owner's option. Owners desiring special classification may make application to the State Forester, accompanied by a certificate of the local assessor stating the value of the land, valuing separately the different parcels if so desired by the State Forester. The State Forester shall examine the forest and, if he finds it meets the legal requirements, shall certify the forest for separate classification and taxation.

Lands thus separately classified shall remain so as long as the forest is properly conserved as determined through inspection by the State Forester. Lands may be withdrawn from such classification at the option of the owner on paying the tax provided below.

2. *The Tax.*—Forest lands when separately classified for taxation shall be subject to a special method of taxation.

Two methods are proposed, depending on whether the forest is a "new forest" or an "established forest."

By a "new forest" is meant lands stocked with forest trees, the majority of which are not over 10 years old, provided that the older

*Extract from report of Committee on Forest Taxation of the Fifth National Conservation Congress.

trees do not add to the assessed value of the property, and that the forest meets with the other requirements of the law. This may include land fully stocked with trees under 10 years of age, but containing also scattered older trees, or lands partially stocked with trees under 10 years of age when planted with a sufficient number of additional trees to bring the forest to the standard set by the law, or open land planted with trees to meet the standard of the law. Such forests, when accepted and classified, shall be taxed by the following method:

The land shall be assessed by the local assessors at its value as bare land, no account being taken of the value of the trees. This assessment shall be repeated at intervals of 20 years until the prevailing age of the trees reaches 70 years. Upon the value thus determined the land shall be taxed annually at a rate equal to one-half of the rate of the general property tax of the locality, but in no case to exceed 5 mills. This limit of 5 mills is chosen on the assumption that 10 mills is probably slightly in excess of the average rate of the general property tax upon true value throughout the United States. In any State where it appeared that the prevailing rate of the general property tax was appreciably higher or lower than 10 mills this rate might be correspondingly changed. This explanation applies equally to the limit of 10 mills proposed below for the tax upon forests over 70 years of age and upon "established forests."

Whenever any timber is cut or other forest product taken from the land a yield tax of 10 per cent. of the stumpage value of the timber cut or the actual value of other forest products shall be paid to the State. Forest products cut for domestic use, which shall be limited to fuel and the construction of fences, buildings, and other improvements upon the property of the owner, or of a tenant with the permission of the owner upon property subject to taxation in the same town as the timber land, shall be exempt from taxation.

Whenever trees are cut before reaching the age of 70 years, and provision is made for planting new trees or otherwise perpetuating the forest according to the standard fixed by law and to the satisfaction of the State Forester, the land may continue separately classi-

fied and subject to the special tax indefinitely until the timber reaches the age of 70 years.

When the timber reaches the age of 70 years there shall be an assessment of the value of both land and trees, which assessment shall be repeated every 10 years (or oftener), and upon this assessment an annual tax shall be imposed at the rate of the general property tax in the locality, but not to exceed 10 mills, which tax shall continue until the trees are cut. When the trees are cut the yield tax of 10 per cent. shall be assessed. From the amount of the yield tax shall be deducted the amount of the previous payments of the annual tax upon land and trees since the trees reached the age of 70 years. If the amount of such previous payments equals or exceeds the yield tax upon the timber cut, no such yield tax shall be due. If after cutting provision is then made for planting or otherwise satisfactorily reproducing the forest, the lands may remain under special classification and taxation, as previously provided for "new forests."

If the owner desires to clear off the timber before it has reached a profitable age for cutting, he shall be at liberty to do so upon paying a tax determined as follows: The value of timber shall be assessed and a tax computed amounting to 1 per cent. of said value multiplied by the number of years since the forest was classified and made subject to the special tax. To this shall be added an amount equal to the total taxes paid upon the land alone during the period since the land was separately classified, and this sum shall be the amount due from the owner. The property shall then become subject to the ordinary property tax. The same procedure shall be followed in any case where the owner fails to maintain the forest according to the standard set by law as determined by the State Forester.

3. *Administration.*—Under this system the collection of all taxes on land and trees except the yield tax would naturally be in the hands of local officers and the revenue would go into the local treasury without further concern on the part of the State. The yield tax, on the other hand, and the tax collected as a penalty for removal of the land from classification or abandonment of the forest should be administered so far as possible by State officers, presumably by the

State Forester and the State Tax Commissioner in co-operation. The proceeds of the yield tax and the penalty tax go into the State treasury, either to remain there or if thought best to be distributed back to the towns and counties where the timber lands are located. This distribution might be made according to any one of four or five possible plans. (See Proceedings of the Sixth Conference of the National Tax Association, pp. 385-389). Your committee recommends, as probably best suited to the conditions of most States, that the distribution be based upon the areas of forest lands separately classified for taxation in the several local jurisdictions respectively.

In all cases the owner should be required to furnish a sworn statement annually of the amount and value of forest products cut during the year. It might also be well to require advance notice of all cutting. Large owners, lumbermen, loggers, sawmill owners, and so forth, should be required to keep regular books giving a record of their cuttings. Their books and accounts should be open to State officers and more elaborate reports could be required of them. In the case of small farm woodlots it would probably not be worth while to require special books or elaborate reports. The sworn statement of the owner would ordinarily be sufficient. In all cases there should be some examination of logging operations, either by State or local officers, to check up the accuracy of reports and to prevent fraud. In the case of all large cuttings the owner or operator should be required to furnish a bond sufficient to cover the amount of the tax that will become due. The tax should also be a lien upon the land, but not upon the timber cut.

THE RELATION OF FORESTS AND WATER.

*FORESTS AND CLIMATE.

The forest lowers the temperature of the air inside and above it. The vertical influence of forests upon temperature extends in some cases to a height of 5,000 feet.

*Extract from Report of the Committee on Forest Taxation of the Fifth National Conservation Congress.

The forest lowers the temperature of the soil in summer and increases the temperature of the soil in winter. This influence extends to a depth of at least four feet.

The relative humidity of the air during the summer is higher in the forest than in the open.

Forests increase both the abundance and frequency of local precipitation over the areas they occupy, the excess of precipitation as compared with that of adjoining unforested areas amounting in some cases to more than 25 per cent.

The influence of forests upon local precipitation is more marked in the mountains than in the plains.

The reason for an increase in the total amount of precipitation over wooded areas as compared with that of barren and deforested ones is due to:

1. The tendency of moisture-bearing currents to precipitate their moisture more readily above or near the forests than over bare or cultivated fields at the same elevation because of the dampening and chilling effect of the forests upon the atmosphere, which induces a greater condensation of the water vapor.

2. The air from forests contains a much larger amount of moisture than that over bare or cultivated fields.

3. The mechanical action of the trees themselves. When a cloud in the mountains passes through a forest, the branches and the leaves of the trees retard its movement. It comes, therefore, into a state when it can no longer retain its moisture in suspension, just as a river carrying sediment deposits part of it as soon as the rapidity of its flow is diminished. The moisture from such clouds is intercepted by the forest in the form of mist or drops of dew or crystals of hoarfrost on the branches and foliage of the trees.

Forests in broad continental valleys enrich with moisture the prevailing air currents that pass over them, and thus enable larger quantities of moisture to penetrate into the interior of the continent. The destruction of such forests, especially if followed by weak, herbaceous vegetation or complete baring of the ground, affects the climate, not

necessarily of the locality where the forests are destroyed, but of the drier regions into which the air currents flow.

While they have a marked influence upon local precipitation, the influence of forests in the mountains upon the humidity of regions lying to the leeward on the whole is not very great.

FORESTS AND STREAMFLOW.

The effect of forests upon streamflow in *level countries* differs from that of forests in hilly or mountainous regions.

In a *level country* where there is no surface runoff, forests, in common with other vegetation, act as drainers of the soil. Hence the importance in draining the marshy lands and improving hygienic conditions. In such countries the effect upon streams is unimportant.

In the plains and in level country the forest:

(1) Constitutes an effective means of draining and drying up swampy lands, the breeding places of malaria, and swamp fevers. The reforestation of the Landes, Sologne, the Pontine marshes, and a hundred other examples prove this.

(2) Draws moisture from a greater depth than does any other plant organism, thus affecting the unutilized water of the lower horizontal strata by bringing it again into the general circulation of water in the atmosphere and making it available for vegetation.

(3) Lowers to some extent the subterranean water level, but it has no injurious effect upon springs, since these are practically lacking in the level countries with horizontal geological strata, where its lowering influence has been chiefly noted.

(4) Refreshes the air above it and increases the condensation of moisture carried by the winds, thus increasing the frequency of rains during the vegetative season.

In *hilly* and *mountainous country* forests are conservers of water for streamflow.

In the mountains the forests break the violence of rain, retard the melting of snow, increase the absorptive capacity of the soil

cover, prevent erosion, and check surface runoff in general, thus increasing the underground seepage and so tend to maintain a steady flow of water in streams.

Forests in hilly and mountainous country, even on the steeper slopes, create conditions with regard to surface runoff such as obtain in a level country. The steeper the slope the less permeable the soil, and the heavier the precipitation the greater is the effect of forests upon streamflow.

FORESTS AND EROSION.

Forests are the most effective agency for protecting the soil from erosion, because: (1) The resistance of the soil to erosive action is increased by the roots of the trees, which hold the soil firmly in place, and (2) at the same time the erosive force of the runoff is itself reduced because the rate of its flow is checked and its distribution over the surface equalized.

FORESTS AND FLOODS.

The total discharge of large rivers depends upon climate, precipitation, and evaporation. The observed fluctuation in the total amount of water carried by rivers during a long period of years depends upon climatic cycles of wet and dry years.

The regularity of flow of rivers and streams throughout the year depends upon the storage capacity of the watershed, which feeds the stored water to the streams during the summer through underground seepage and by springs. In winter the rivers are fed directly by precipitation, which reaches them chiefly as surface runoff.

Among the factors, such as climate and character of the soil, which affect the storage capacity of a watershed, and therefore the regularity of streamflow, the forest plays an important part, especially on impermeable soils. The mean low stages as well as the moderately high stages in the rivers depend upon the extent of forest cover on the watersheds. The forest tends to equalize the flow throughout the year by making the low stages higher and the high stages lower.

Floods which are produced by exceptional meteorological conditions cannot be prevented by forests, but without their mitigating influence the floods are more severe and destructive.

CONCLUSIONS.

The extent of forest land necessary for the regulation of stream-flow and the protection of the soil against erosion must be not less than from *one-fifth to one-third of the total area of the country*.

Forests must be protected, not so much in localities which already suffer from lack of moisture, as in regions which lie in the path of prevailing winds and are still abundantly supplied both with ground water and precipitation.

In the dry regions large bodies of forest may have an unfavorable effect upon the available water supply. There rows of trees or wind-breaks surrounding fields and orchards, by preventing the drifting of the snow and increasing the activity of the wind, will act more as conservers of moisture in the soil than solid bodies of timber.

The care with which forests should be protected in the eastern half of the United States must increase from north to south and from west to east.

In the Atlantic plain and southern Appalachians, which are the gateway for the prevailing winds from the Gulf of Mexico and the Atlantic Ocean, forests must be especially conserved if the humidity of the Central States and the prairie region is to be maintained.

If the clearing of the forest in the Atlantic plain and southern Appalachians is a necessity, it should be done only under condition that the cleared land is to be devoted to intense cultivation, as, after forests, crops contribute most to the moisture of the air.

The highest organic production is in harmony with the safeguarding of the humidity in the regions which lie in the path of the prevailing winds. Cleared land which becomes waste or poor pasture or grows up to weak vegetation means so much evaporation lost to the passing air currents.

MARYLAND GEOLOGICAL SURVEY.

WILLIAM BULLOCK CLARK, STATE GEOLOGIST.

Walter Mitford

THE FAUNA AND FLORA

THE LIFE ZONES AND AREAS

OF

ALLEGANY COUNTY

THE SUMMER BIRDS OF WESTERN MARYLAND

BY

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Biological Survey, U. S. Dept. Agriculture

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THE FAUNA AND FLORA

THE LIFE ZONES AND AREAS OF ALLEGANY COUNTY

BY

C. HART MERRIAM

The best guide to the agricultural capabilities of a region is afforded by the distribution of the native animals and plants; for experience has shown that areas characterized in a state of nature by the presence of particular species are adapted to the cultivation of particular varieties of agricultural crops. The importance of this fact is so great that the national government has been engaged for years in a biological survey of the United States with a view to determining the boundaries of the areas inhabited by different associations of animals and plants.

It has been found that North America may be divided primarily into two vast regions: a northern or Boreal, and a southern or Austral, according to the sources from which the native animals and plants were derived. The boundary between these areas lies, in the main, north of the United States, but disconnected arms or tongues of the Boreal area push far southward into the United States along the summits of the higher mountain ranges—the Alleghanies in the east and the Rocky Mountains and Sierra-Cascade system in the far west.

The state of Maryland, owing to its southern position, is in the southern or Austral region, but the high mountains in the western part of the state are so much colder than the lower lands on the east that their summits are in places inhabited by species characteristic of the northern or Boreal region. Excepting these small mountain summits, the total area of which is insignificant, Maryland lies wholly

within the Austral region. This region is commonly divided into several belts, known to naturalists as Lower Austral, Upper Austral, and Transition. The Transition, as its name implies, is a belt of overlapping of northern and southern types. The Lower Austral, or Austroriparian, belt begins on the east coast at the mouth of Chesapeake Bay and takes a southerly and westerly course around the southern end of the Alleghanies. The Upper Austral, or Carolinian, belt extends from the neighborhood of New York City southerly along the coast to Chesapeake Bay and includes the whole state of Maryland except the mountains. The mountains fall mainly within the Alleghanian division of the Transition zone, and, as already remarked, a few of their higher summits are strongly tinged with Boreal forms.

While the Boreal region has too cold a climate for successful agriculture, all of the Austral zones are of agricultural importance. The whole of the state of Maryland, therefore, so far as its climatic conditions and life zones are concerned, is an agricultural state—no part being too cold for the cultivation of crops. The rainfall and humidity also are neither too scanty nor too excessive for agriculture; hence, except where unfavorable topographic and soil conditions prevent, the whole state may be made productive.

A very hasty examination of Allegany and Garrett counties recently made by my assistants, Vernon Bailey and E. A. Preble, at the request of Professor William Bullock Clark, Director of the Maryland Geological Survey, shows that Garrett county and the western part of Allegany county (west of Piney Mountain and the Potomac valley) are mainly in the Alleghanian area of the Transition zone, and that the eastern part of Allegany county (east of Cumberland) is mainly in the Carolinian area of the Upper Austral zone.

Tongues of the Carolinian fauna, characterized by the tulip tree, sycamore, red bud, sassafras, sweet gum, dogwood, and serib pine,[1] occupy the narrow valleys of the North Branch of the Potomac river, Wills Creek, Jennings Run and Braddock Run, and reach up,

[1] Among the characteristic animals of the Carolinian area of Maryland are the opossum, fox squirrel, cardinal bird, Carolina wren, tufted titmouse, gnatcatcher, Carolina chickadee and summer tanager.

as a rule, to an altitude of 1200 or 1300 feet. Above this, the whole county, except the warmest slopes, which are tinged with Carolinian forms, belongs to the Transition zone. In Garrett county, in the upper part of the Transition zone (above 2600 feet altitude) cold sphagnum and alder swamps abound. These swamps contain a strong admixture of high Transition and even Boreal species, such as the Junco, or Slate-colored Snowbird (*Junco hyemalis*), Solitary Vireo (*Vireo solitarius*), Magnolia Warbler (*Dendroica maculosa*), Canadian Warbler (*Wilsonia canadensis*), Redbreasted Nuthatch (*Sitta canadensis*), Hermit Thrush (*Hylocichla aonalaschkae pallasii*), Redbacked Mouse (*Evotomys gapperi*), Canadian White-footed Mouse (*Peromyscus canadensis*), two species of Jumping Mouse, or Jerboa (*Zapus hudsonius* and *Z. insignis*), Varying Hare (*Lepus americanus virginianus*), and the northern Sooty Shrew (*Sorex fumeus*), all of which were obtained by E. A. Preble at Finzel post-office, six miles north of Frostburg. Still farther west the Boreal tinge is even stronger, and in some very extensive swamps between Accident and Bittinger (mainly on the west side of the wagon road) Mr. Preble found spruce trees common. The cutting off of the spruce and hemlock from these small boreal islands lets in the hot sun and results, in numerous instances, in changing the fauna and flora from Canadian to Alleghanian.

The fauna of Allegany county is a mixture of Carolinian and Alleghanian species and comprises, so far as known, no boreal islands. The Potomac valley, and valleys of the principal streams, are Carolinian; the uplands, Alleghanian.

THE SUMMER BIRDS OF WESTERN MARYLAND

BY

EDWARD A. PREBLE

During the summer of 1899 three short trips were made to western Maryland for the purpose of studying its fauna and flora in the joint interests of the U. S. Department of Agriculture and the Maryland Geological Survey. The time spent in the field aggregated about a month. Special attention was paid to birds and mammals—the plants, for lack of time, being merely noted incidentally with reference to their bearing on the different life areas of the region.

A short preliminary trip was made in May. Reaching Frostburg, near the western border of Allegany county, eleven miles west of Cumberland, a suitable place for a few days' work was found in Finzel, a postoffice near the northeast corner of Garrett county, about a mile and a half west of the main ridge of Great Savage Mountain, at this point having an altitude of nearly 3000 feet. Finzel lies some 400 feet lower. About midway in distance and altitude between Finzel and Great Savage lies Little Savage Mountain. These ridges are covered with a rather sparse growth of oaks and chestnuts. In the shallow depression between them is a dense swamp, the main source of Savage river. This swamp is densely grown up to hemlock (*Tsuga canadensis*), black spruce (*Picea mariana*), tamarack (*Larix laricina*) and several other species, with a dense undergrowth composed mainly of *Rhododendron maximum*. To the west of Finzel the country is cut up by numerous ridges mainly covered with oak and chestnut, the intervening valleys being rather swampy and traversed by small brooks, and usually clothed with heavy forest, hemlock and rhododendron predominating and often extending nearly to the summit of the ridges on their western slopes.

After spending several days about Finzel, mainly engaged in trapping mammals; having obtained a fair knowledge of the mammalian fauna, it seemed desirable to ascertain the conditions in other portions of the county. The turnpike road was traversed westward from Frostburg across Great Savage, Meadow and Negro mountains to Keyser Ridge, and thence, leaving the turnpike, the country was examined southward to Accident, across Negro Mountain to Bittinger, thence by a circuitous route to Grantsville, and back to Frostburg. Several large tracts of coniferous woods were located and gave promise of interesting results if visited later in the season.

Beginning June 17th, 5 days were spent in studying and collecting the birds about Finzel, among which were several species not before recorded as breeding within the state. On June 22, the point of study was shifted westward to Grantsville in Garrett county, a small town situated on a ridge overlooking the valley of the Castleman, about two miles south of the Pennsylvania line, and a point of departure was located at a farmhouse about two miles east of town from which the valley of the Castleman and the ridges to the eastward could be easily worked. Most of the country is covered with a rather heavy growth of deciduous trees, oaks and chestnuts predominating. A good-sized tract of hemlock stands near the turnpike three miles east of Grantsville and a considerable quantity also remains on the western slopes of the ridges near the Castleman, where red-berried elder and rhododendron abound. At this point the valley of the Castleman lies at an altitude of about 2100 feet, while the ridges in the vicinity rise four or five hundred feet higher.

White pine was formerly found in this region in great abundance, but has now almost entirely disappeared. The axe of the lumberman has latterly been directed to the hemlock and spruce, which in turn are fast disappearing.

On June 27 the field of observation was transferred to Bittinger, a postoffice about nine miles south of Grantsville on the plateau between the north and south branches of the Castleman. Its altitude is about 2600 feet. Considerable tracts of hemlock and spruce occur in the vicinity, and in their shade were found *Taxus minor*, *Dirca*

palustris, *Oxalis acetosella* and other northern plants, and also many interesting birds to be mentioned later.

On July 1 another change was made to Mountain Lake Park in the southern part of Garrett county. Here, as throughout the county, the face of the country is traversed by numerous chestnut ridges having a general northeast and southwest trend, but coniferous forests are entirely absent. In the vicinity of Kearney, some hemlock woods still remain and there are several species of birds not observed at Mountain Lake Park. A considerable quantity of hemlock occurs on the western slopes of Great Savage Mountain in the vicinity, with an undergrowth of *Rhododendron maximum*, *Taxus minor*, and *Oxalis acetosella*.

Study and collecting trips were also made to Rawlings, Dans Mountain, Oldtown, and Little Orleans, where short stops were made to ascertain what birds were common in the vicinity.

Following is a list of the birds observed during the several trips. They were all seen between June 17 and July 24 (with the exception of *Otocoris*), and while of course the nests of all the species were not found, there is no doubt that all were breeding in the vicinity. A male horned lark in full song, observed near Accident on May 18, was doubtless breeding. Several olive-backed thrushes were seen near the borders of the tamarack swamp near Finzel on May 15 and may breed there, but since they may have been migrants, and since they were not found there in June, the species is not included in the following list. The wild turkey occurs throughout the wilder parts of the region but was not observed. The number of species recorded would doubtless have been considerably increased had it been possible to devote the time entirely to birds.

LIST OF SUMMER BIRDS IN WESTERN MARYLAND.

Ardea virescens. GREEN HERON.—Though doubtless occurring elsewhere in the region, Green Herons were observed only along the Potomac and its tributaries. One was seen near Rawlings and a number of adults and young were observed at Little Orleans and Old-

town. At the latter place two broods of young, which had left the nests and were climbing about among the branches, were seen.

Philohela minor. Woodcock.—The tracks and borings of a Woodcock were seen at the edge of a swamp at Finzel, and several were seen at Grantsville and Mountain Lake Park.

Actitis macularia. Spotted Sandpiper.—Several were noticed on the shores of the Castleman, near Grantsville, and also a number along the Potomac at Oldtown and Little Orleans.

Aegialitis vociferus. Killdeer Plover.—A pair of Killdeer Plovers were seen in a field near Rawlings on July 21.

Colinus virginianus. Quail.—This species seemed to be fairly common throughout the region. It was heard several times near Grantsville, where they are said to be abundant some seasons. Several were heard between Grantsville and Bittinger, and the species was also noted at Mountain Lake Park, Rawlings, Oldtown, and Little Orleans.

Bonasa umbellus. Ruffed Grouse.—This species was abundant in the higher parts of the region. Three females each, with a brood of young, were observed near Finzel and the birds seemed equally abundant near Grantsville, and were also observed at Bittinger and on Dans Mountain, near Rawlings.

Zenaidura macroura. Mourning Dove.—The Mourning Dove was noted in small numbers at Bittinger, Mountain Lake Park and Swanton. It was abundant near Rawlings and Oldtown.

Cathartes aura. Turkey Buzzard.—This species was seen in small numbers at Bittinger, Swanton, Dans Mountain, Oldtown and Little Orleans.

Accipiter velox. Sharp-shinned Hawk.—A pair seen at Mountain Lake Park, and one in deep woods near Swanton. Its actions seemed to indicate that it had a nest in the vicinity.

Accipiter cooperi. Cooper's Hawk.—One was seen perched in a dead tree on a partially cleared hillside near Swanton. I decoyed it quite near by imitating the cry of a bird in distress.

Buteo borealis. Red-tailed Hawk.—Only seen once, a few miles north of Rawlings. The bird was sailing about over the valley.

Buteo lineatus. Red-shouldered Hawk.—A very noisy pair seen daily at Finzel, and the species was also noted near Grantsville. A nest in a large birch in deep woods near Bittinger had probably been occupied by a pair of these birds, which were several times observed in the vicinity.

Buteo latissimus. Broad-winged Hawk.—One was taken on the summit of the ridge about three miles east of Grantsville.

Falco sparverius. Sparrow Hawk.—This species was noted at Grantsville, Bittinger and near Mountain Lake Park, only one being seen at each place.

Megascops asio. Screech Owl.—The familiar notes of this species were heard several times during the night of June 24, at Grantsville. Though doubtless found throughout the region, the bird was not elsewhere noted.

Bubo virginianus. Great Horned Owl.—The remains of a brood of full-grown young were seen in the woods near Finzel. I saw one near Bittinger, one evening about dusk, perched on a high dead tree, at the edge of the forest. It soon started off in search of food.

Coccyzus americanus. Yellow-billed Cuckoo.—Several were seen and heard at Finzel and one was taken on June 20.

Coccyzus erythrophthalmus. Black-billed Cuckoo.—One was taken near Grantsville on June 26.

Cergle alcyon. Kingfisher.—One was seen near Oldtown on July 28.

Dryobates villosus. Hairy Woodpecker.—Fairly common over the higher portions of the region. One was taken at Finzel and several seen in oak and chestnut woods near Grantsville. A pair, accompanied by young, were seen in deep woods near Bittinger.

Dryobates pubescens. Downy Woodpecker.—Evidently not common. The species was noted at Grantsville, Bittinger, and near Rawlings, only a single individual being noted in each case.

Sphyrapicus varius. Yellow-bellied Woodpecker.—Rather common and generally distributed over the higher portions of the region. A few were noted near Finzel. A pair seen near Grantsville June 29 evidently had a nest near by. Old birds, accompanied

by young not long from the nest, were seen at Bittinger and Mountain Lake Park, and later both old and young birds were observed at Swanton.

Ceophloeus pileatus abieticola. NORTHERN PILEATED WOODPECKER.—A bird of this species was seen in heavy mixed woods near Swanton. It doubtless occurs sparingly throughout the region, as it was heard in several places.

Melanerpes erythrocephalus. RED-HEADED WOODPECKER.—Quite generally distributed and common throughout the greater part of Garrett county traversed. It was fairly common about Grantsville and abundant at Bittinger and Mountain Lake Park. The birds seemed to delight in the tall dead oaks and chestnuts left in the clearings. They paid frequent visits to the cultivated cherry trees which are common throughout the region.

Colaptes auratus luteus. NORTHERN FLICKER.—Very common and generally distributed throughout the region.

Antrostomus vociferus. WHIPPOORWILL.—Whippoorwills were heard nightly at Finzel and near Grantsville. I also heard several at Swanton during the night of July 18, but did not note the species elsewhere.

Chordeiles virginianus. NIGHTHAWK.—A few were seen at Bittinger, Mountain Lake Park, Swanton, Rawlings and Oldtown.

Chaetura pelagica. CHIMNEY SWIFT.—This species was very generally distributed throughout the region and was everywhere common, and in the vicinity of the towns, abundant.

Trochilus colubris. RUBY-THROATED HUMMINGBIRD.—The ruby-throat seemed to be uncommon. Only one was seen at Bittinger and one near Rawlings. A number were noted at Swanton and along the roadsides near Oldtown.

Tyrannus tyrannus. KINGBIRD.—Rather common and generally distributed throughout the region, being noted at all the places visited.

Myiarchus crinitus. CRESTED FLYCATCHER.—Rather common near Grantsville, Mountain Lake Park, Swanton and about Rawlings and Dans Mountain.

Sayornis phœbe. PHŒBE.—Generally distributed but rather rare. With the exception of Mountain Lake Park, it was seen in small numbers at all the localities visited.

Contopus virens. WOOD PEWEE.—Fairly common and very generally distributed, being noted as more or less common at all the localities visited.

Empidonax virescens. ACADIAN FLYCATCHER.—This species was seen on only one occasion, at Oldtown.

Empidonax traillii alnorum. ALDER FLYCATCHER.—A number were seen in alder thickets in the meadows and spongy places near Mountain Lake Park, and two males were taken July 3 and 4. They were rather active and frequently uttered their characteristic note, but were shy and generally kept concealed on the opposite side of a thicket of alders, and the specimens taken were secured with some difficulty.

Empidonax minimus. LEAST FLYCATCHER.—One was seen and taken in an apple orchard near Grantsville.

Otocoris alpestris praticola. PRAIRIE HORNED LARK.—While driving through Garrett county on May 18, I saw a male bird of this species. He was on a rail fence singing lustily and was not at all shy. It was near the town of Accident, about ten miles from the northwest corner of the county. There can be little doubt that the bird was breeding.

Cyanocitta cristata. BLUE JAY.—This bird was noted as common at all the places visited except Oldtown and Little Orleans. Young, not long from the nest, being fed by their parents, were observed at Bittinger on June 28. They had notes very similar to those of young crows.

Corvus corax principalis. NORTHERN RAVEN.—A pair of ravens were seen on several occasions at Finzel. They were said to have a nest in a large hemlock near that place which they had occupied for several successive seasons.

Corvus americanus. COMMON CROW.—Fairly common and generally distributed, being noted at all the localities visited. Young birds not long from the nest were seen at Grantsville and Bittinger late in June.

Dolichonyx oryzivorus. Bobolink.—A pair of Bobolinks were observed in a field near Grantsville on June 23. The bird is said to be a regular summer visitor, but is not common. No others were seen.

Molothrus ater. Cowbird.—A small flock of Cowbirds was seen in a field near Rawlings on July 22.

Agelaius phoeniceus. Redwinged Blackbird.—Quite common in the meadows and low fields in the valley of the Castleman near Grantsville. A few were also seen at Mountain Lake Park, Bittinger and Oldtown.

Sturnella magna. Meadow Lark.—Common and quite generally distributed throughout the region. Numbers were seen at Grantsville, Bittinger, Mountain Lake Park, Rawlings and Oldtown.

Icterus galbula. Baltimore Oriole.—During my stay near Grantsville I saw several in a cherry tree near the house. At Mountain Lake Park, I took one, which was feeding on the berries of the "Service Tree" (Amelanchier). Several individuals, evidently a family, were seen in the oak woods near the base of Dans Mountain, near Rawlings.

Quiscalus quiscula. Purple Grackle.—Several bands, consisting of old birds accompanied by young not long from the nest, were seen at Bittinger. They seemed interested mainly in the cherry trees, which at the time were loaded with ripening fruit. They were very noisy, and except when feeding, were quite shy. Specimens taken were intermediate between *quiscula* and *aeneus*, as might be expected. The species was also noted at Mountain Lake Park and Swanton.

Astragalinus tristis. American Goldfinch.—This species was common and very generally distributed throughout the region, being seen almost daily at all the places visited.

Poocetes gramineus. Vesper Sparrow.—This species was abundant in the fields about Finzel, Grantsville and Bittinger and was also noted at Rawlings.

Ammodramus savannarum passerinus. Grasshopper Sparrow.—A number of these birds were seen along roadsides in the vicinity of Rawlings.

Spizella socialis. CHIPPING SPARROW.—This familiar species was common and very generally distributed throughout the region. A nest containing four fresh eggs was found at Finzel on June 21.

Spizella pusilla. FIELD SPARROW.—This species was noted in considerable numbers at all the places visited, excepting Oldtown and Little Orleans.

Junco hyemalis carolinensis. CAROLINA JUNCO.—Fairly common about the open portions of the hemlock woods in the vicinity of Finzel. It was also seen in the vicinity of a hemlock forest about 3 miles east of Grantsville on June 22. During my stay at Bittinger the species was observed daily and young, apparently just from the nest, were seen June 29.

During a drive through Garrett county, on May 18, I found a nest of this species near Bittinger, containing four apparently fresh eggs. The site was beneath the edge of a mossy bank within a few feet of the highway.

Melospiza fasciata. SONG SPARROW.—This bird was noted as common at all the places visited.

Pipilo erythrophthalmus. TOWHEE.—Noted in considerable numbers in scrubby oak woods in the vicinity of Finzel, Grantsville, Mountain Lake Park, Swanton, and on Dans Mountain, near Rawlings.

Cardinalis cardinalis. CARDINAL.—This species was rather common in the valley of the Potomac near Rawlings, Oldtown and Little Orleans. In the higher portions of the region it was observed but once, in the valley of the Castleman about three miles northeast of Grantsville.

Zamelodia ludoviciana. ROSEBREASTED GROSBEAK.—Rather common in mixed and deciduous woods about Finzel. I saw a pair in mixed woods near Bittinger, and one near Swanton.

Cyanospiza cyanea. INDIGO BUNTING.—Common and very generally distributed throughout the region, being noted at all the places visited excepting Bittinger and Swanton, where it was probably overlooked. A nest found near Grantsville on June 23 contained young just hatched.

Piranga erythromelas. SCARLET TANAGER.—Fairly abundant at all the places visited excepting Oldtown and Little Orleans.

Progne subis. PURPLE MARTIN.—Several colonies were observed about Mountain Lake Park, and a colony at Frostburg in the northwestern part of Allegany county.

Petrochelidon lunifrons. CLIFF SWALLOW.—This familiar species noted in the vicinity of nearly every farmhouse throughout the higher part of Garrett county. It was common near Finzel, Grantsville, Bittinger and Mountain Lake Park. Great numbers of their nests were seen beneath the overhanging portions of the old-fashioned barns.

Hirundo erythrogaster. BARN SWALLOW.—Generally distributed and common throughout the region, being noted, usually in large numbers, at every place visited, excepting Oldtown. They nested in nearly every barn through the country. In the vicinity of Grantsville, June 22-27, great numbers of young birds just from the nest were observed.

Cliviicola riparia. BANK SWALLOW.—A single bird was seen at Little Orleans on July 24.

Ampelis cedrorum. CEDAR WAXWING.—Noted in abundance at Finzel, Grantsville, Bittinger, Mountain Lake Park and Swanton. A nest found at the latter place on July 19 contained three eggs. A few individuals were also seen at Oldtown.

Vireo olivaceus. RED-EYED VIREO.—This species was very abundant and generally distributed throughout the region, being observed at all the places visited.

Vireo flavifrons. YELLOW-THROATED VIREO.—A number were observed in thickets bordering the Potomac at Oldtown.

Vireo solitarius. SOLITARY VIREO.—This species was fairly common in hemlock and mixed woods near Finzel, Grantsville and Bittinger. I took a specimen near Kearney, a few miles southeast of Mountain Lake Park, and the song of one was heard at Swanton. I also saw several on Dans Mountain. Specimens taken at Finzel and near Kearney show some slight approach in measurements and color of upper parts to *V. s. alticola*, but, on the whole, seem much nearer to the typical form.

Mniotilta varia. BLACK AND WHITE WARBLER.—Common and quite generally distributed. It was seen at all the places visited ex-

cepting Grantsville and Little Orleans, where it was probably present, but overlooked. About the base of Dans Mountain, near Rawlings, a number were seen searching for food on the rail fences, often at a considerable distance from the roads.

Helmitherus vermivorus. Worm-eating Warbler.—One was taken about half-way up Dans Mountain, near Rawlings, on July 21, and a day or two later I saw one at Oldtown.

Helminthophila chrysoptera. Golden-winged Warbler.—A number were seen and one taken in young growth near Swanton, and I saw several on Dans Mountain near Rawlings.

Compsothlypis americana. Parula Warbler.—One was seen at Oldtown on July 23, and another the day following at Little Orleans.

Dendroica aestiva. Yellow Warbler.—A pair observed near Grantsville late in June, and several at Oldtown and Little Orleans, were the only ones noted during my trip.

Dendroica caerulescens. Black-throated Blue Warbler.—Rather common at Finzel and Bittinger, where deserted nests were noticed and at Swanton. I also took an individual near Kearney, a few miles southeast of Mountain Lake Park. Several specimens taken exhibit considerable black on the back, supposed to be indicative of subspecies *cairnsi*, but which seems more likely to be an indication of high plumage increasing in intensity as the bird grows older.

Dendroica maculosa. Magnolia Warbler.—Common in the hemlock and spruce forests throughout the higher portions of Garrett county. It was noted in considerable numbers at Finzel, Bittinger and Swanton, and several seen in a grove of hemlocks near Kearney several miles southeast of Mountain Lake Park. A nest found near Bittinger on June 27 contained three fresh eggs; another was deposited the next day. The nest was situated in a small hemlock about four feet from the ground, a characteristic situation. The late date would seem to indicate a second litter, though I saw no young birds.

Dendroica pensylvanica. Chestnut-sided Warbler.—A common bird over most of the higher portions of Garrett county. Many were observed at Finzel, and a newly-built nest was seen. It was also common at Grantsville and Mountain Lake Park, and young birds were taken on Dans Mountain, near Rawlings, on July 21.

Dendroica blackburniæ. BLACKBURNIAN WARBLER.—Rather common in the hemlocks about Finzel. I saw one near Bittinger on June 30 and took one on Dans Mountain, near Rawlings, on July 21.

Dendroica virens. BLACK-THROATED GREEN WARBLER.—A female was seen at Finzel on June 18.

Dendroica discolor. PRAIRIE WARBLER.—Several were seen in bushy woods at Oldtown July 22-23.

Seiurus aurocapillus. OVEN-BIRD.—A very common species throughout the region.

Seiurus noveboracensis. WATER-THRUSH.—This species was fairly common about Finzel, especially in a swamp between Big and Little Savage Mountains. Nearly every small stream flowing through low woods had a pair or two. A single bird was observed at Swanton.

Seiurus motacilla. LOUISIANA WATER-THRUSH.—Though normally affecting low altitudes, this species frequently follows small streams up to their source. One was thus observed near Finzel along a brook flowing through a dense hemlock forest, whose undergrowth of Rhododendron and Kalmia also afforded a congenial shelter to *S. noveboracensis*. Several were seen along Crabtree Run, near Swanton, and I took a specimen on Dans Mountain July 21.

Geothlypis trichas. MARYLAND YELLOW-THROAT.—Noted in rather small numbers at Finzel, Grantsville, Mountain Lake Park, Rawlings, Oldtown and Little Orleans.

Icteria virens. YELLOW-BREASTED CHAT.—A pair or two noted in the vicinity of Finzel. It was rather common about Mountain Lake Park, Swanton, Rawlings, Oldtown, and Little Orleans.

Wilsonia mitrata. WILSON'S WARBLER.—In thickets of young growth on the lower slopes of Dans Mountain, near Rawlings, this species was rather common.

Wilsonia canadensis. CANADIAN WARBLER.—This was the most abundant warbler at Finzel, where old birds were seen feeding young just from the nest about June 30. The species was rather common in the rhododendrons, which abounded in favorable situations in the valley of the Castleman near Grantsville. It was also rather common about Swanton.

Setophaga ruticilla. American Redstart.—A pair observed at Finzel, and a number seen at Swanton, Rawlings, Oldtown and Little Orleans.

Galeoscoptes carolinensis. Catbird.—A very abundant breeder throughout the region.

Harporhynchus rufus. Brown Thrasher.—A few were seen near Finzel, Grantsville and Bittinger.

Thryothorus ludovicianus. Carolina Wren.—One was noted in a garden near Oldtown.

Thryomanes bewickii. Bewicks Wren.—I saw one by the roadside near Bittinger on June 30, and found both old and young birds rather common on Dans Mountain, near Rawlings, on July 21.

Troglodytes aedon. House Wren.—A male in full song was seen several times about Little Orleans on July 24.

Certhia familiaris fusca. Brown Creeper.—A female was taken in heavy hemlock woods near Bittinger on June 28.

Sitta carolinensis. White-breasted Nuthatch.—Very common and generally distributed throughout the region.

Sitta canadensis. Red-breasted Nuthatch.—A small flock of these birds, evidently a family, was seen on the branches of a tall dead tree, in the deep woods near Bittinger. It was also seen near Finzel about the middle of May, when it was doubtless breeding.

Parus bicolor. Tufted Titmouse.—A number were seen in thickets beside the Potomac near Oldtown on July 23.

Parus atricapillus. Black-capped Titmouse.—Rather common about Finzel, Bittinger and Mountain Lake Park.

Hylocichla mustelina. Wood Thrush.—A very common bird about Finzel, Grantsville, Bittinger and Mountain Lake Park. Its song was also heard on Warrior Mountain about 4 miles north of Oldtown.

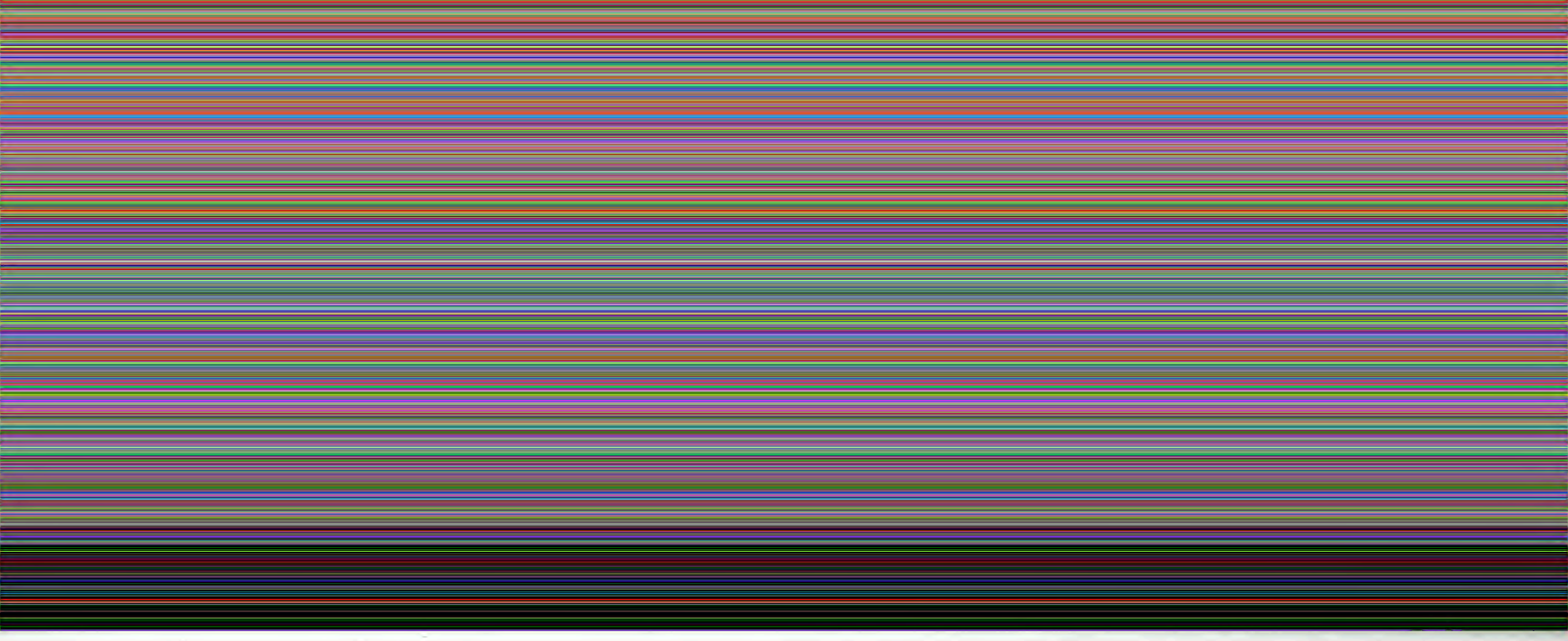
Hylocichla fuscescens. Wilson's Thrush.—Generally distributed over the higher portions of Garrett county, being common about Finzel, Grantsville, Bittinger, Mountain Lake Park and Swanton. A few were also seen on Dans Mountain, near Rawlings.

Hylocichla aonalaschkae pallasii. Hermit Thrush.—Several of

these birds were heard in the "oak barrens" near Finzel. Its song was also heard once near Grantsville and once at Bittinger. In the white oak woods near Mountain Lake Park, several were heard and two taken.

Merula migratoria. ROBIN.—A very common breeder throughout the region.

Sialia sialis. BLUEBIRD.—Common and generally distributed throughout the region. A brood of young, accompanied by their parents, was seen near Finzel on June 17.



MARYLAND GEOLOGICAL SURVEY.

WILLIAM BULLOCK CLARK, State Geologist.

THE FORESTS OF ALLEGANY COUNTY

BY

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(Special Publication from Allegany County Report.)

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CONTENTS

Walter Mulford

THE FORESTS OF ALLEGANY COUNTY

BY

GEO. B. SUDWORTH

Introduction.

An explanation of the circumstances under which this investigation took place seems proper. The earnest desire of Professor William B. Clark, State Geologist of Maryland, to develop all the economic resources of the state, naturally led to a consideration of the forests. The writer was detailed to examine the forests of Allegany county as a beginning of this work. The co-operation of the U. S. Division of Forestry in this work was deemed proper on the ground that the information obtained would be of mutual value both to the Division of Forestry and the Maryland Geological Survey.

With the exception of the photographs taken, all expenses attending this field work were defrayed by the Maryland Geological Survey. These photographs, some of which are reproduced for the present paper, number about ninety, and remain the property of the Division of Forestry.

The purpose of this investigation was to supply information as to the condition, composition, character and uses of the forests of this county. The relation of timber-cutting, grazing, and forest fires to reproduction were also subjects of special study, with a view to pointing out a means of abating their evil effects, and thus increasing the productiveness of Allegany forests.

The examination of this county was accomplished by personal travel either on foot, by rail, or by team and wagon. As only the southern and western boundaries of the county are accessible by rail, most of the necessary travel was performed on foot and by team.

The county is well provided with private and public wagon-roads

and trails, giving abundant opportunity for thoroughly exploring the region from east to west and from north to south.

The method of examining the county was, briefly, to gain first a general impression of the topography and location of the wooded portions by inspection from the summits of the highest mountains or hills. A careful study of the various forest growths, the effects of fires, timber-cutting, and mining was then carried out by actual travel over representative portions of the wooded sections, including all of the larger mountains. The photographs taken illustrate the main features studied.

Several county officials and other residents of the county identified with railway and mining interests have kindly supplied important data on the local prices of lumber and the amount of timber consumed for mining props. Thanks are due for such information to Mr. Somerville of Lonaconing, Messrs. Davidson, Armstrong, and B. S. Randolph of Frostburg, and to Mr. J. W. Cook of Cumberland. Special thanks are due Mr. B. S. Randolph for his cordial attention to the writer while visiting the mines and timberlands of the Consolidation Coal Company.

Location.

Washington, Allegany and Garrett counties form the western, tongue-like portion of Maryland. Allegany county constitutes the middle or narrowest section, with Garrett on the west and Washington on the east. The south boundary of Allegany county is defined by the Potomac river; the east boundary, by Sideling Hill Creek; the north boundary, by Pennsylvania (roughly between longitude 78° 20′ and 79° 33′); while the west boundary is formed by a straight line from the crest of Savage Mountain at the Mason and Dixon Line to the mouth of Savage river.

The area of this county is 477 square miles, or 305,280 acres.

Topographic Features.

The surface of this county is uniformly broken into low mountains and hills, trending mostly in a northeasterly and southwesterly

MAP
OF
ALLEGANY COUNTY
SHOWING
WOODED AREAS
MARYLAND GEOLOGICAL SURVEY
WM. BULLOCK CLARK, STATE GEOLOGIST
1900

direction. The intervening valleys are, for the most part, narrow, merging into low foothills which form the lower slopes to the higher mountains.

The salient features in the topography are the long high ridges known as Town Hill, Warrior Ridge, Wills Mountain and Dans Mountain. Sideling Hill and Savage Mountain are equally prominent barriers on the east and west, but are mainly outside of Allegany county. The west boundary of the county lies on the east slope of Savage Mountain, while the east boundary lies at the bottom of the west slope of Sideling Hill. The elevation of these mountains ranges from 1,000 to 2,900 feet.

Most of the larger mountains have long and gradual slopes, including also broad flat benches at elevations of 800 to 1,200 feet. Less commonly, the mountain slopes are precipitous, notably on the south border of the county. The surface of the mountains and higher hills is often broken by exposed boulders of quartzite and sandstone. The summits of the mountains are marked by mostly bare rocky cliffs.

Soil

The soil of nearly all the hills and mountain slopes is thin, being composed largely of fine slaty shale. Cultivated portions are rapidly worn out, and even where the timber grows the soil is often poor in humus. This poor top-soil under forest cover is due partly to a necessarily slow disintegration of the substratum of pure shale and broken rock which lies close to the surface and partly to the frequent forest fires which continually destroy the enriching leaf mould.

The soil of the lower hills and valleys is rocky, but deeper and richer. The best agricultural lands are, therefore, situated mostly in the valleys and on low adjacent hills (Plate XXV, Fig. 2). Considerable land has been cleared on the higher mountain slopes, but it is far less productive than the lower areas.

Water Flow.

The county is well watered by numerous rocky streams fed by innumerable cold springs among the low hills and on the higher

mountain sides. All are tributary to the Potomac river. The most important of these streams are Sideling Hill Creek, Fifteen-Mile Creek, Flint river, Town Creek, and Georges Creek. They vary in width from twelve to twenty-five feet and carry from six to fifteen inches of water. At high water their volume is increased to two or three times the normal flow.

The water of most of these streams is pure and wholesome. That of Georges Creek and several of its tributaries is, however, so strongly impregnated with iron, sulphur and drainage from coal and fire-clay mines as to be unwholesome. No fish exist in these waters.

In earlier days these streams supplied waterpower for small saw-mills and flour-mills throughout this region. Few of these mills are in existence now. The flow of streams is chiefly important to farmers in affording an abundant and convenient supply of water for stock. The small transient steam sawmills also depend on this source of water supply. The maintenance of the numerous springs peculiar to this region is of prime importance to nearly all farmers and residents of the smaller towns, many of which depend on this source of water supply.

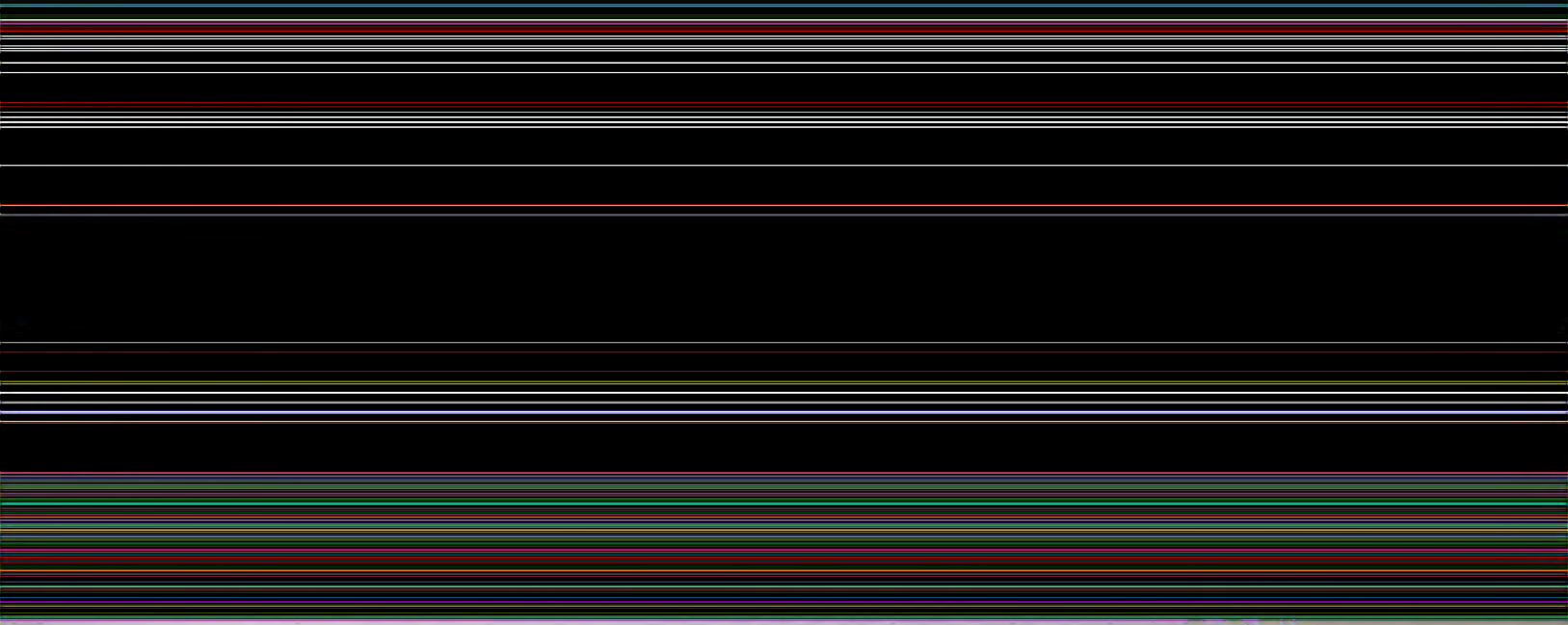
At present these resources are well protected by forest cover, as are also the headwaters of all the streams draining the county.

As indicating the close relationship, however, between water flow and forest cover it is interesting to note in this connection that the oldest inhabitants of this region assert the existence of a greater rush of water in the spring and fall of recent years than was formerly observed, when the country was more continuously wooded. In earlier times the larger streams are said to have carried a uniform flow, with little or no sudden increase during spring and fall. The heavy rains and melting snow under present conditions, however, occasion an immediate and often dangerous rise of water in the larger streams at certain points. The rise of water sometimes prevents farmers crossing fords for a week or more, thus cutting off their communication with markets, etc. To obviate such difficulties, the county has built a few new roads to avoid impassible fords.

The explanation of this rush of water is simple. Increased, indis-

FIG. 1.—THIN FOREST COVER, POTOMAC RIVER.

FIG. 2.—FARM AND FOREST LAND, MARTIN MOUNTAIN.



ceminate clearing of woodland, especially on the larger slopes, brings about a more direct and rapid drainage than was permitted by the original close forest cover of the county.

Wooded Regions.

With the exception of a few treeless swampy meadows of small size, the entire county was once a continuous forest. The heaviest timber existed in the coves, on the low hills, and on the lower slopes and benches of the mountains, where the soil is deepest and most porous. The rocky upper slopes and summits appear to have borne a forest of small stunted trees.

The wooded portions of the county are now confined to the larger hills and mountain ridges, with irregular extensions into the valleys. Most of the streams also bear fringes of forest growth. Roughly estimated, the agricultural land of this county is about thirty per cent of the entire area, the remainder being mostly in forests with a small per cent of brush land. The latter, however, contains forest tree species of brush size, and is, therefore, to be classed strictly as reforested land.

The forests of the mountains form for the most part a continuous cover down to the usually cleared valleys (Plate XXV). Only occasional clearings and worn-out, abandoned farms are seen on the mountain sides; but wherever these cleared lands have been long neglected, they are already reforested, or are rapidly becoming so as shown in Plate XXVIII, Fig. 1.

Character of the Forests.

The character of the forests, changeable throughout, varies especially from north to south. The prevailing growth is deciduous, but this is conspicuously mingled with patches, and often large areas of conifers, the latter being somewhat more abundant in the central and southern parts of the county.

Small detached hills in these regions bear a pure growth of conifers as seen in the region of Pine Hill and Piney Grove, while portions of surrounding slopes are covered largely with deciduous forest. In

other cases similar hills bear a growth chiefly of conifers on their north slopes and a deciduous forest on their south slopes. As a rule the larger mountain slopes bear a variously mixed growth of conifers and deciduous trees, sometimes evenly mingled or with the conifers in alternating vertical belts. The slopes near the larger waterways also bear conspicuous fringes of conifers, which give way to the hardwoods higher up on adjacent slopes.

Composition of Forests.

The peculiar position of Western Maryland, intermediate between the North and the South, gives Allegany county a forest flora rich in species. The higher summits, coves and valleys exhibit a climate and soils closely similar to those of the more northern states, while the climate and soils of the lower valleys, glades and hills are characteristic also of the adjacent southern states. As a result, there is a conspicuous association of northern and southern tree species. This association is of more than passing interest, since the kinds represented are of economic importance. Conifers and hardwoods of the middle South and North mingle here almost on the same ground.

The following is a complete list of coniferous and hardwood trees of Allegany county:

CONIFERS.

1. White Pine ..... *Pinus strobus.*
2. Pitch Pine ..... *Pinus rigida.*
3. Scrub Pine ..... *Pinus virginiana.*
4. Table-Mountain Pine ..... *Pinus pungens.*
5. Shortleaf Pine ..... *Pinus echinata.*
6. Hemlock ..... *Tsuga canadensis.*
7. Red Juniper ..... *Juniperus virginiana.*

HARDWOODS.

8. Butternut ..... *Juglans cinerea.*
9. Black Walnut ..... *Juglans nigra.*
10. Bitternut Hickory ..... *Hicoria minima.*
11. Shagbark Hickory ..... *Hicoria ovata.*
12. Mockernut Hickory ..... *Hicoria alba.*
13. Pignut Hickory ..... *Hicoria glabra.*
14. Small Pignut Hickory ..... *Hicoria ovalis.*
15. White Willow ..... *Salix alba.*
16. Large-tooth Aspen ..... *Populus grandidentata.*
17. River Birch ..... *Betula nigra.*
18. Sweet Birch ..... *Betula lenta.*
19. Hornbeam ..... *Ostrya virginiana.*

20. Blue Beech.....*Carpinus caroliniana.*
21. Beech.....*Fagus atropunicea.*
22. Chestnut.....*Castanea dentata.*
23. White Oak.....*Quercus alba.*
24. Post Oak.....*Quercus minor.*
25. Chestnut Oak.....*Quercus prinus.*
26. Swamp White Oak.....*Quercus platanoides.*
27. Red Oak.....*Quercus rubra.*
28. Scarlet Oak.....*Quercus coccinea.*
29. Yellow Oak.....*Quercus tinctoria.*
30. Pin Oak.....*Quercus palustris.*
31. Barren Oak.....*Quercus pumila.*
32. Slippery Elm.....*Ulmus pubescens.*
33. American Elm.....*Ulmus americana.*
34. Hackberry.....*Celtis occidentalis.*
35. Red Mulberry.....*Morus rubra.*
36. Cucumber-tree.....*Magnolia acuminata.*
37. Tulip-tree.....*Liriodendron tulipifera.*
38. Papaw.....*Asimina triloba.*
39. Sassafras.....*Sassafras sassafras.*
40. Witch Hazel.....*Hamamelis virginiana.*
41. Sycamore.....*Platanus occidentalis.*
42. Sweet Gum.....*Liquidambar styraciflua.*
43. Serviceberry.....*Amelanchier canadensis.*
44. Cockspur.....*Crataegus crus-galli.*
45. Scarlet Haw.....*Crataegus coccinea.*
46. Pear Haw.....*Crataegus tomentosa.*
47. Small-leaf Haw.....*Crataegus uniflora.*
48. Wild Plum.....*Prunus americana.*
49. Wild Red Cherry.....*Prunus pennsylvanica.*
50. Sour Cherry.....*Prunus cerasus.*
51. Black Cherry.....*Prunus serotina.*
52. Redbud.....*Cercis canadensis.*
53. Honey Locust.....*Gleditsia triacanthos.*
54. Locust.....*Robinia pseudacacia.*
55. Allanthus.....*Ailanthus glandulosa.*
56. Staghorn Sumach.....*Rhus hirta.*
57. Dwarf Sumach.....*Rhus copallina.*
58. Mountain Maple.....*Acer spicatum.*
59. Striped Maple.....*Acer pennsylvanicum.*
60. Sugar Maple.....*Acer saccharum.*
61. Silver Maple.....*Acer saccharinum.*
62. Red Maple.....*Acer rubrum.*
63. White Basswood.....*Tilia heterophylla.*
64. Dogwood.....*Cornus florida.*
65. Black Gum.....*Nyssa sylvatica.*
66. Mountain Laurel.....*Kalmia latifolia.*
67. Rhododendron.....*Rhododendron maximum.*
68. Persimmon.....*Diospyros virginiana.*
69. Black Ash.....*Fraxinus nigra.*
70. White Ash.....*Fraxinus americana.*
71. Green Ash.....*Fraxinus lanceolata.*
72. Nannyberry.....*Viburnum prunifolium.*

General Distribution of Forest Trees.

The limitation of certain trees to particular areas forms somewhat conspicuous features in the composition of the forests of this region. There are, of course, no very sharp lines of separation between the

ranges of tree species, but within general limits, at which there is more or less overlapping or mingling of two or more species, it may be noticed that finally one kind of tree disappears and another appears. For example, in ascending one side of a mountain, Beech, Maple, Basswood, etc., may appear at the base of the mountain. Above these a succeeding zone may contain Chestnut, Sweet Birch, etc.; and the next higher zone, Chestnut Oak, Table-mountain Pine, Wild Red Cherry, etc. These zones blend into each other more or less by the mingling of the trees peculiar to each zone. Similarly defined areas of tree growth of still other species may be met with on the opposite slope of the same mountain. Or in passing from deep valleys on a mountain side to adjoining ridges or benches at the same altitude, often there may be found an assemblage of trees peculiar to each of these dissimilar localities.

The explanation of these phenomena is believed to lie in the fact that certain trees have become so completely adapted to a given kind or condition of soil (dry, moist, loose or compact), or climate, that they cannot exist where the required soil and climate are wanting. Thus the presence of a northern climate in portions of this region appears to account for the presence, by extension, of northern trees into this county which are prevalent in their wider northern range under the same conditions. The more cosmopolitan trees of this region are conspicuous over a greater area, while the less widely adapted kinds appear within narrower limits.

The part also which some trees and shrubs play by taking first possession of denuded lands, thus rendering the soil favorable by protection of moisture for the introduction of still other trees, is a most interesting and practical consideration in the distribution of trees. This is especially true where fire and the axe have destroyed a part or the whole of an original forest. The full value of all the trees in a region cannot be determined without a knowledge of the relationship of species in their natural succession.

DISTRIBUTION OF PRINCIPAL TIMBER TREES.

The most conspicuous of the timber species are the White Oak, Chestnut Oak, Red Oak, Chestnut and White Pine. They form

FIG. 1.—WOODED HILL IN SOUTHWESTERN ALLEGANY COUNTY.

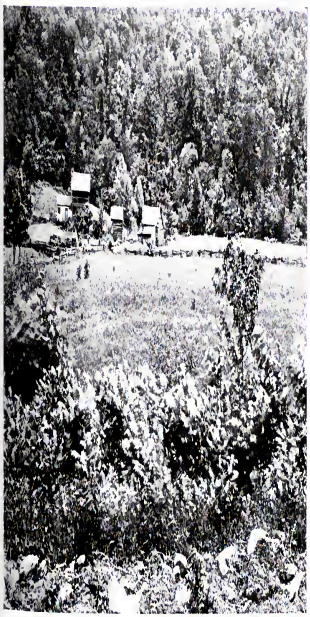
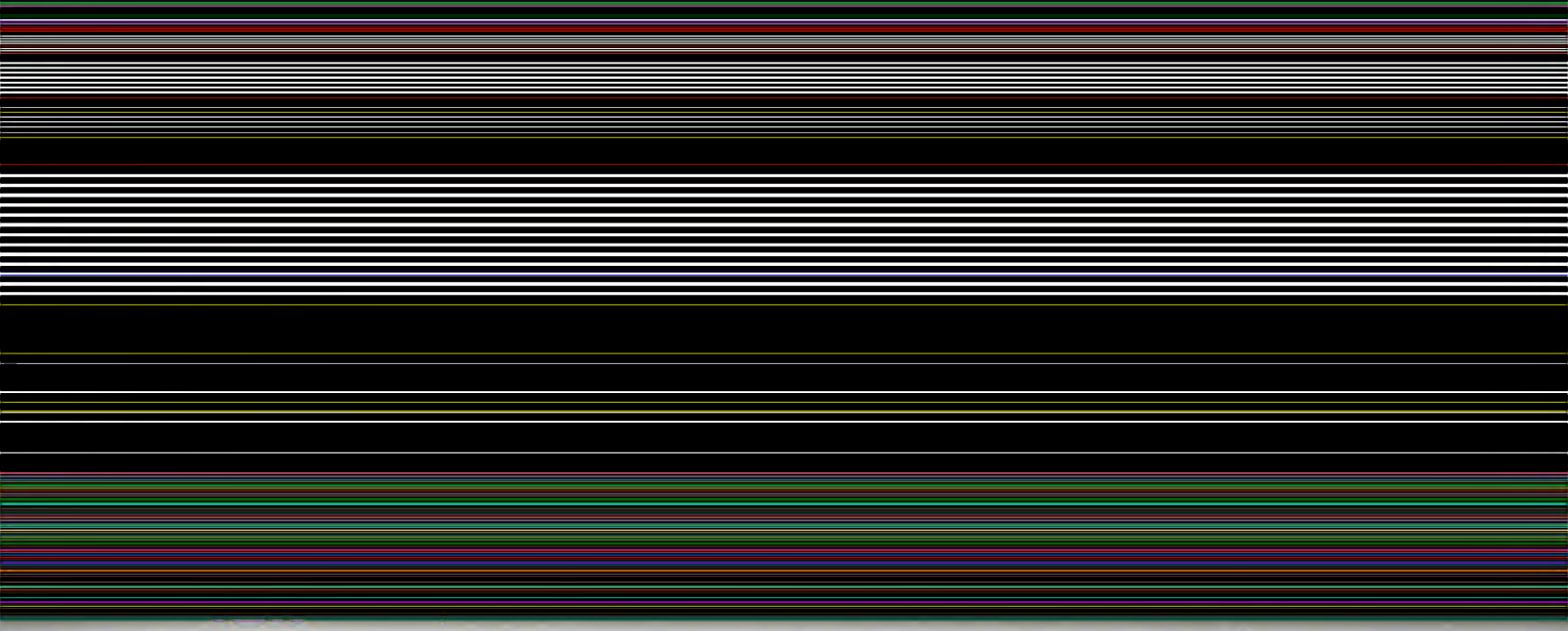


FIG. 2.—NARROW AGRICULTURAL VALLEY IN SOUTHEASTERN ALLEGANY COUNTY.



forests in which, according to exposure and altitude, the one or the other predominates; in fewer instances areas occur with mixtures of all five species, together with other kinds which do not form forests.

The *White Oak* occurs on all the low hills and on the lower and middle slopes and benches of the high mountains. Originally it also occupied the high valleys now cleared. Its presence usually indicates the deeper, richer, and less rocky soils.

The *Chestnut Oak* appears commonly on all the upper, rocky, gravelly slopes and summits of the mountains and hills. It grows persistently even on precipitous slopes where the surface consists entirely of broken quartzite and sandstone; but here the trunks are short and gnarled. The larger and better formed trees are found where the rock is broken and carries a thin cover of soil. The White and Chestnut Oak often occur together, but in most cases the one or the other prevails under the peculiar conditions which suit it best. Few and scattering White Oaks are found on the rocky sites chosen by the Chestnut Oak, and *vice versa*.

Chestnut is confined chiefly to poor, dry, gravelly, southern, eastern and western slopes. It is sometimes mingled with Chestnut Oak, but more often constitutes the principal growth over a considerable area, giving way in richer moist coves and on benches to White Oak and other hardwoods, and appearing again on the thinner soils. As with Chestnut Oak, the best growth occurs on the middle and lower slopes; that found on and near the summits of the mountains is short and of small diameter.

The *Red Oak* is a constant associate of the White Oak, Chestnut Oak and Chestnut, but far less abundant than these species. In stands of 60 to 80 trees to the acre the Red Oak forms only from five to ten per cent. It is a tree singularly well adapted to a variety of soils, often producing well-formed trunks even in the deep crevices of almost bare rock. The largest trees occur in rich coves and sinks where the underlying rock is broken.

The *White Pine* occurs almost entirely on northern and eastern slopes, ascending to the summits of the highest mountains (Mt. Savage, Warrior Ridge and Dans Mountain). It is especially con-

spicuous along the rocky north slopes of streams, often forming dense, narrow belts of pure growth down to the water's edge (Fig. 14). Higher up on the slopes it is usually mingled with hardwoods. The White Pine forest shown in Fig. 14 is composed chiefly of young timber (25 to 75 years old), ranging from 6 to occasionally 15 inches in diameter, and under 60 feet in height. A much older, scattered growth of this pine is found among hardwoods. Under these conditions the trunks are 18 to 30 inches in diameter

Fig. 14.—Pure growth of white pine, near Flintstone.

and 80 to 100 feet high. The White Pine of this county grows best in moist, well drained, clayey loam soils, such as produce the finest White Oak.

DISTRIBUTION OF SUBORDINATE TIMBER TREES.

The next most conspicuous timber trees are, among conifers, the Pitch Pine, Shortleaf Pine, Table-mountain Pine and Scrub Pine. Of hardwoods, the principal remaining species are Sugar Maple, Red Maple, Shagbark Hickory, Tulip-tree, White Ash, White Basswood, Locust, Black Gum and American Elm. The pines commonly pass

for one species. Together, they constitute an important element in the forest cover of very exposed, bare, rocky, southern slopes.

The *Scrub Pine* forms a dense cover in the poorest shaly soils on the lower southern slopes of the high ridges, or more frequently on the south side of low hills throughout the middle and southern sections of the county (Plate XXVII, Fig. 2). It is peculiarly adapted to exposed, sterile soils, often taking possession of abandoned, worn-out fields to the exclusion of all other species. In richer soils and less exposed localities it gives way to patches of hardwoods. Most of the Scrub Pine now standing is of small size, ranging from two to six inches, with occasional trees eight to fourteen inches in diameter. The largest trees which grow on least exposed sites have straight clear trunks twenty to thirty feet long. The growth found on the most exposed, precipitous sites is usually low, crooked, and much branched.

At higher elevations, comprising the middle benches and summits of the mountains, *Pitch* and *Table-mountain Pine* occupy sterile, rocky situations on southern, southeastern and southwestern exposures. Scattered individuals also occur mingled with hardwoods on the low shaly hilltops adjacent to the mountains (Plate XXIX, Figs. 1, 2). Where these pines form the principal growth, the two species are usually mingled in about equal numbers. Not infrequently, however, the Table-mountain Pine forms pure open stands of ten to fifty acres on narrow, rocky benches high up on the mountain sides. In exceptional instances also, stunted Shortleaf Pine is to be seen among these mountain groves, notably on Town Hill. Little merchantable timber is produced by the Pitch Pine and Table-mountain Pine, as their principal growth is low and much branched and the wood coarse-grained and knotty.

The hardwoods of this group appear more or less scattered among the deciduous species already mentioned as forming forests. One of the most abundant of these is the *Sugar Maple*. It occurs in all the moist rocky coves and in the vicinity of streams throughout the county. Its ability to thrive in the seams of almost bare limestone and quartzitic rock is remarkable. Well-formed large trees were

frequently met where only a scanty deposit of soil had filled the narrow crevices in the rock.

Closely associated with the Sugar Maple, but in fewer numbers, are the *Red Maple*, *White Basswood*, *White Ash*, *Shagbark Hickory*, *Locust*, *Tulip-tree* and *Beech*. These scantily represented species form open forests in which none occur abundantly or continuously, but at irregular and often long intervals. These trees were doubtless more abundant in former years. The present economic value of this growth is small, except for fuel, as no considerable yield of any one kind can be secured without very wide culling.

DISTRIBUTION OF OCCASIONAL TIMBER TREES.

Still less prominently represented are a few other valuable timber trees, notably the Black Walnut, Butternut, Mockernut and Pignut Hickory, Swamp White Oak, Cucumber-tree, Black Cherry, Sycamore, Black Ash and Red Juniper. Excepting the Black Ash and Swamp White Oak, which are peculiar only to swampy glades of the high valleys, all of these trees are found as stragglers among the preceding more abundant kinds. Very probably the original forests of this region contained much larger numbers, as the special conditions favorable to their growth are prevalent.

The other trees enumerated are nearly all small and of little importance. They are generally distributed among the more conspicuous forest growth. A few only are confined to certain localities, and interesting because of their rarity in this region, or special usefulness in establishing a cover under which better kinds may grow. Among these species are the Sweet Birch and Wild Red Cherry, which occur only on the highest summits. The latter is not a tree of economic value and is mentioned only on account of its rarity. The Sweet Birch supplies an important furniture wood in mountainous parts of the adjacent states where the rocky soil is deep and rich. The timber produced is of large size. In Allegany county, however, this Birch is necessarily small on account of the present extremely sterile soil.

The Barren Oak is the most conspicuous of small trees in the

FIG. 1.—SCRUB PINE, NEAR OLDTOWN.

FIG. 2.—DEFECTIVE LARGE WHITE PINE IN YOUNG HARDWOOD, FIFTEEN MILE CREEK.

region. It forms low, dense, brushy thickets high up on the mountains and ridges wherever the original deciduous forests have been entirely cut or burned off. Being partial to the poor, shaly soils of these high elevations, it serves a useful purpose in establishing a ground cover, which prevents violent washing of the soil. Useful timber species soon follow under the protection of the more hardy Barren Oak.

Finally, the Hackberry, Sweet Crab, Thorny Haws, Wild Plum, Serviceberry, Redbud, Nannyberry and Sumachs are small forerunners in the natural reforestation of abandoned cleared lands in the valleys on the lower hills. Together with briars and other shrubs, these small trees take complete possession of such lands in from ten to fifteen or more years. Following this growth may be seen the slow, sure introduction of the better kinds of forest trees.

Important Timber Trees: Their Abundance and Uses.

The most abundant and commercially important timber trees of this region are White Pine, Shortleaf Pine, Hemlock, White Oak, Chestnut Oak, Red Oak, Chestnut, Shagbark Hickory, Sugar Maple, White Ash, Tulip-tree, Basswood and Black Walnut. Other species represented supply much useful timber, but occur too sparingly to afford large supplies.

The original forests of this county produced considerable White and Shortleaf Pine and large quantities of White Oak, Yellow Poplar and Hickory timber, together with an abundance of Chestnut Oak and Hemlock tan-bark. The timber was large and of excellent quality, and is estimated to have frequently given an acre yield of from 8,000 to 10,000 board feet, over large areas, or possibly more in some localities.

The old, slow water sawmills made but small inroads upon this supply; but evidence is everywhere present of the nearly complete culling made later by portable steam sawmills (Fig. 15). The latter have so completely lumbered out the large sound timber on all the principal streams, in the once heavily wooded coves and on the rich mountain benches and gentle slopes, that at present sizable timber of good quality is scarce and distant from public roadways.

Most of the large White Pine is now gone. Defective old White Pines are frequently seen scattered over slopes now covered with young hardwood forest (Plate XXVII, Fig. 2); only an occasional sound White Pine is to be found.

Shortleaf Pine is similarly exhausted. Small groups and scattered single trees are to be found in patches of hardwoods on farms in the lower hill country, or forming thin belts skirting the lower slopes of the higher, wooded mountains. Only occasional large

FIG. 13.—Portable steam sawmill.

trees are to be found (Plate XXX, Fig. 1). The majority are now too few or of too small size to furnish any considerable amount of timber.

The saw timber now available consists chiefly of White Oak, Chestnut Oak, Red Oak and Chestnut, with only occasional logs of second growth White Pine, Shortleaf Pine, Pitch Pine, Basswood and Shagbark Hickory. The approximate acre yield of timber now standing amounts to from less than 500 to about 2,000 board feet; exceptional, isolated small bodies would cut from 3,000 to 6,000 feet per acre. These supplies occur, however, at long intervals, and, as already

stated, are profitably reached only by small portable sawmills, which find employment mostly for only a few months in one place. Sizable timber is especially scarce near railways and the principal wagon-roads, over which the original stock has largely been taken.

A few portable sawmills are cutting small quantities of the above-mentioned timber at various points through the northern and middle portions of the county. In some cases the output is a mixed cut of hardwoods and pine, while in other localities the cut is principally either oak or pine. The best quality of lumber produced is oak. The pine cut is very knotty and of second- or third-rate quality. Owing most likely to the absence of convenient railway connections, a comparatively low price, $8.00 to $12.50 per 1,000 board feet, is received for the average local output of lumber.

The demand for mining props and railway ties is apparently large and relatively more profitable to the producer than lumber. The output of this material is, however, confined chiefly to localities near the coal and fire-clay mines and the railways in the western part of the county, and to the region of the Baltimore and Ohio Railroad and Chesapeake and Ohio Canal. Poor roads and high hills render it unprofitable to haul such heavy material from the more distant interior sections lying to the north.

The mining props cut show that nearly all the trees of the region contribute to this material. The species commonly cut are White Oak, Chestnut Oak, Scarlet Oak and Red Oak, Shagbark Hickory, Pignut Hickory and Mockernut Hickory, Chestnut, Red Mulberry, Locust, Sugar Maple, Red Maple, Black Gum, White Ash, Black Cherry, White Pine, Pitch Pine, Scrub Pine, Table-mountain Pine and Shortleaf Pine. All are used without distinction, but those most highly prized for their strength and durability are White Oak, Chestnut and Locust. The props range from five to seven inches in diameter at the butt, and are nine feet long. It is rare, therefore, that a tree furnishes more than three props. The present stand of young timber fit for this purpose affords a yield of 25 to 50 props per acre. Where the stand is largely Chestnut and Locust, which is often the case, such cuttings may be made approximately every

ten to fifteen years. For young forests containing mixtures of the other species mentioned, a cutting for mining props can be made in from fifteen to eighteen or more years. Excluding the conifers, much of this material is supplied by coppice sprouts, the Chestnut and Locust far outstripping the other hardwoods in growth. The remainder of the props comes from pole stock, grown from seed, 25 to 30 years old. The annual consumption of mining props in the coal and fire-clay mines of western Allegany county is roughly estimated at about 1,000,000. This represents an annual culling of about 28,000 acres.

The wastefulness of cutting such timber as White Oak, Hickories, Maples, White Ash and White Pine at the short interval of fifteen to eighteen years should be apparent, and will be discussed later. The use of the other less valuable timber species, and especially the rapid growing Chestnut and Locust is more advisable.

This county has produced large quantities of Chestnut Oak tan-bark and considerable Hemlock in the western part. The sources of supply are, however, now greatly diminished or exhausted. No bodies of Hemlock exist in the county. The small quantity of young timber scattered along rocky north slopes of streams in western Allegany, is insufficient to supply tan-bark.

The once abundant stand of Chestnut Oak has likewise been nearly exhausted by bark peelers. The comparative lightness of this product has enabled producers to secure bark from even the steep, rocky slopes of the highest mountains, from which the hauling of heavier saw-timber would have been unprofitable. The large tanning establishment which continued for many years at Gilpintown, in the north central part of the county, had to be abandoned a number of years ago for lack of tan-bark.

With scarcely an exception, the exploitation of tan-bark in the past was attended by a total waste of the timber, and most of the bark peeling of the present time leaves the trunks unused. The only exception observed by the writer was in recent work on the lands of the Consolidated Coal Company in the western part of the county. Here all peeled Chestnut Oak is being sawed up for mining timber with the other timber stripped from coal-bearing land.

Relation of Lumbering and Mining to Reproduction.

It would be difficult to find a region in which the useful timber has been more generally removed than in this county, and at the same time, one in which so much forest cover has been left intact. Doubtless only the non-agricultural nature of the greater part of the original forest-bearing regions has prevented an almost complete deforestation. In cutting the timber no pains were taken to assist the reproduction of original timber species. The purpose of all cuttings was the same, whether for sawlogs, tan-bark, ties, or mining props; the largest amount of useful material, regardless of consequences, was the prime object. That all but the twenty-five or thirty per cent of arable land in the county has continued to bear a forest cover, is evidence of the greatest natural persistence in reproduction, which often takes place under very unfavorable conditions.

The reforesting of denuded land in this humid region is, therefore, one of the easiest problems. In spite of abusive methods of lumbering and other cutting there is no evidence of the disappearance of any of the original timber species. A careful study of the young timber and seedlings shows all the old species to be present in the young growth. The absence, however, of large-sized trees of certain species, in fact, sometimes of any but small seedlings, usually suggests to the casual observer that once prevalent trees have permanently disappeared from a region. The fact also that the commercial supply of such timber as White and Shortleaf Pine appears to remain exhausted, may add to the impression that these trees can never again produce the original abundance of timber. But the natural reproduction of these trees in this region is peculiarly good. It required one to two or more hundred years to produce the supply of large White and Shortleaf Pine found in this county forty years ago; and the various stages of struggle between the contending hardwoods and pines for the possession of this ground were unseen by those who cut off the finally dominant pines. Much of the area thus wooded now bears a principally young deciduous forest with only scattered remnants of the once abundant pine; trees which at the time the larger timber was taken escaped the axe either because they

were too defective for use or of undersize. The old defective trees have continued to exist, and the undersized are now large enough for saw-timber, but generally too few to claim attention.

The establishment of another growth of pine like the one removed can be accomplished only by another long struggle. The seed trees left standing are centers of reproduction. But each of the pines must spread under conditions best suited to its reproduction. The White Pine of this county will establish itself in pure growth on cleared land on exceptionally moist, protected, portions of northern slopes, and elsewhere only under the moderate shade of young hardwoods. Once established, however, the young pines do not require further protection; but, as a matter of fact, they must remain suppressed till accident or design removes enough of the hardwoods to allow the pines to grow up.

The Shortleaf Pine must spread from the few seed trees left here and there by pushing into sunny, partly shaded openings among the hardwoods. It makes a successful stand in such places, if it outstrips or keeps up in height growth with the hardwoods.

This reproduction of pine, which is going on now, would, if uninterrupted, require so many years that the generation of settlers who saw and helped to remove the original crop of pine could not witness the perfection of the returning crop. Moreover, the commercial conditions of the region are now greatly changed from those attending the former growth. The present increasing and constant demand for small-sized timber in this region prevents the White or Shortleaf Pine and many other useful timbers from reaching mature growth. Thousands of pine props are made from very young trees, thus cutting off all chance for the production of the more valuable mature timber.

In conclusion, it may be restated that while the present and past cutting of saw-timber, ties, mining props and timber for tan-bark has locally depleted or entirely exhausted the supply of timber, it has not materially changed the composition of the forests now standing. The original species remain, and the hardwoods promptly increase wherever the axe, fire and grazing are withheld; the conifers come back

FIG. 1.—NEGLECTED FARMLAND, EASTERN ALLEGANY COUNTY.

FIG. 2.—SHORTLEAF PINE AND PITCH PINE, TOWN HILL.

FORESTS OF ALLEGANY COUNTY.

more slowly. Moreover, as already shown, where cleared agricultural land is long abandoned, this land quickly reverts to the original forested condition.

It is not to be presumed, however, that with a widespread and complete removal of existing species a serious change would not be made in the composition of the subsequent forest growth. The reproduction of all trees, as with other plants, depends emphatically on the presence of seed trees, be they far from or near the cleared land. But the lumbering and other timber-consuming industries of previous years have by chance left enough seed trees to assure the perpetuation of all species for the present.

The removal of large deposits of coal from beneath wooded areas may permanently change the surface, kill the existing timber and retard subsequent reproduction.

As is well known to those familiar with these coal-mining operations, as much as possible of the big coal-veins, about 6 to 9 feet thick and lying in a horizontal position, is taken out before abandoning the mines. In agricultural regions these worked-out coal-beds may doubtless be left sufficiently shored up by pillars of coal to prevent any collapsing of the surface. In the rougher hill country, however, mostly with brush or forest cover, such expensive precautions are not likely to be taken. The coal is taken out and the surface left to sink or retain its position, as circumstances permit. When coal-beds lie over one hundred feet below the surface, the unsupported cavity seems not to result in any but an irregular depression in the surface. Where the removal of deposits is nearer the surface (30 to 75 feet), the final dropping of the surface is usually violent. Cavernous pits are produced which engulf the forest growth in mingled masses of variously tilted, fallen and upright trunks; but much of this continues to grow. The timber thus involved is almost entirely inaccessible. These breaks in the surface are gradually much smoothed in their more abrupt portions by the washing and sliding of soil and rocks. Smaller vegetation covers the bare spots, and the undermined rough surface is finally overgrown with brush and forest trees.

Wherever coal lands bearing considerable useful timber are controlled by ownership, the usual plan is to remove all usable timber before the coal is mined. This takes all sound trees down to about three inches in diameter. If uninterrupted, the final recovery by original species is well assured. For when carefully examined, the forest floor of such denuded lands is found to contain well established seedlings of the principal timber species from two to ten years old. In addition to these, much of the sapling growth comprising the same kinds survives the destructive lumbering methods employed and also the caving-in of the surface.

The much greater value of the coal deposit must always properly have precedence over the present timber crop lying above, and also over that which would have been possible during the term of years necessary for the land to recuperate from the effects of the undermining. It only remains to be said, therefore, respecting the relationship of coal-mining operations and forest reproduction that there is an appreciable loss in timber production on undermined forest land. The period of this loss will vary, according to the purpose for which the timber rotations are taken, from twenty to one hundred or more years. The actual annual loss of timber growth for the species represented could not be accurately stated without an extended study of the productiveness of abandoned coal lands.

Some permanent damage is also to be mentioned as a result of a fixed change in the surface of undermined forest lands. The inaccessibility of such lands for future lumber operations is greatly increased. In many places the timber is likely to be difficult to get at, and the building of roadways is expensive on so broken a surface.

Forest Fires and their Relation to Reproduction.

Forest fires have been widely prevalent in this county, but their effects are not strikingly evident. Types of the widespread and long-enduring devastation so common in the more western timbered states are nowhere seen in this region. However severe the damage done may be, the ravages of Allegany county fires are soon greatly concealed by rapid and abundant reproduction. Moreover, very little large timber appears to have been killed by fire.

Two factors explain the rapid recovery and small injury to large timber. The largest areas of timber land are comprised in the principal mountain ranges. The most prevalent fires have occurred in these localities. Now the principal reason that destructive fires do not occur, is in the fact that there is no deep humus and little accumulated débris to feed a deep burning fire. In its present condition, the soil and humus cover in these forests is only from one to two inches deep and lies on bare rock and shale. Large areas bear no soil or humus at all, except in the crevices of the rock, while elsewhere the bare soil is composed largely of slaty shale.

With very little dry, fallen timber or brush, the fires occurring in these sections are fed mostly by the heavy fall of leaves. The exposed rock and shale immediately beneath permits only a surface fire, which almost never reaches the tree roots lying deep in crevices or beneath the shale.

The ordinary effect upon the larger timber trees is a noticeable but harmless scorching of the thick bark from two to six feet up; the resin-covered trunks of the Table-mountain, Pitch and Shortleaf Pine bear the higher fire marks. The greatest damage to large timber observable within recent times resulted from a fire which occurred about six years ago. Considerable dry, down timber in some localities where selective cutting for saw-timber had been done, attended by a dry season, resulted in an unusually severe fire. Few large trees were killed, but many were badly burned in spots at the collar, evidently from the burning of unused logs and treetops lying near or in contact with green trunks. While these burney trees survived the fire perfectly, the trunks are, as a result of burning, without an exception, decaying at the heart and deteriorating for saw-timber.

The effect of surface fires on seedlings and coppice sprouts is disastrous in killing most growth from one to ten feet high. The thin-barked stems of all species are severely scorched so that they die down to the ground. An encouraging feature is, however, that the roots of seedlings over one year old are rarely killed. They produce vigorous sprouts the following season. The scorching of Chest-

nut and Oak sprouts is often so slight as to kill only the thin bark, leaving the sapwood uninjured; a few immature leaves are then put forth, but the stems finally die down to the ground.

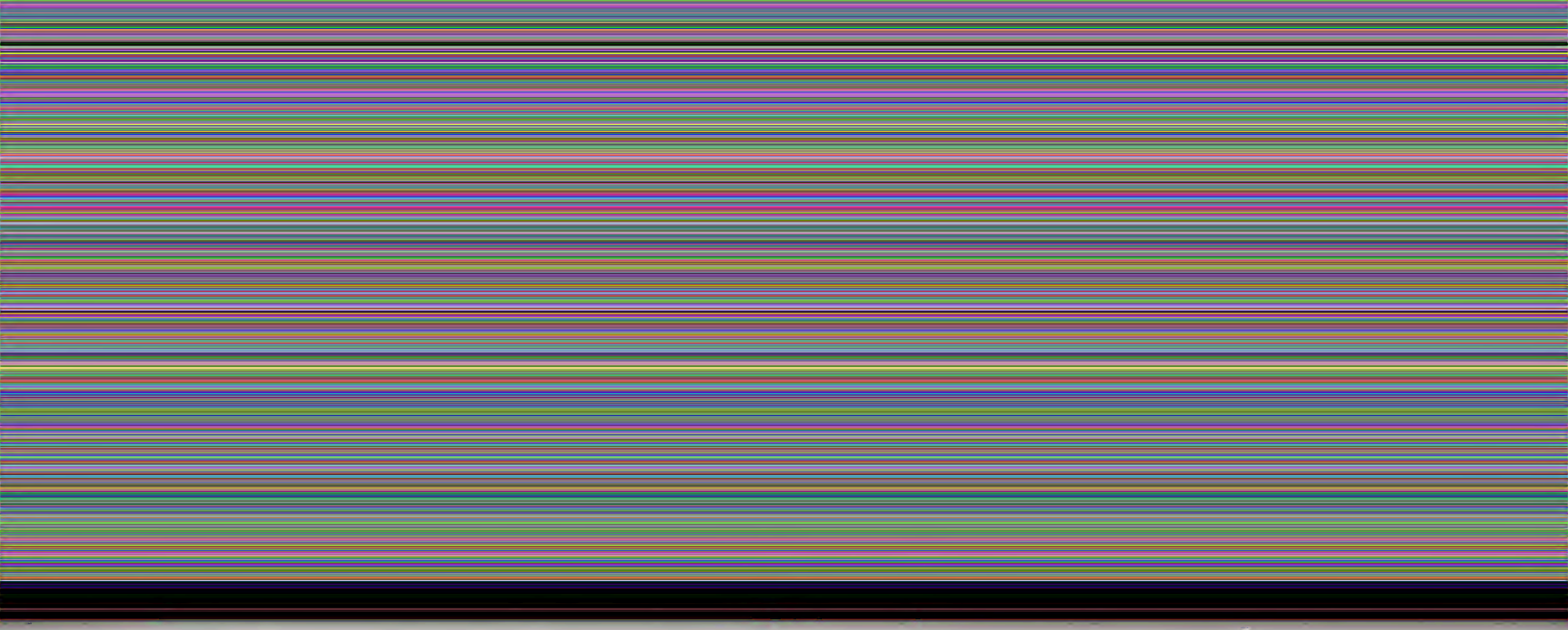
While in general the damage by fires in this region appears not to be great, especially since there is little or no apparent decrease in the forest cover, nevertheless, the combined effects upon all ages of growth are very appreciable. The greatest damage is done in the periodic destruction of from one to ten or more years' growth of seedlings and coppice sprouts. A few very young seedlings are also killed. Clearly, therefore, the productiveness of these forests is much reduced; in fact, where fires run through this young growth at short intervals it is practically held at a standstill for many years. Actual growth is confined only to such saplings and older trees as are, from their size, capable of withstanding light fires. The direct effect of retarded reproduction would be much more apparent to consumers of timber in the region than it is now, if these forests were systematically cut over for the fullest utilization of timber. The present timber-producing stock would eventually be exhausted. Wooded areas which now give the impression to many of being constantly stocked and improving would soon be reduced to an unproductive state. Many acres of woodland are thus to be found which yield practically nothing, from the fact that all small stock is periodically destroyed.

Closely related to this retardation is the fact that constant destruction of humus reduces the productive power of the forest soil, both in point of richness and in the power of retaining moisture. A loss of the latter directly affects all agricultural lands below the wooded mountain slopes. For with all small vegetation and absorbing humus burned off, a large percentage of rain- and snow-water rushes over the clean surface to wash and erode the tilled lands below.

The common belief expressed by many people in this region, that the frequency of forest fires is beneficial in rendering each succeeding fire less and less dangerous is a pernicious fallacy, overlooking the damage just recited.

FIG. 1.–PITCH PINE, NEAR PINE PLAINS, EASTERN ALLEGANY COUNTY.

FIG. 2.–TABLE MOUNTAIN PINE, DANS MOUNTAIN.



Management and Utilization of Forest Resources.

Without a much more detailed examination than was possible in the brief time given the work by the writer, it would not be possible to formulate an adequate plan of management for the various forest types and conditions of this county. The needs of different sections of the county are not the same, and would, therefore, require special study. It is believed, however, that a statement of some of the general needs of Allegany county forests in point of treatment and utilization will not be out of place, and may even prove of considerable practical value to intelligent owners of woodlots. Indeed, it is gratifying to state in this connection that the farmers and other owners of woodlands, and officers in charge of forest lands in this region are remarkably well informed upon the condition and composition of their forests. The average intelligent farmer is perfectly familiar with the location and character of the principal timber trees of his region, and recognizes most of them even in their younger stages of growth. Such information is of great practical value, and with the suggestions to be given, will, for the time being, enable thoughtful men to improve their woodlots considerably.[1]

Nearly sixty years of constant drain upon the forests of this county has reduced them to a state of the lowest productiveness, which has in turn led to an impression among many people that this resource is irretrievably gone. As already pointed out, however, the rapid natural reproduction in this region is most encouraging for a recuperation of these depleted forests if the latter can be placed under a conservative management. Moreover, it is believed that the large percentage of rocky hills and mountain land now in forest can be most profitably held in this condition; in fact, much of the hill and mountain land, once cleared and now abandoned, was evidently neglected because of low agricultural productiveness.

In conclusion, attention is called to the following general recom-

[1] For careful improvement and utilization of their forest lands owners are especially recommended to apply to the Division of Forestry, U. S. Department of Agriculture, for Circular 21, entitled "Practical Assistance to Farmers, Lumbermen and Others in Handling Forest Lands." (1898.)

mendations which are believed to be important in the management of woodlands in this county, both as looking to increased production of timber and to the protection of agricultural lands from erosion and the consequent deterioration. Discussions of these recommendations follow in detail:

1. Protection of forest lands from fire.
2. Exclusion of grazing from forest lands.
3. Regulation of indiscriminate cutting.
4. Regulation of indiscriminate clearing.

Protection of Forest Lands from Fire.

Sufficient has been said as to the injury to forests by fires.

Fires in this region are commonly believed to be caused through the carelessness of pleasure parties, hunters, woodsmen and other people in the forests.

The penalty imposed by the Maryland law[1] for wilfully or carelessly setting forest fires appears to be adequate, but it is believed will never completely control the evil. The great difficulty under

[1] By an early statute in this state, it was forbidden to maliciously set on fire any woods, fences, marshes, lands, leaves, or rubbish thereon, within the counties of Baltimore, Anne Arundel, Frederick, Montgomery, Allegany, Queen Anne's, Harford, Cecil, or Prince George's, so as to occasion any loss, damage, or injury to other persons, under penalty of a fine not exceeding $100, one-half to the informer and the other half to the county, besides the costs; or, if unable to pay this fine, by imprisonment not over six months. A slave thus convicted might be punished by whipping, not exceeding thirty-nine lashes, on the bare back, unless his owner chose to pay a fine not exceeding ten pounds. The owner of property injured or destroyed by such fires might recover its value from the party who caused it.

By an act passed March 29, 1858, entitled "An act to repair injuries done by fire from railroad engines," it was provided, that if any woods, fields, or other property, real or personal, be burned or injured by fire from engines, the company should pay the loss. Actions for damages under this act were to be tried at the first term of the court in which they are brought, if process be served on the defendant ten days before the court convenes, or, if not, then at the court next following. Service might be had upon any director, officer, attorney, agent, or servant of the defendant. Upon failure to appear, the court might, after the second term, upon proof of service by the sheriff's return, or by affidavit, enter a judgment by default against the defendant, by a jury impanelled at bar, as in cases of writs of inquiry.

the present status of securing conviction must always render this law an inadequate protection unless special provision be made to enforce it. This can be accomplished thoroughly only through the services of special officers.

Protection from forest fires in other states has been secured by the appointment of fire-wardens, whose duties are to enforce the fire law and exterminate forest fires. Chief fire-wardens are now regularly appointed by state authority in New York, Pennsylvania and Minnesota. In other states, where, as yet, these officers are not provided, local officers of the law (constables, etc.) have been made fire-wardens. The benefit of these systems of fire service in states, counties and townships possessing woodland is unquestionably great. As an example of this, it may be stated that the work of fire-wardens in the Preserve counties of northeastern New York has resulted in a recent very marked control and reduction in the number of forest fires. In addition to the special state fire-warden of New York, over two hundred supervisors in these counties are appointed deputy fire-wardens. The state provides that a compensation of two to two and one-half dollars a day be paid to deputy fire-wardens for actual time spent in fighting fires. In special cases of need these officers may hire a temporary force of men to assist in subduing fires; and for such service a per diem rate of two dollars is paid.

The establishment of a fire service for Western Maryland seems imperative. This section combines the most heavily wooded counties—Washington, Allegany and Garrett—and should, therefore, very fully form the basis for establishing such protection. It is believed that the plan of combining the duties of fire-wardens with those of supervisors of these counties would be thoroughly feasible.

Exclusion of Grazing from Forest Lands.

The damage done to forest land by grazing is in the destruction of seedlings, by tramping and browsing, and in laying bare the surface, which is afterward dried out and washed. Under these conditions reproduction is either seriously checked or prevented.

A well-managed forest cannot serve for two purposes—good pas-

ture and the fullest production of timber. If woodland affords good grass pasture it is proof that the ground is not fully stocked with trees; and if trees are wanting in grassy places, most likely it is because the incoming seedlings have been trampled down from season to season by grazing cattle and so crowded out by the hardier grasses. A properly stocked forest managed for short rotations of small timber, such as mining props, ties, etc., should afford no forage for stock. Grazing should be relegated to cleared lands or to brush and woodlands intended only for grazing.

Regulation of Indiscriminate Cutting.

The injuries resulting from indiscriminate cutting are: removing needed seed trees of the most useful species, the leaving of old trees which are suppressing valuable young growth, and neglecting to lop waste tops and trunks which otherwise fail to rot and supply fuel for fire.

Timber-cutting in the past has not left a sufficient number of seed trees of the valuable species. The loss of a proper number of seed trees is a disadvantage to the forest in depriving it of immediate means of repeopling the kinds thus taken out. The return of species from distant sources is slow and involves a loss of valuable time. Care should be taken, therefore, in marking trees to be cut out, that three to four seed trees of all the original useful timber species of a locality be left evenly distributed on every acre.

The timely removal of old trees which are suppressing and damaging young timber is urgent. The need of such discriminative cutting is very apparent in the forests of this county. As an example of this need may be mentioned the suppression caused by a single large White Oak standing on the lower east slope of Warrior Mountain. Eight large sapling White Pines, four White Oaks, two Hickories, two Walnuts, and one Shortleaf Pine were all entirely overtopped by the heavy crown of the old White Oak, and were becoming stunted and twisted in their efforts to reach the needed light. The removal of the White Oak would have allowed these saplings to advance. Failure to relieve them at the proper time has already pre-

FIG. 1.–SHORTLEAF PINE AND HARDWOOD, NEAR PINEY GROVE.

FIG. 2.–CUT-OVER HARDWOOD FOREST, SAVAGE MOUNTAIN.

FORESTS OF ALLEGANY COUNTY.

vented five to six years of profitable growth. Suppression of this kind is easily recognized and remedied by any intelligent farmer or woodsman.

In the majority of cases where timber is cut for sawlogs, ties and props, from 10 to 30 per cent or more of the trees is left on the ground as waste tops; and in the case of timber cut for tan-bark, the entire trunks are commonly left unused. The danger of neglecting unlopped, waste treetops, especially of hardwoods, is that the timber is usually braced up from the ground where it seasons thoroughly and rots very slowly, affording additional fuel for forest fires. The burning of this material was observed to have done severe damage to large trees standing near or in contact with it.

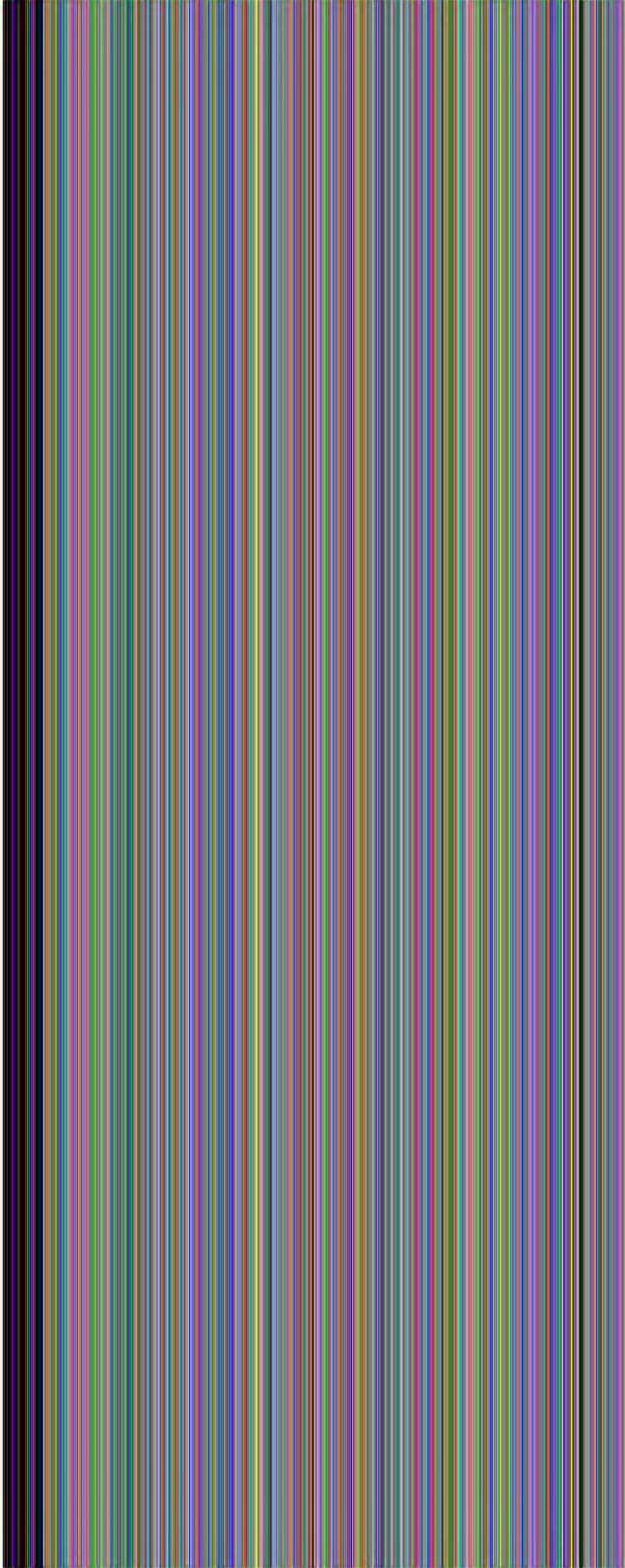
Strict economy would not allow hardwood tops to be wasted when they can be cut into fuel. But if circumstances are such as to make this entirely impracticable or unprofitable, the refuse should be cut and disposed on the ground so that it will decay as rapidly as possible. The essential point is to bring it all in contact with the ground, where it will decay. To accomplish this properly it will be necessary to lop all large limbs which stand above ground.

Precaution should be used in felling large timber so as not to drop a big top, which must be left unused, near or in contact with large standing trees. Such refuse tops should be placed, in felling, in open places distant as far as possible from standing timber in order to avoid burning the latter in case of fire. The labor of properly reducing waste hardwood tops will often be considerable, while the lopping of the much smaller branches of unused conifer tops can be done more quickly.

Most farmers can easily carry out these precautions when doing the cutting themselves or superintending it. It will be difficult, however, to enforce this extra work in contract cutting, except under the most rigid insistence. In the case of timber stolen, which not infrequently occurs in the mountain forests, attention to waste tops will of course be entirely neglected.

Regulation of Indiscriminate Clearing.

Examples of injudicious clearing are to be seen in many sections of this county, and include the instances where narrow hilltops, mountain ridges and steep slopes have been stripped of their forest cover. Heavy surface washing and deep trenching follow these clearings not only on the high slopes thus cleared, but also on the better lands lower down. The result is a constant impoverishment of the soil. The rapid deterioration of these naturally thin hill soils under constant surface washing is abundantly attested in the fact that many acres are now abandoned. Reference has been made also to the increased rise of water in streams during the spring and fall as a result of indiscriminate clearing.



CHARCOAL BURNERS' CAMP.

Walter Mulford

THE FORESTS OF CECIL COUNTY

BY

H. M. CURRAN.

WITH AN INTRODUCTION BY GEORGE B. SUDWORTH

INTRODUCTION.

The following report on the "Forests of Cecil County" is made under the auspices of the Bureau of Forestry in cooperation with the Maryland State Geological Survey. This cooperation dates from 1900, when the Division of Forestry furnished a report on the "Forests of Allegany County." It is gratifying to state in this connection that, with its greater force of assistants, the Bureau of Forestry has been able to carry on a much larger amount of forest work in Maryland during the season of 1901 than was previously possible. Following Allegany county, three of the best wooded counties of the State were thoroughly explored; these comprise Cecil, Garrett, and Calvert counties. As planned by Professor Clark, each of these reports will be published separately.

Mr. H. M. Curran, Agent in the Bureau of Forestry, Division of Forest Investigation, has efficiently prosecuted this work. He was assisted in making valuation surveys of the various types of forests by Messrs. J. E. Keach, A. O. Waha, and F. R. Miller. Special credit is due, also, to Mr. John Foley, of the Division of Forest Management, for the excellent photographs from which half-tone illustrations were made for the Cecil, Garrett, and Calvert county reports.

Acknowledgments are due the Kenmore Pulp and Paper Company, of Elkton, and the Principio Forge Company, at Principio Fur-

nace, for their courtesy in furnishing information in regard to the manufacture of pulpwood and charcoal.

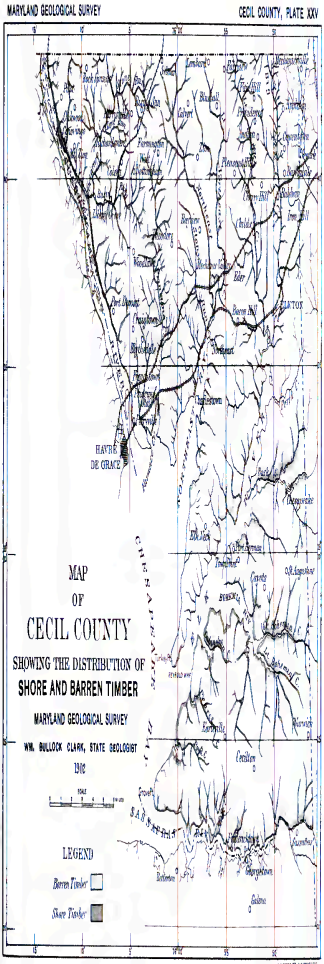
The Maryland Geological Survey bore the expenses of all the field work and travel connected with these investigations, while the Bureau of Forestry contributed the services of the necessary experts.

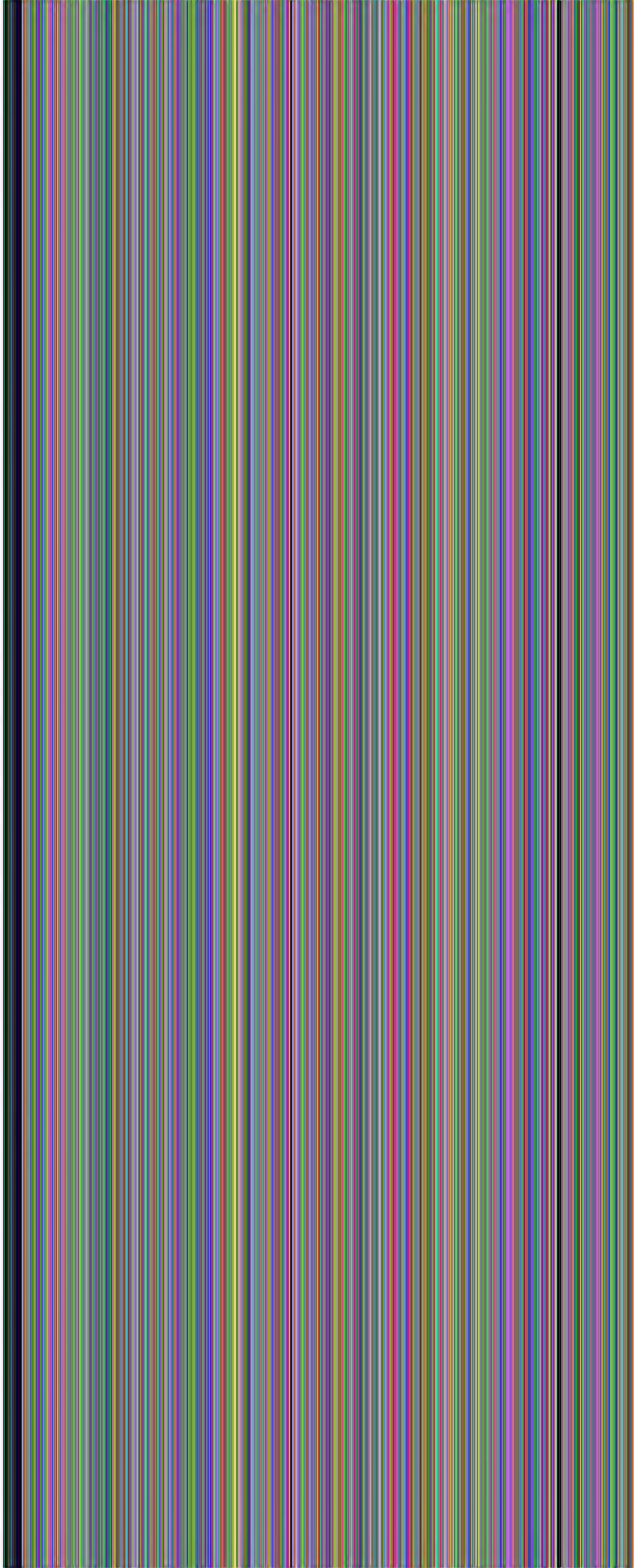
The purpose of these investigations is to give a comprehensive view of the forest resources of the counties named and finally of the entire State. The scope of the work includes a study of available timber supplies, their character, extent, and relationship to dependent wood-consuming industries, and of causes which have deteriorated the quality and greatly depleted Maryland forests. While the space and time devoted to this report would not permit the presentation of a technical working plan applicable to the various types of forests studied, yet a special effort has been made to point out the abuses and neglect to which the forests have long been subjected. Emphasis has been laid also upon the necessity and importance of a conservative management and improvement of existing woodlots and timber tracts. To this end the author has given some general instructions which, if followed, it is believed would prove widely beneficial in the improvement, extension, and maintenance of a more regular supply of commercial and other timber. In addition to observing these general precautions, the owners of woodlots and timber tracts may avail themselves of the expert advice and cooperation[1] offered by the Bureau of Forestry both in tree planting and in the conservative management of woodlands and timberlands.

Location.

Cecil is the most northern of the Eastern Shore counties of Maryland. It is situated at the head of Chesapeake Bay, which forms part of its southern boundary. The Susquehanna river is the western boundary and separates Cecil from Harford. On the north and east the county is bounded by Pennsylvania and Delaware.

[1] Outlined in Circulars 21 and 22, copies of which may be had *gratis* by applying to the Bureau of Forestry, U. S. Department of Agriculture, Washington, D. C.


MAP
OF
CECIL COUNTY
SHOWING THE DISTRIBUTION OF
SHORE AND BARREN TIMBER
MARYLAND GEOLOGICAL SURVEY
WM. BULLOCK CLARK, STATE GEOLOGIST
1902
LEGEND
Barren Timber
Shore Timber
HAVRE DE GRACE
ELKTON
Charlestown
Port Deposit
Rising Sun
Cecilton
Chesapeake
Earleville
Georgetown
Galena
Betterton
Childs
Elk Neck
Bacon Hill
Port Herman
Cherry Hill
Fair Hill
Calvert
Principio
Perryville
Conowingo
Warwick
St. Augustine
CHESAPEAKE BAY
SASSAFRAS R.
NORTHEAST R.
BOHEMIA R.



Topography and Soil.

The most marked topographic features of Cecil county are the broad necks of land separated by tidal rivers (Plate XXII). These necks are found in the southern part of the county and often bear the name of the adjacent river. The principal necks, beginning at the south, are, Sassafras, Middle, Town Point, Back Creek, and Elk. Sassafras and Elk are the largest necks, being 12 miles long. The greatest width of Sassafras Neck is seven miles, and of Elk, five.

With the exception of Elk Neck, these divisions are level or rolling areas of clayey or sandy loam, as shown in Plate XXII, Fig. 2. Their general elevation above tide-water is never more than 80 feet. They slope gradually to the bay-shore or end abruptly there in steep cliffs.

Elk Neck differs from the other necks in having a ridge or backbone of high land for the greater part of its length (Plate XXII, Fig. 1). The high points of this ridge reach an elevation of 300 feet. Its soil, too, varies with its topography, being poor, rocky, or of a gravelly nature, especially in the north. The slopes along the bay-shore are good farming lands, though hardly equalling in fertility the deep soils of the eastern necks.

The northern and main portion of the county reaches an elevation of 400 feet for the greater part of its area. The lower half is broken and hilly, with poor gravel soils similar to those of Elk Neck. North of this is a belt of good soil from three to five miles wide extending across the county from east to west. This section is rolling, with its lowest depressions along the streams, and ends abruptly to the west in steep cliffs along the Susquehanna river.

Drainage.

Chesapeake Bay receives the entire drainage of the county through numerous sluggish streams in the south and through swift-flowing, shallow creeks (Plate XXIII, Fig. 2) in the north. The creeks are from 30 to 100 feet in width and usually carry less than two feet of water.

In the southern part of the county wide tidal rivers (Plate XXIII, Fig. 1) receive the water from the creeks and form waterways for the Bay shipping. The principal rivers of the county are, Northeast, Elk, Bohemia, and Sassafras. Their greatest width is two miles, and all have ship channels. The Susquehanna river, receiving the drainage of the western portion of the county, enters the Chesapeake at Perryville.

Woodlands and Forests.

The total area of Cecil county is 375 square miles, or 240,000 acres. The area of the included water (ponds, rivers, etc.) is 10,900 acres, and of the marsh, 3000 acres. This leaves for the farm-lands and forest 226,100 acres. The wooded portion of the county is 15 per cent of this, or 35,000 acres.

Forest Types.

The wooded areas comprise two types of forest. The first type (Plate XXVI)—Barrens Timber—is found on the poor gravel soils of Elk Neck, and on similar soils of the region north and east. It is a young hardwood growth, with areas on which Scrub Pine occurs. The second type (Plate XXVII)—Shore Timber—includes the thin fringe of trees found along the streams, rivers and bay-shore. The growth is mainly hardwood, of both mature and young trees.

Barrens Timber.

This type of forest has an area of 20,000 acres, distributed as shown on the map (Plate XXV), and covers the region locally known as "Barrens." The term "Barrens" is applied to this region because of the poor soil found there and the fact that large areas are constantly covered with brush (Plate XXVI, Fig. 2). When fire kills this brush, the burned areas are indeed barren. The timber of the Barrens is not virgin, but a sprout growth of Chestnut and Oak. In age it varies from one to forty years. The periodical removal, by the charcoal-burner, of all sound material one inch and over in diameter has resulted in rather even-aged stands of

FIG. 1.—A THIN STAND, DUE TO FIRE.

FIG. 2.—AN AREA RECENTLY CUT.

BARRENS TIMBER.

Chestnut and Oak, which sprout readily. In regions where fires occur the stands are very thin and open (Plate XXVI, Fig. 1), allowing Scrub Pine and Mountain Laurel to come in.

The character of this timber is shown in the following table:

TABLE SHOWING RELATIVE ABUNDANCE OF SPECIES IN THE BARRENS TIMBER.

Average of 48 acres. Trees 5 inches and over in diameter breast high.

Species.	Average number of trees per acre.	Percentage of each species.	Average diameter breast high. Inches.	Average stand per acre. Cords.
Red and Black Oaks..	49	31	12	2.56
Chestnut.....	36	23	10	2.10
White Oaks	30	19	10	.94
Chestnut Oak	22	14	8	.60
Tulip-tree.....	..	..	..	..
Other species.....	21	13	9	.85
Average of all species.....	158	100.0	100	7.05

NOTE.

Red and Black Oaks

Include: Red, Scarlet, Yellow, Spanish, Pin, Black Jack, Willow, and Bartram Oaks.

White Oaks

Include: White and Post Oaks.

Other species

Include: Red Cedar, Scrub Pine, Mockernut and Pignut Hickories, Locust, Beech, Red Maple, Largetooth Aspen, Black Gum, Sweet Gum, Dogwood, Sassafras, Mountain Laurel, and Blue Beech.

The total stand on the 20,000 acres of the Barrens is 141,000 cords. Most of the wood cut here is made into charcoal. A cord of wood properly burned yields 35 bushels of coal; so that, reduced to the charcoal burner's unit, the total yield would be 3,535,000 bushels. This amount of coal can be made from the Barrens timber, but the thinness of the stands over the greater part of the area so increases the cost of hauling and cutting as to make the work unprofitable. The thinness of the stands is due to fire, and the fires are due to carelessness. The normal wood production for the Barrens is in the neighborhood of 30 cords per acre. Burnt areas yield less than ten cords per acre. The difference, 20 cords, worth $1.00 per cord, represents the loss per acre from fire. The burning of 100 acres of

fully-stocked brush lands means a loss to the owner of from $1600 to $2000.

SHORE TIMBER.

This second type of forest has an area of 15,000 acres distributed as indicated on Plate XXV. It occupies the depressions along the streams, or occurs as thin fringes on the bay-shore (Plate XXVII). The greater part of this shore-timber is found in the best agricultural regions of the county, and the soils upon which it grows are often similar to those of the surrounding farm-lands. The fact that these timbered areas are at certain seasons too wet for grain crops, or so steep that they gully when under cultivation, accounts for their remaining in forest. These forests, mainly hardwoods, have been constantly culled by the farmers and others for all kinds of material for domestic use and for sale. We find here defective old Oaks and Chestnuts (Plate XXVIII, Fig. 1), remnants of the virgin forest, and associated with them, sprouts and seedlings of many species. The sides of the depressions and the moist bottoms, where the drainage is good, are capable of supporting a very vigorous tree growth (Plate XXVIII, Fig. 2). Chestnut and White Oak do well on the slopes, while Tulip-tree and Black Walnut thrive nearer the streams. The growth of all these species is especially good in the southern part of the county, where the greater part of the shore-timber is found; the streams in the north (Plate XXIII, Fig. 2) have little or no timber along their courses.

The varied character of this type and its distribution over the county in small patches make the cost of gathering sufficient measurements for an estimate of the present stand, prohibitive. The following table is the result of the measurement of a number of the better stands (Plate XXVII, Fig. 1) and may not be applied to the 15,000 acres of the type.

FIG. 1.—A GOOD STAND, SASSAFRAS NECK.

FIG. 2.—INTERIOR VIEW OF ABOVE.

SHORE TIMBER,

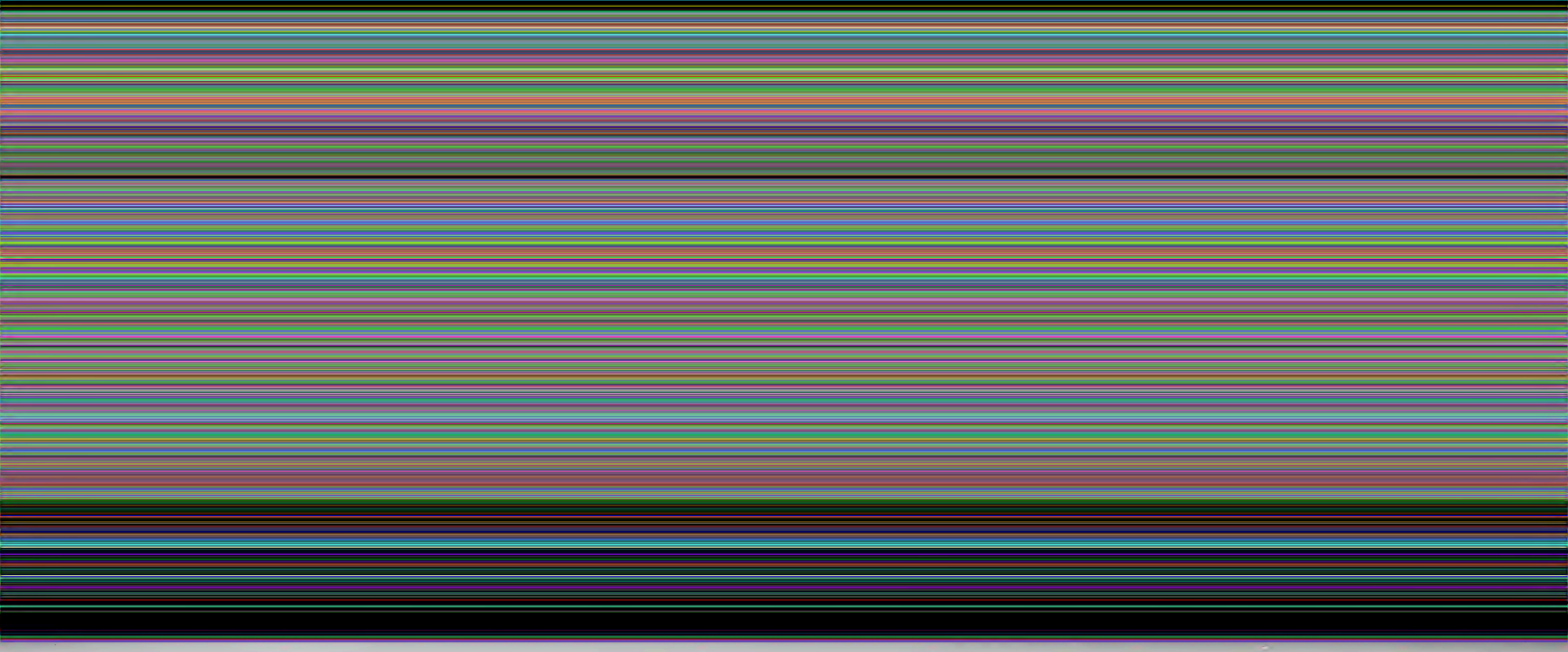


TABLE SHOWING THE RELATIVE ABUNDANCE OF DIFFERENT SPECIES IN THE SHORE TIMBER.

Average of 80 acres. Trees 5 inches and over in diameter breast high.

Species.	Average number of trees per acre.	Percentage of each species.	Average diameter breast high. Inches.	Average stand per acre Cords.
Chestnut	24	18	14	3.64
Red and Black Oaks	18	14	15	2.76
Chestnut Oak	10	8	16	2.04
White Oaks	8	6	17	1.81
Tulip-tree	8	6	14	.81
Other species	65	48	11	3.93
Average of all species	133	100	13	14.99

NOTE.

Red and Black Oaks
include: Red, Scarlet, Yellow, Spanish, Pin, Black Jack, Willow, and Bartram Oaks.

White Oaks
include: White, Post, Swamp White, and Cow Oaks.

Other species
include: Red Cedar, Pitch Pine, Scrub Pine, Black Cherry, Mockernut, Pignut and Bitternut Hickories, Basswood, Locust, Beech, Sycamore, River Birch, Red Maple, Black Gum, Sweet Gum, White Willow, Red Mulberry, Persimmon, Butternut, Dogwood, Sassafras, Laurel, Blue Beech, and Redbud.

The grouping of commercial trees with inferior species in the tables is due to the fact that they occur in such small numbers on the areas measured as to be of little importance.

The above table shows an average of 15 cords per acre for the better stands. If this wood were of a quality to make lumber, the yield would be 12,000 board feet per acre. Little lumber is ever cut from these stands, as most of the good material is cut before it reaches timber dimension. The material left year after year to grow to large size (Plate XXVIII, Fig. 1) is usually defective and unfit for lumber.

The table also shows the effects of culling. The inferior species in the stands measured are 48 per cent of the total number of trees. The constant removal of the Oaks, Chestnut, and Tulip-tree, and the leaving of other species results in an ever-increasing proportion of what may be termed the weeds of the forest. When the best stands show 48 per cent of weeds, one may expect the poor stands to show

even a larger proportion. In many observed cases the entire stand is weed growth. In the forest, as on the farm, knowledge and industry bring good crops; ignorance and neglect, weeds.

The shore woodlands are well adapted to the growth of trees suitable for lumber. The land, though unsuited to agriculture, is well suited to tree growth. The principal commercial trees, Oaks, Chestnut, Tulip-tree, Black Walnut, Hickory, and Ash grow rapidly and reach large sizes when properly treated. Cheap water transportation to the principal eastern markets, New York, Philadelphia, and Baltimore, as well as to the local markets in the county, is possible. The large farming population could be employed in the winter, when work is slack, to cut and manufacture the product. The fire danger is small, owing to the position of the timber, with cultivated land on one side and water on the other. Taxes, though high, are being paid by the owners on lands producing poor wood crops, and the rates would not be increased if full crops of good material were produced. Every condition is favorable to the profitable production of forest crops on the shore woodlands. The future should see every acre of the 15,000 in this type producing at least 12,000 feet of lumber, the equivalent of the 15 cords of wood found on the best stands to-day. This would mean 180 million feet of lumber for the shore-timber, an amount far below its producing capacity.

Forest Trees.

The trees found in the county are principally hardwoods. Red Cedar and Pitch, Shortleaf and Scrub Pines are the only conifers found, and only two, Red Cedar and Scrub Pine, are common. The mingling of northern and southern species in this locality accounts for the large number present. The following is a list of the native trees of Cecil county:

CONIFERS.

1 Pitch Pine.....*Pinus rigida.*
2 Scrub Pine.....*Pinus virginiana.*
3 Shortleaf Pine.....*Pinus echinata.*
4 Red Cedar.....*Juniperus virginiana.*

HARDWOODS.

5 Butternut.....*Juglans cinerea.*
6 Black Walnut.....*Juglans nigra.*
7 Bitternut Hickory.....*Hicoria minima.*
8 Mockernut Hickory.....*Hicoria alba.*
9 Pignut Hickory.....*Hicoria glabra.*
10 White Willow.....*Salix alba.*
11 Largetooth Aspen.....*Populus grandidentata.*
12 River Birch.....*Betula nigra.*
13 Sweet Birch.....*Betula lenta.*
14 Blue Beech.....*Carpinus caroliniana.*
15 Beech.....*Fagus atropunicea.*
16 Chestnut.....*Castanea dentata.*
17 White Oak.....*Quercus alba.*
18 Post Oak.....*Quercus minor.*
19 Chestnut Oak.....*Quercus prinus.*
20 Swamp White Oak.....*Quercus platanoides.*
21 Cow Oak.....*Quercus michauxii.*
22 Red Oak.....*Quercus rubra*
23 Scarlet Oak.....*Quercus coccinea.*
24 Yellow Oak.....*Quercus velutina.*
25 Spanish Oak.....*Quercus digitata.*
26 Pin Oak.....*Quercus palustris.*
27 Black Jack Oak.....*Quercus marilandica.*
28 Willow Oak.....*Quercus phellos.*
29 Bartram Oak.....*Quercus heterophylla.*
30 Slippery Elm.....*Ulmus pubescens.*
31 White Elm.....*Ulmus americana.*
32 Hackberry.....*Celtis occidentalis.*
33 Red Mulberry.....*Morus rubra.*
34 Sweet Magnolia.....*Magnolia glauca.*
35 Tulip-tree.....*Liriodendron tulipifera.*
36 Papaw.....*Asimina triloba.*
37 Sassafras.....*Sassafras sassafras.*
38 Witch Hazel.....*Hamamelis virginiana.*
39 Sweet Gum.....*Liquidambar styraciflua.*
40 Sycamore.....*Platanus occidentalis.*
41 Serviceberry.....*Amelanchier canadensis.*
42 Scarlet Haw.....*Crataegus coccinea.*
43 Black Cherry.....*Prunus serotina.*
44 Redbud.....*Cercis canadensis.*
45 Honey Locust.....*Gleditsia triacanthos.*
46 Locust.....*Robinia pseudacacia.*
47 Allanthus.....*Allanthus glandulosa.*
48 Staghorn Sumach.....*Rhus hirta.*
49 Holly.....*Ilex opaca.*
50 Silver Maple.....*Acer saccharinum.*
51 Red Maple.....*Acer rubrum.*

HARDWOODS—Continued.

32 Boxelder ..... *Acer negundo.*
33 Basswood ..... *Tilia americana.*
34 Dogwood ..... *Cornus florida.*
35 Black Gum ..... *Nyssa sylvatica.*
36 Mountain Laurel ..... *Kalmia latifolia.*
37 Persimmon ..... *Diospyros virginiana.*
38 Black Ash ..... *Fraxinus nigra.*
39 White Ash ..... *Fraxinus americana.*
40 Red Ash ..... *Fraxinus pennsylvanica.*
41 Nannyberry ..... *Viburnum prunifolium.*

DISTRIBUTION.

The trees of Cecil county may be arranged in two groups, based on their commercial importance and their abundance.

I.—Important Commercial Trees.

II.—Inferior Commercial Trees.

The first group contains those species which furnish lumber, posts, ties, or telegraph poles. The second group consists of those species which yield cordwood.

IMPORTANT COMMERCIAL TREES.

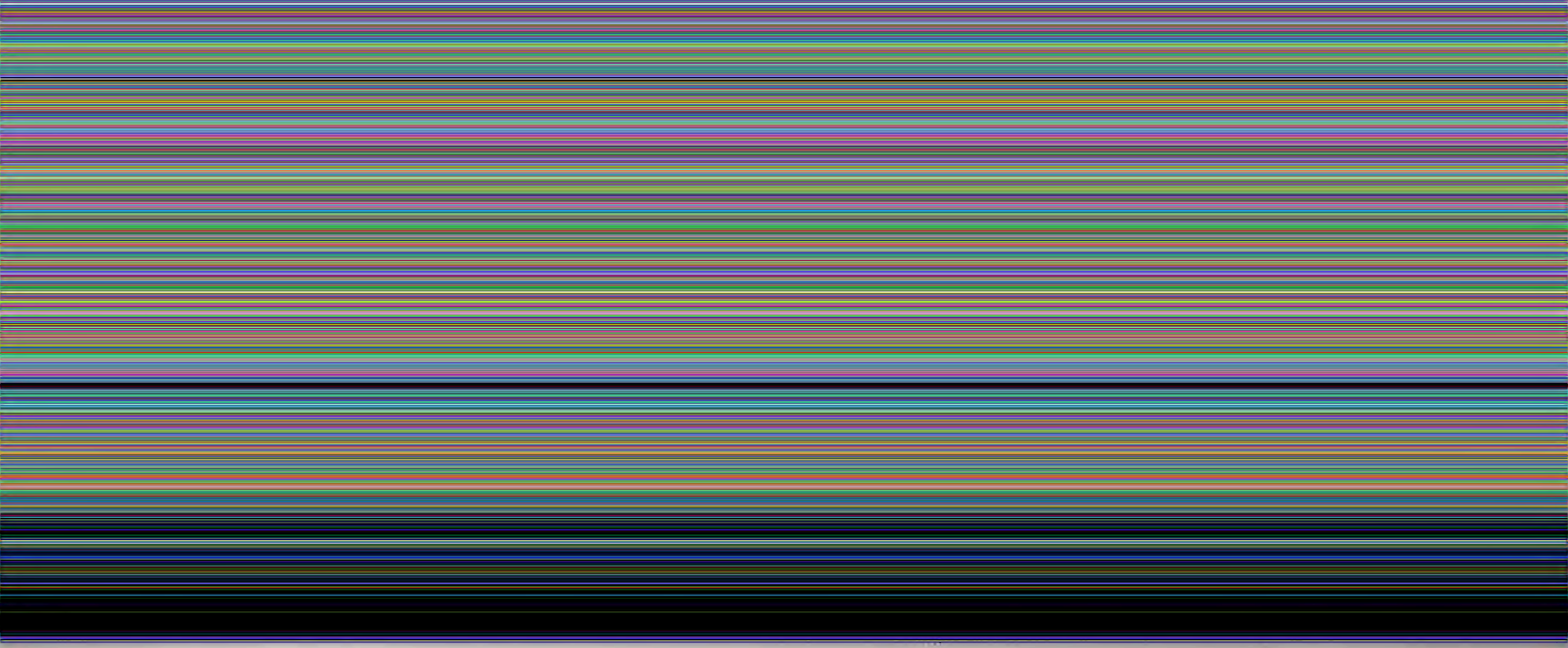
The abundant trees of this group are Chestnut, Tulip-tree (Yellow or White Poplar), and White, Red, and Black Oaks. They are found in all parts of the county in varying quantities. The tables on pages 299 and 301, based on a careful measurement of seventy-five acres of the two types of forest, show the abundance of the species, the relative proportion of each, and their average diameter. Under White Oaks are included White, Post, and Swamp White Oaks. Chestnut Oak has been separated from the other White Oaks because it furnishes tan-bark. The Black and Red Oaks comprise the remaining species of Oaks found in the county.

Chestnut predominates on the better soil of the shore-timber, while in the Barrens Red and Black Oaks are the most abundant species. The shore-timber has 53 per cent of commercially important trees and the Barrens 87 per cent. Tulip-tree is not found in measurable quantities on the poor soil of the Barrens, but is uniformly distributed through the moister shore woodlands, which are especially adapted to its growth.

FIG. 1. A DEFECTIVE OLD CHESTNUT IN YOUNG GROWTH.

FIG. 2. HOLLY-TREE COPPICE. A DENSE STAND.

SHORE TIMBER.



Black Walnut, Black Cherry (Plate XXIX, Fig. 1), White Ash, Red, Ash, Beech, Basswood, the Elms, and the Hickories, which are present over the greater part of the county, reach large sizes, and would, if properly grown, produce merchantable timber. Black Walnut is especially at home in the moist bottoms along the streams.

The three pines of the county, Pitch, Scrub, and Shortleaf, are found in greatest numbers on Elk Neck. The Pitch and Shortleaf Pines occur only as scattered individuals, while the Scrub Pine forms pure stands (Plate XXIX, Fig. 2) on areas once cultivated. Red Cedar is found in all parts of the county as a tree of fence rows (Plate XXIX, Fig. 1) and is a distinct feature of the agricultural regions.

Locust, with Red Cedar and Sumach, occurs as a roadside tree and is also associated with these and Scrub Pine on areas formerly cultivated. On good soil Locust is a rapid grower, and, if in the open, soon reaches a size suitable for posts.

INFERIOR COMMERCIAL TREES.

The abundant species of this group are, Sweet Gum, Black Gum, Red Maple, Persimmon, Dogwood, Sassafras (Plate XXX, Fig. 1), Sycamore, River Birch, Red Mulberry, Willow, Blue Beech, Laurel, Staghorn Sumach, and Witch Hazel. They are common in all parts of the county, but never form pure growth. They occur as scattered individuals in the forest, or form clumps or fringes (Plate XXIII, Fig. 2) along the streams.

The less abundant species of the group are, Sweet Birch, Black Ash, Silver Maple, Boxelder, Holly, Papaw, Honey Locust, Redbud, Hackberry, Serviceberry, Nannyberry, Ailanthus, Butternut, Aspen, Sweet Magnolia, and Scarlet Haw. These species, though not found throughout the county, are often quite common in certain localities.

USE OF MATERIAL.

The principal uses of wood in the county are for charcoal, building material, pulpwood, ties, telegraph poles, fencing, and firewood. The

local demand for these products, with the possible exception of charcoal and firewood, is greater than the supply.

BUILDING MATERIAL.

Only a small portion of the lumber used for building in Cecil county is manufactured there. The absence of timber suitable for lumber is very noticeable and is emphasized by the fact that there

FIG. 23. Cordwood for pulp, Elkton.

is not a sawmill of any size operating in the county. Even portable mills are very rare, and can find work for only a few months in the year. Although the population of Cecil county is large and thrifty, and the demand for lumber constant, no attempt is being made to increase the local supply of timber.

PULPWOOD.

The large pulp mill at Elkton (Fig. 23) consumes annually 12,000 cords of wood, but can obtain only a small amount of it in the county.

The wood of the Tulip-tree (called White Poplar) is the principal pulp material used by the mill. No attempt is being made to grow wood for this industry. The present treatment of the Tulip-tree in Cecil county will decrease rather than increase the future supply. The trees are cut when they have reached a diameter of 6 or 8 inches (Plate XXVIII, Fig. 2). The cutting usually takes place in the spring or early summer, when the bark is easily removed. Stumps cut at this season often refuse to sprout or the stumps decay so rapidly as to make the sprouts unthrifty or short-lived. Very often thick stands of young Tulip-trees are cut and every tree removed. When the stumps fail to sprout a second crop is lost, as no seed trees have been left.

TIES AND TELEGRAPH POLES.

Most of the timber used for these purposes is Oak or Chestnut. Telegraph poles are made from Chestnut, while both Chestnut and Oak are used for railroad ties. The White Oaks are preferred by the tie-makers, but the Red and Black Oaks are often used. There is always a good market for ties and poles in the county and fair prices are paid. Farmers owning stands of young Oak and Chestnut often sell them to contractors. A given price per tie or pole is paid or the stand is sold as a whole and the contractors cut what they can from it. This method of disposing of the timber is seldom satisfactory to the farmers, because they are not well-informed as to what a given tract will yield, or what the materials are worth. They are thus the prey of unscrupulous contractors.

FENCING.

Farmers have for some time been troubled by the gradual disappearance of fencing material. The use of hedges and wire has lessened the demand for Chestnut, the principal material for rails. This material is still plentiful, owing to the rapid growth of the Chestnut from sprouts, and the lessened demand. For posts the farmers prefer the White Oaks and Locust. The scarcity of these materials often forces them to use Chestnut. The county's supply of Locust

was never large and the White Oaks are so constantly drawn on for various uses that the supply is always low.

CHARCOAL AND CORDWOOD.

Cordwood is the principal forest crop of the county. Owing to the cheapness of coal and its greater convenience for domestic use, the amount of wood used for fuel (Fig. 24) is small. The greater part of the cordwood cut is made into charcoal, for use by the Principio

Fig. 24. Cordwood for domestic use. Elk Neck.

Forge Company. This company's annual consumption is from 325,000 to 350,000 bushels. Charcoal burning has been practised in this region for over fifty years (Plate XXX, Fig. 2). Whether the local supply of timber for charcoal will keep pace with the demand is mainly a question of protecting the forest from fire.

Forest Fires.

Forest fires are responsible for the present poor condition of the Barrens timber. The charcoal burner, in cutting over a tract,

removes all material an inch or more in diameter as shown in figure 24. The kilns are built on the tract, and during the process of burning, or soon after, fire catches in the dry tops and refuse left on the ground and spreads over the cutting. If conditions are favorable, fire often spreads to the surrounding woods. Few of the cut-over areas escape fire, and many are repeatedly burned. The sprouting stumps are either killed or injured, and the resulting stand is very open. Many inferior species are thus allowed to come in, noticeably Mountain Laurel and Scrub Pine, neither of which makes good charcoal.

The Barrens are capable of producing 25 cords per acre. Where good stands of Oak and Chestnut are found that much is cut. The present average production is seven cords, or less than one-third of what it should produce. This is the result of fires. If thinning by fire goes on, it will be impossible in the near future to burn charcoal profitably in the county.

Although fires are not common in the shore-timber, they are especially noticeable where ties and telegraph poles have been cut. The slash left from such cuttings on these areas usually catches fire and results in great damage to the future crop.

Fire Protection.

The only measure to insure fire protection to the forests of the county is the awakening of a sentiment among the farmers that will not tolerate carelessness in regard to fire. Measures for the protection of these forests can be easily devised, but it will be useless if the Cecil land-owners do not care to see them enforced.

The owners of forest lands seldom realize their loss when a fire occurs. This is the reason for their indifference. If a crop of hay is burned, the owner appreciates his loss. The crop represents to him the money value of his labor. If the woodland, in young sprouts, is burned and the crop is so thinned that at the time of cutting 100 acres yield $1000 instead of $3000, the owner's loss of $2000 is a future one and is not appreciated.

The growing crop requires no outlay of time or money, and is

therefore considered valueless until the trees reach cordwood size. The wood crop is more often considered a lucky find or a gift than a constant source of revenue to be cared for and protected. The man who sets fire to a field crop is considered a criminal and is punished by law. He who burns a wood crop may boast of it openly without censure. The loss in the first case may be $300, in the second, $2000. As soon as the farmers realize their loss from forest fires they will protect their lands and enforce fire laws.

Future of Forests.

The present condition of Cecil county forests is the inevitable result of long abuse and neglect. The better soils of the county were once covered with magnificent forests of White Oak and Chestnut on the uplands, and of Tulip-tree, Black Walnut, and Hickory along the streams. To-day there are only a few defective remnants of these forests.

Early condition.

The steady decline of the forest resources of Cecil county is easily explained. The earliest settlers cleared small areas of level land near the shores of the Bay and millions of feet of choice Oak were cut and burned. Year by year new settlers came and cleared forest land; the older settlers enlarged their fields, and so the forest receded from the more desirable farming regions.

As the population of the county increased, timber for ships, for buildings, and for export was demanded, and the choicest trees convenient to the watercourses were removed. Consumption and prices increased, and the lumbermen went farther and farther from the water for their logs. Soon even the remoter parts of the county were stripped of their best timber, and as prices continued to rise the material left by the first loggers was finally consumed. The increase of population resulted in the clearing of all good agricultural land in the county, and the only timbered areas left were strips along the streams and bay-shore, or on the high hills and poor soils unfit for cultivation. These are the lands now occupied by forests.

FIG. 1.—BLACK CHERRY, RED CEDAR, AND SASSAFRAS.

FIG. 2.—SCRUB PINE ON LAND ONCE CULTIVATED.

ROADSIDE TREES.

Only the growth of the vigorous Chestnut and Tulip-tree, persistent under the harshest treatment, makes it possible to obtain desirable material. These species sprout readily from the stump and grow rapidly (Plate XXVIII), and have therefore, in a measure been able to hold their own. The fact that the Tulip-tree bears seed at an early age has also been an important factor in its survival. White Oak has practically disappeared from the greater part of the county, being replaced by the faster growing Red and Black Oaks. The gums, Red Maple, and Scrub Pine are creeping in, in ever-increasing proportions, and with them many other undesirable species.

PRODUCING CAPACITY.

Before suggesting a treatment for the improvement of Cecil county forests, the present capacity of the different sections for timber production should be discussed.

The slow growth and small size of the trees of the Barrens (Plate XXVI) limit that region to the production of cordwood. The trees of the shore-timber, however, grow rapidly and reach sizes suitable for lumber. The depleted condition of the shore forest makes it impossible to determine by measurement their possible acre yield. The following table gives the present possible yield of the better stands if the material produced were fit for lumber. The figures in the column under "board feet" are the lumber equivalents of the figures under "cords." These cord figures are taken from table on page 299.

TABLE SHOWING POSSIBLE YIELD OF SHORE-TIMBER.

Species.	Average stand per acre.		Stand on 15,000 acres.	
	Cords.	Board Feet.	Cords.	Board Feet.
Chestnut	3.64	3,191	54,600	47,865,000
Red and Black Oaks	2.76	2,303	41,400	35,295,000
Chestnut Oak	2.04	1,751	30,600	26,265,000
White Oaks	1.81	1,303	27,150	22,545,000
Tulip-tree	.81	683	12,150	10,245,000
Other species	3.93	3,417	58,950	51,255,000
Average of all species	14.99	12,910	224,850	193,650,000

This table shows a stand of 193 million feet of lumber for the shore woodlands if the better stands were present over the entire area. Substract from this the 51 million feet of inferior material under "Other Species" and the total merchantable stand would be 142 million feet of lumber. It is probable that, if the better stands were made to produce full crops and these full crops were found over the entire area of the shore-timber, the merchantable stand would be over 200 million feet of lumber.

The possible yield for the Barrens timber, if we consider 30 cords a full crop, would be 600,000 cords. Twenty-five cords per acre are now cut from unburnt areas, so that the estimate of 30 cords per acre is not high.

IMPROVEMENT.

There are three questions of prime importance to Cecil forest owners:

1. Improvement of the composition of existing stands.

2. Improvement of quality and quantity of material produced.

3. Growth of improved stands on all forest-producing areas unfit for agriculture.

To improve the composition of the stands, they must first be protected from fire. At the time of cutting, seed trees of the desired species should be left to reproduce their kind. These trees should be selected from the best found on the area and should, if possible, be in seed-bearing when the cutting takes place. Five to ten trees of each species desired should be left and they should be distributed evenly over the areas and not in groups. In cutting desirable species which sprout readily from the stump, care should be taken to insure a good sprout growth. The cutting should take place in the fall or winter and the surface of the cut should be slanting to prevent a rapid decay of the stump before the sprouts are well established. An opposite course may be taken with undesirable species. If the cutting takes place in the summer and the tops are piled on the stumps and burned, no sprouts will appear. All defective trees (Plate XXVIII, Fig. 1) should be classed with inferior species and

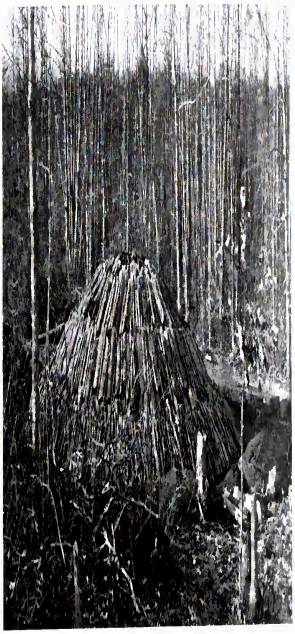


FIG. 1.—MAKING A KILN.

FIG. 2.—BURNING A KILN.

CORDWOOD FOR CHARCOAL.

removed with them, their place to be taken by thrifty young sprouts or seedlings. The trees to remain for a crop on the Barrens are Chestnut, and the Red, Black and White Oaks. The main crop of the shore-timber should come from Tulip-tree, White Oak, Chestnut Oak, Chestnut, White Ash, Black Walnut, and Mockernut Hickory. A supplemental crop may come from the other Oaks, Ashes, and Hickories, the Elms, Locust, and Dogwood.

After the composition of a stand has been improved by the removal of the weeds and the starting of a good crop, the quality and quantity of the desired crop must be considered. This is simply deciding on the cultivation necessary to produce the largest possible amount of good material. If a cordwood crop is grown, each acre should have enough trees to shade the ground and prevent its drying; surface fires must be kept out, as the litter helps to retain the moisture of the soil. The shade and litter are essential to the best growth of the trees. For the cordwood crop the stands should be even-aged, maturing, like grain crops, at one time, giving a clean cut, and thus lessening the cost of production. The cordwood crop may be compared to the grass or small grain crops, both are started and left to themselves until the time for cutting. A lumber crop, like a special agricultural crop, tobacco, for instance, requires constant care from planting to maturity, in order to produce the desired quality and quantity of material. Only the general needs of a lumber crop may be mentioned here.

Litter and shade are as important for the lumber crop as for cordwood. Tall trunks, clear of limbs, make the best lumber, and to produce these the trees must stand very close in their youth (Plate XXVIII, Fig. 2). The lower limbs die in the shade and drop early, and the young trees grow tall and straight. After the clear boles, or trunks, are secured, the stands must be thinned to allow the trunks to increase in diameter. Several thinnings may be necessary during the life of a crop. If we start with 1000 small trees per acre, there may be room for only 200 large trees when they are ready to cut. In thinning, the 800 trees must be removed. The early thinnings will furnish fuel, posts, and rails, and

the later ones, ties, telegraph poles, pulpwood, and some lumber. It will thus be no longer necessary to destroy entire woods (Fig. 24) to obtain these materials, as is common to-day.

These suggestions for growing and cultivating a crop of timber are easily followed on lands where a good forest growth is found (Plate XXVII). On areas with only a scattered growth of inferior trees or brush the problem of growing an improved stand is often a difficult and costly one to solve. There are thousands of acres of land in the county suited to forest growth and unsuited to agriculture. These lands, producing less than a cord of wood per acre, represent idle capital which should bear interest in the form of wood crops. To establish a crop, many of these areas will have to be seeded or planted. This method of starting forests is expensive if undertaken on a large scale. Most of the unimbered areas of Cecil county are small and are scattered through the farm lands. If, each winter, when the work is slack, the farmers would plant a portion of their waste lands with trees, a good crop could be started with but little loss of time and money to the owners. Locust, Tulip-tree, White Ash, Black Walnut, and White Oak are suggested as suitable for this planting. Either seed or young trees may be used. The area of the shore-timber would be doubled if all areas unfit for cultivation were planted with forest trees.

It is believed that if the forest land in Cecil county were properly treated it would yield annually a neat sum from the sale of material and each succeeding year see its value increased; the wood-consuming industries of the county could be supplied with home-grown material; money which now leaves the county would remain and add to its wealth; lumber industries would spring up and give employment to men in the winter months when work is scarce; and the county would thus be able to support an increased population and add materially to the resources and prosperity of the State.

Walter Mulford

THE FORESTS OF GARRETT COUNTY

BY

H. M. CURRAN

WITH AN INTRODUCTION BY GEORGE B. SUDWORTH

INTRODUCTION.

The following report on the "Forests of Garrett County" is made under the direction of the Bureau of Forestry, in cooperation with the Maryland Geological Survey. For the history of this cooperation and a statement of the special purposes of these forest investigations, the reader is referred to the reports on the "Forests of Allegany County,"[1] and the "Forests of Cecil County."[2]

Mr. H. M. Curran, Agent in the Bureau of Forestry, Division of Forest Investigation, has prepared the present report, which is based on a careful personal study of the forest conditions of the county. He was assisted in making valuation surveys of the several types of forest by Messrs. J. E. Keech, A. O. Wahs, and F. R. Miller. Credit is due, also, to Mr. John Foley, of the Division of Forest Management, for the very excellent photographs from which the half-tone illustrations for this report were made.

A very important feature of Mr. Curran's report is the development of the fact that Garrett county still possesses considerable timber, and that, with fire protection and regulated cutting, the forests of the county can be expected to yield a steady supply of timber, which is greatly needed for the development of local mines and other industries. As a means of securing a constant supply of timber and also of increasing and preserving the natural beauty of the region, the recommendation that the state acquire as rapidly as possible, as

[1] Md. Geol. Survey, Allegany County, 1900, p. 368.

[2] Md. Geol. Survey, Cecil County, 1902, p. 405.

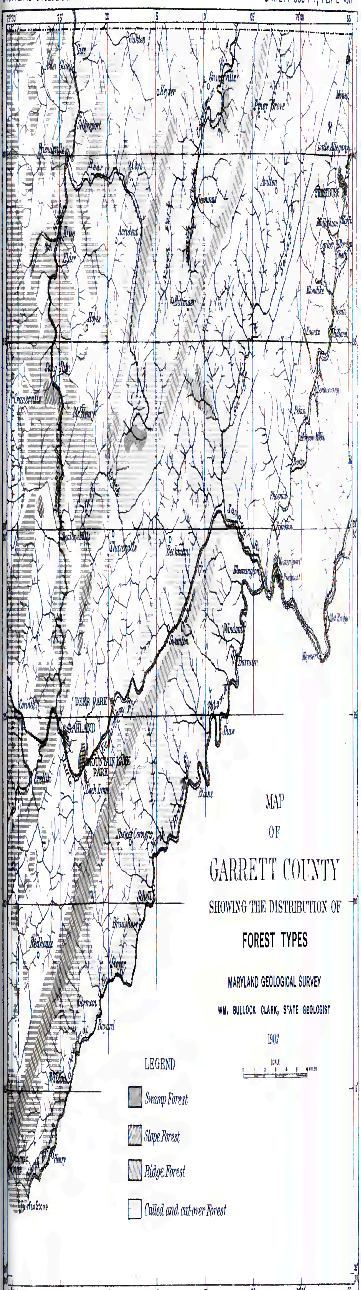
much non-agricultural land as is available for the establishment of a forest reserve, is worthy of serious consideration. In the same manner that the adoption of a national forest policy is necessary and is becoming more and more possible, it is the duty and to the interest of every forest-bearing state to give support to the general movement and at the same time to determine a policy for the fullest development and the best management of its forest resources. Garrett county has a large area of rough, untillable mountain land suitable only for forest growth. It is believed that this land should be concentrated in a state forest reserve.

While the general advice given in the present report for the care of woodlands is not intended to take the place of a detailed forest working plan, nevertheless, observance of this advice will go far to improve the present condition of Garrett county forests. It is hoped, also, that the present report will pave the way for a more detailed study of Garrett county forest lands and stimulate the owners of both large and small woodlots to apply the principles of practical forestry.

General Conditions.

Garrett, as has been described in the preceding pages, is the largest and most western of the counties of Maryland. Within its roughly triangular shape, it has an area of 650 square miles, or 435,200 acres. The northern boundary of the county is formed by Pennsylvania, the southern by the Potomac river, and the western by West Virginia. Allegany county lies to the east of Garrett. The dividing line is straight and extends in a southwesterly direction from the crest of Savage Mountain at the Mason and Dixon Line, to the confluence of the Savage and Potomac rivers. The only irregular boundary of Garrett county is the southern, where the county line follows the windings of the Potomac river.

The most marked topographic features of the county are four high, flat-topped mountain ridges, which extend from Pennsylvania into the county in a southwesterly direction. The two central ridges which are known as Negro and Meadow mountains, converge near Thayerville, whence they extend southwestward in a single but less distinct



A. Hoen & Co. Lith. Baltimore

ridge of which Roman Nose is the highest peak. The eastern and longest ridge extends entirely across the county and bears the names of Savage and Backbone mountains. Savage river breaks through this ridge in the eastern part of the county, the northern portion of the ridge being known as Big Savage Mountain and the southern as Great Backbone Mountain. Winding Ridge, which is the fourth and most western, extends parallel to Negro Mountain from the Pennsylvania line to a point near Sang Run. Here its distinct ridge-like character is lost in an irregular group of peaks and table-land on both sides of the Youghiogheny river. These four main ridges have a general elevation above sea-level of from 2500 to 3400 feet. They often rise abruptly to elevations above the river beds of from 1000 to 1800 feet. The river channels through the mountains are deep, narrow ravines, with sides so steep and strewn with boulders as to be difficult of ascent.

The agricultural valleys between the ridges and along the streams have a general elevation of 2500 feet above sea-level. They are seldom more than 500 feet below the crests of the highest ridges and are usually 500 to 1000 feet above the river beds.

Garrett county is well drained. The streams start on the high mountain slopes and flow rapidly to the rivers below. The principal streams of the county are, the Youghiogheny, Potomac, Savage, and Castleman rivers. The Youghiogheny and Castleman rivers unite in Pennsylvania and join the Monongahela. Their waters, through the Ohio and Mississippi, finally reach the Gulf of Mexico. The Savage and Potomac rivers unite and send their waters to Chesapeake Bay.

The rivers are from thirty to one hundred feet in width, and their beds are usually filled with a mass of rounded stones and boulders.

The depth of water varies with the width of the stream and the season of the year, from a few inches to three or four feet. The boulders in the stream beds make navigation of any kind impossible. It is therefore necessary to remove the timber along the streams by means of railroads following the watercourses.

The area of Garrett county is 435,200 acres. The agricultural

valleys include forty-six per cent of this, or 199,900 acres. It is not probable that the farming areas of the county will be materially increased in the future, as the best lands are now occupied, and many areas once cultivated are being abandoned on account of their poor soil. The tilled lands often extend up from the valleys over the foothills and high on the ridges themselves. The soils of the valleys are deep and vary from a clay to sandy loam. The soil of the higher slopes is shallow and rocky, but fertile, producing good grain crops.

Forest Lands.

Fifty-four per cent, or 235,200 acres, of Garrett county is wooded. Of this wooded area, 210,200 acres are cut-over or culled forest lands, and 25,100 acres are in virgin forests.

CUT AND CULLED FORESTS.

These areas are found in all parts of the county and include the principal types of timber discussed later. The best or all of the timber on these lands has been taken. The present growth varies from low brush of Mountain Laurel and Barren Oak to mature forests from which only the best material has been removed. The largest portion of the culled and cut-over lands bears a sprout growth of oaks and chestnut, 5 to 30 feet high. Scattered singly or in groups through these sprout forests are old defective or inferior trees left by the lumbermen. The soil of these forest lands varies, but is mainly poor, shallow, and rocky, unsuited to agriculture other than pasture. The map (Plate XXI) shows the area and distribution of these lands with reference to the agricultural lands and virgin forests.

VIRGIN FORESTS.

The present area of the virgin forests of the county is 25,100 acres. The timber is, however, rapidly disappearing. The local mills cut annually from 1000 to 3000 acres. The acreage of these forests may be divided among three types, as follows:

Type.	Acres.
Ridge Timber	20,230
Slope Timber	4,138
Swamp Timber	733
Total	25,146

At present the greater part of the lumbering is in the Slope and Swamp forests, but unless the ridge timber is also cut, most of the mills will be idle in a few years.

The character of the virgin forests may be best understood by a study of them by types. The distribution of the types is shown on the map (Plate XXI).

Ridge Timber.

This forest type occupies the benches and broken, rocky crests (see Plate IX, Fig. 6 and Plate XXV, Fig. 1) of Backbone, Meadow, and Negro mountains. It is essentially a chestnut forest. The soils upon which it occurs are shallow and sandy, or very rocky. The acreage of this forest (20,220) is four times the combined acreage of the other two types. Commercially it is the least important of the three. This is due to the inferior character of the Ridge Timber. The trees have short trunks, and are often stunted in exposed situations. The Chestnut, which is the principal commercial tree of the type, is usually defective. The trunks are first injured by repeated fires, and finally rendered unfit for lumber by the entrance of fungi and insects. The defectiveness of the Ridge Timber is the principal reason for such large areas remaining unlumbered. It is probable that, with the exhaustion of the timber of the Slope and Swamp forests, and the development of the mining interests of the county, the Ridge Timber will be lumbered and thus added to the cut and culled area of the county. The character of this type, in which Chestnut predominates, is shown in Table No. 1, on following page.

Slope Timber.

The Slope Timber is commercially the most important of the three types. It contains the largest number of species, and, with one exception (Table No. 6), the heaviest growth of timber. The composition of the slope forest varies between two extremes. On the steep slopes above the Youghiogheny river it is often pure Hemlock, and in the richer coves almost pure White Oak. Between these extremes we have slopes upon which Hemlock and hardwoods mingle, while

on other slopes Chestnut predominates, there being but little Hemlock or White Oak present.

TABLE NO. 1.

Average of 33 acres.

Trees 12 inches and over in diameter breast-high.

Species.	Average number of trees per acre.	Percentage of each species.	Average diameter breast-high.	Average stand per acre. (Doyle Rule.) Board Feet.
			Inches.	
Chestnut	30.45	47.24	18.6	10,694.59
Red Oak	13.47	20.94	17.9	2,170.28
White Oak	6.88	10.73	15.1	1,582.23
Chestnut Oak	4.09	6.43	18.7	849.19
Red Maple	3.30	5.24	16.6	914.40
Sweet Birch	2.22	3.38	15.8	321.21
Hemlock	.18	.29	21.4	149.85
Basswood	.13	.24	15.5	18.09
Beech	.06	.09	15.1	9.57
White Pine				
Spruce				
Sugar Maple				
Yellow Birch				
Other species	3.30	5.62	14.1	354.03
Average of all species	63.21	100.00	17.5	16,406.34

NOTE.—"Other species" include the occasional and inferior trees occurring with the merchantable species.

The Slope Timber may be divided into the following sub-types, which are determined by the abundance of the principal species:

Sub type.	Acres.
Chestnut	2,260
Hemlock and hardwoods	1,380
White Oak	480
Hemlock	143
Total	4,263

CHESTNUT.—This sub-type is found in two bodies, one on the Youghiogheny river, near Sang Run, the other on Monroe Run, a tributary of Savage river. These bodies occupy steep slopes above the streams and represent the best hardwood growth of the county. The following table shows the composition of these forests:

FIG. 1.—HEMLOCK AND HARDWOODS, NEAR BEVANSVILLE.

FIG. 2.—WHITE OAK AND HEMLOCK, NEAR BEVANSVILLE.

FORESTS OF GARRETT COUNTY.

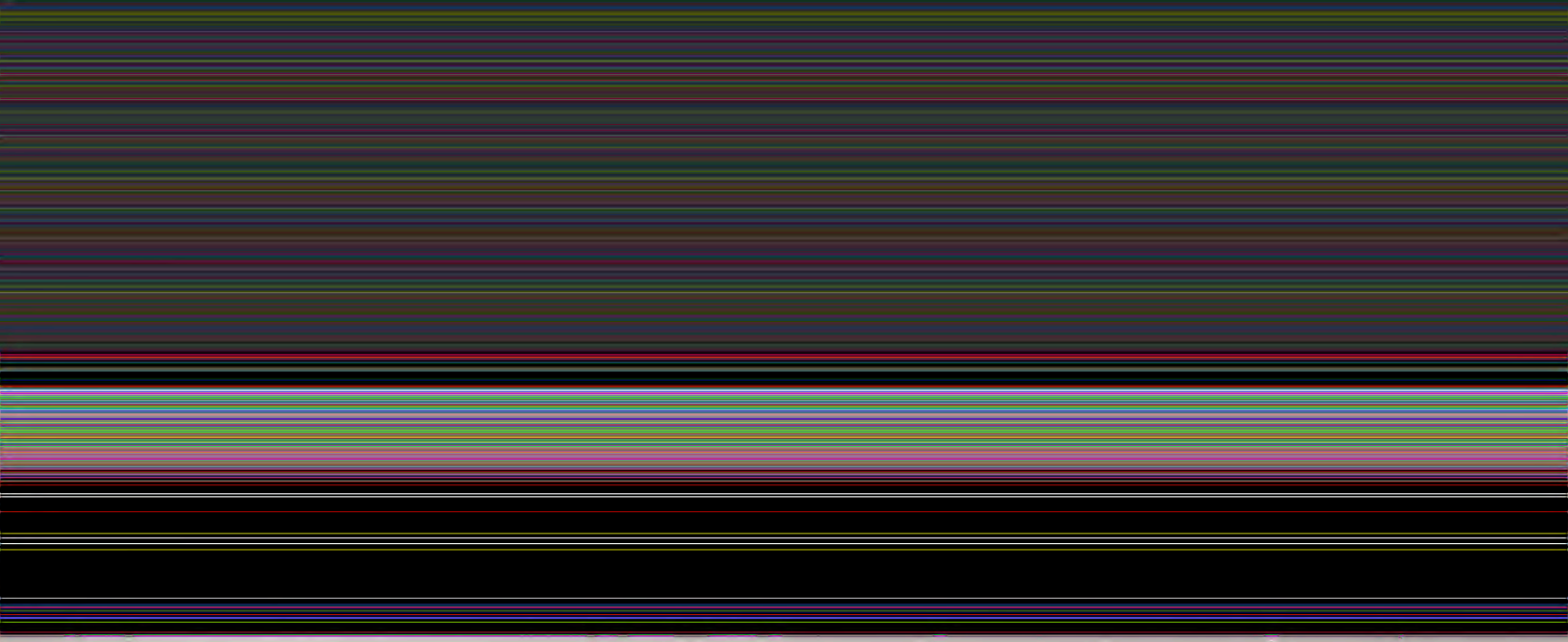


TABLE NO. 2.

SUB-TYPE: CHESTNUT.

Average of 15 acres.

Trees 12 inches and over in diameter breast-high.

Species.	Average number of trees per acre.	Percentage of each species.	Average diameter breast-high.	Average stand per acre. (Doyle Rule.)
			Inches.	Board Feet.
Chestnut	22.22	36.06	12.7	3,906.09
Sugar Maple	12.68	20.51	13.2	4,535.25
Red Oak	5.66	9.16	22.9	2,571.90
Basswood	3.41	5.73	16.8	851.06
Yellow Birch	2.47	3.99	15.6	344.63
Sweet Birch	2.07	3.34	16.5	331.56
Beech	1.75	2.83	16.4	366.69
White Oak	1.55	2.51	23.5	988.37
Chestnut Oak	.14	.23	19.4	28.12
Hemlock				
White Pine				
Spruce				
Red Maple				
Other species	7.80	12.62	15.2	946.83
Average of all species	61.82	100.00	15.6	19,691.39

WHITE OAK.—There are only three small bodies of this sub-type in the county, and the preservation of this timber is accounted for by the fact that the owners do not wish to sell. White Oak was one of the first timbers cut in the county and is still eagerly sought. The best of this oak is found in coves, or on moist, gentle slopes along streams. The soil which it occupies is usually deep, and makes good farming land. With the removal of this timber and the clearing of the land, it is hardly probable that there will ever be a second growth of pure White Oak in the county. The character of the White Oak stands is shown in Table No. 3, on following page.

HEMLOCK AND HARDWOODS.—The forests of this sub-type were once quite extensive, occupying the gradual slopes along the rivers and other streams. Recent lumbering operations have rapidly reduced these areas. There are three small tracts in the county, two on Castleman river and one on Bear Creek. The Castleman tracts are being lumbered, while the Bear Creek tract remains uncut. The

largest operations in the county have had for their principal object the removal of Hemlock. Extensive stands on the Youghiogheny river, Bear Creek, and Cherry Creek have been recently cut. Except in the recent cuttings on Castleman river, fire has followed lumbering, killing the reproduction and small trees left by loggers. In many places the fire has been so severe as to completely destroy all vegetation on the area; the abundant humus, and even the top layers of the soil have also been burned. No reproduction of Hemlock can be expected on these areas. The probability of a future stand of this species in the county is practically destroyed, unless artificial planting is done. (See Plate XXIII, Fig. 1.)

TABLE NO. 3.

SUB-TYPE: WHITE OAK.

Average of 25 acres.

Trees 12 inches and over in diameter breast-high.

Species.	Average number of trees per acre.	Percentage of each species.	Average diameter breast-high.	Average stand per acre. (Doyle Rule.)
			Inches.	Board Feet.
White Oak	46.80	51.12	17.7	10,119.08
Chestnut	6.20	10.75	18.7	2,134.72
Red Oak	2.32	4.03	17.4	445.90
Red Maple	1.32	2.29	15.4	271.44
Chestnut Oak	.64	1.11	18.6	166.08
White Pine	.12	.21	15.3	32.84
Sweet Birch	.08	.14	16.1	11.68
Hemlock				
Spruce				
Sugar Maple				
Yellow Birch				
Beech				
Basswood				
Other species	.20	.35	14.7	22.16
Average of all species	57.68	100.00	17.5	13,197.20

The principal hardwood of this sub-type is Sugar Maple. The sugar groves of the county are small areas of the type from which the Hemlock and all hardwoods, except the Maple, have been removed. These sugar orchards are neither numerous nor extensive except in the Castleman valley. The farmers show but little interest

in the maple sugar industry or in the orchards; the old trees are often defective and there are many dead trees throughout the groves. Nothing is being done to improve old groves or to produce new ones, and as the lumbering operations are taking the principal areas containing Sugar Maple, the future production of sugar and syrup will probably be small.

The character of the stand of this sub-type is shown in the following table:

TABLE NO. 4.

SUB-TYPE: HEMLOCK AND HARDWOODS.

Average of 29 acres.

Trees 12 inches and over in diameter breast-high.

Species.	Average number of trees per acre.	Percentage of each species.	Average diameter breast-high.	Average stand per acre.
			Inches.	(Doyle Rule.) Board Feet.
Hemlock	33.87	39.14	18.8	9,194.55
Sugar Maple	20.57	28.99	18.5	7,909.05
Beech	7.72	10.62	14.9	1,177.04
Basswood	3.54	7.62	17.1	707.70
Yellow Birch	4.24	5.97	17.7	901.45
White Oak	2.55	3.55	24.6	1,583.38
Chestnut	2.21	3.04	19.1	833.87
Red Oak	1.99	2.59	21.1	665.96
Sweet Birch	1.63	2.23	17.6	330.60
Chestnut Oak	.15	.21	22.9	76.34
White Pine				
Spruce				
Red Maple				
Other species	2.72	3.74	17.1	603.70
Average of all species	72.71	100.00	18.3	23,374.14

HEMLOCK.—The last stand of practically pure Hemlock is found on the Youghiogheny river near Muddy Creek. This, with the exception of the White Pine of the Swamp Timber, is the heaviest stand in the county. The trees are large and grow on steep, rocky slopes above the river. A dense thicket of laurel covers the ground under the trees and adds to the difficulty of lumbering. However, the cost of logging on this tract has not prevented the lumbermen from attempting the removal of the timber. A railroad is being built

along the foot of this slope and with its completion logging will commence. (See Plate IX, Fig. 2.)

The character of the stand is shown in the following table:

TABLE NO. 5.

SUB-TYPE: HEMLOCK.

Average of 25 acres.

Trees 12 inches and over in diameter breast-high.

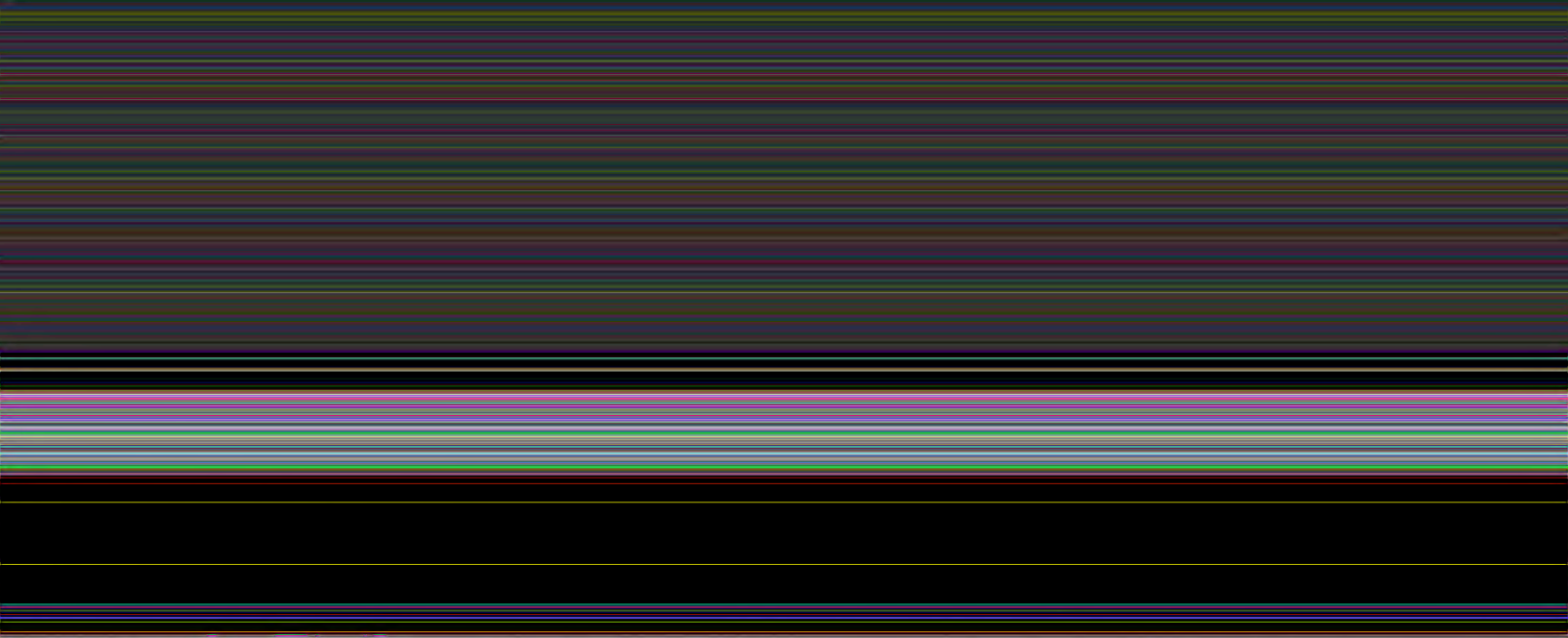
Species.	Average number of trees per acre.	Percentage of each species.	Average diameter breast-high.	Average stand, per acre. (Doyle Rule.)
			Inches.	Board Feet.
Hemlock	54.72	86.04	20.0	27,483.41
Yellow Birch	4.26	6.69	16.2	681.92
Sugar Maple	1.56	2.45	18.8	673.16
Beech	1.09	1.58	14.9	154.56
Basswood	.76	1.18	17.2	149.28
Red Maple	.49	.64	14.8	74.12
White Oak	.20	.33	22.4	84.92
White Pine	.16	.25	21.0	77.88
Sweet Birch	.12	.19	13.1	9.32
Chestnut	.08	.12	17.0	8.00
Red Oak	.04	.06	17.0	7.00
Chestnut Oak				
Spruce				
Other species	.56	.56	16.3	82.52
Average of all species	63.60	100.00	19.6	29,466.29

Swamp Timber.

This is the last of the three principal types of virgin forest. The other two, Ridge Timber and Slope Timber, have each a much larger acreage than this. The Swamp Timber has fewer species than any of the types of forest, and yet contains the most valuable timber of all. The principal species are Spruce and White Pine, with a varying amount of Hemlock. The areas occupied by this type surround and extend into the swamps and sedge-covered tracts along the streams, known as Glades and mountain meadows. The wetter portions of these areas are covered with herbaceous plants and alder brush, and the drier portions are heavily wooded. The timber growth is mainly Spruce, with occasional groups of excellent White Pine. The last of this Swamp Timber is found in the depressions between Negro and Meadow mountains at the head of Cherry Creek. It is being

FIG. 1.—HEMLOCK AND HARDWOODS, CASTLEMAN RIVER.

FIG. 2.—RIDGE TIMBER. EFFECT OF FIRES ON CHESTNUT, BACKBONE MOUNTAIN.



rapidly lumbered, and will be removed within two years. (See Plate XVIII, Figs. 1, 2.)

Two sub-types of the Swamp Timber are distinguishable; the first has White Pine as the predominant species, and the second, Spruce.

White Pine.—White Pine was once quite a common tree along the streams and rivers of Garrett county, and was one of the first timbers removed. It reached the best development and grew in almost pure stands on the moist level lands surrounding the swamps and mountain meadows. The areas occupied by this growth were never more than a few acres in extent, and the number of such areas was small. As a scattered tree along the streams and mountain slopes it was fairly common and reached large sizes. The reproduction of this pine is fairly abundant, considering the numbers of old trees and the treatment it has received. Young seedlings are found throughout the county and are making a good growth. (See Plate XVIII, Fig. 12.) The last group of pure White Pine in the county was cut recently.

The following table is the result of the measurement of three acres of this sub-type:

TABLE NO. 6.

Sub-type White Pine.

Average of 3 acres.

Trees 12 inches and over in diameter breast-high.

Species.	Average number of trees per acre.	Percentage of each species.	Average diameter breast-high.	Average stand per acre. (Doyle Rule.)
			Inches.	Board Feet.
White Pine	40.30	55.76	25.9	38,473.8
Hemlock	11.66	16.13	20.6	7,283.3
Red Maple	7.66	10.60	14.6	1,896.9
Spruce	7.65	10.57	16.0	1,369.2
Yellow Birch	4.00	5.53	15.4	533.0
Chestnut	.33	.47	17.0	70.3
White Oak	.33	.47	18.0	71.6
Red Oak	.33	.47	12.0	16.6
Basswood				
Sweet Birch				
Beech				
Sugar Maple				
Chestnut Oak				
Other species				
Average of all species	72.26	100.00	22.1	44,727.6

SPRUCE.—The winter of 1902 will probably see the last large stand of Spruce in the county removed. It is at the head of Cherry Creek, between Negro and Meadow mountains. The best of the Spruce occurs on the level or gradually sloping land surrounding the swamps. As the land rises, and becomes drier, oak and other hardwoods prevail. The stand of Spruce is good; the trees have grown rapidly, are tall, and the trunks are clean. In all respects it seems well adapted to this locality, and but for the fact that the lands upon which it grows are valuable for agriculture, it would seem wise to encourage the growth of Spruce. The reproduction here is fair, and except for the fires which follow logging, would insure a good second growth.

Spruce, like White Pine, sometimes occurs as one of the lesser components of the moist slope forests. On Backbone Mountain, near the West Virginia line, it occurs with Hemlock in considerable abundance, but is being rapidly removed.

The following table is from measurements taken in the stand of Spruce at the head of Cherry Creek:

TABLE NO. 7.

SUB-TYPE: SPRUCE.

Average of 20 acres.

Trees 12 inches and over in diameter breast-high.

Species.	Average number of trees per acre.	Percentage of each species.	Average diameter breast-high.	Average stand per acre.
			Inches.	(Doyle Rule.) Board Feet.
Spruce	41.10	63.81	17.0	13,341.75
Hemlock	13.40	23.21	21.7	10,097.15
Yellow Birch	4.50	6.99	16.4	708.40
Red Maple	1.50	2.33	15.8	474.53
Beech	1.05	1.63	15.8	191.60
Sugar Maple	.50	.77	20.9	236.40
White Pine	.20	.31	19.1	69.25
Basswood				
Sweet Birch				
Red Oak				
Chestnut Oak				
White Oak				
Chestnut				
Other species	.15	.23	19.9	43.70
Average of all species	64.40	100.00	15.1	25,162.80

The Stand.

The figures for the present stand of timber in Garrett county were obtained by multiplying the acreage of each forest type by the average acre yield obtained from measurements of typical areas within the type. In the table no allowance is made for defective timber. The Ridge Timber has been excluded from the merchantable class on account of its general defectiveness.

The following tables show the present stand of virgin timber by types and the merchantable stand by types and species:

TABLE NO. 8.

TOTAL STAND.

Type. Sub-type.	Area. Acres.	Average stand per acre, Board Feet.	Total stand. Board Feet.
RIDGE TIMBER.			
Chestnut	20,220	16,406	331,720,000
SLOPE TIMBER.			
Chestnut	2,790	19,691	45,082,000
White Oak	480	13,197	6,334,000
Hemlock and hardwoods	1,280	23,375	29,920,000
Hemlock	143	20,867	4,213,000
SWAMP TIMBER.			
Spruce	720	25,183	18,268,040
White Pine	3	44,728	134,000
Total	25,146	17,230	435,790,000

TABLE NO. 9.

MERCHANTABLE STAND.

Type. Sub-type.	Area. Acres.	Average stand per acre. Board Feet.	Total stand. Board Feet.
SLOPE TIMBER.			
Chestnut	2,290	13,744	42,682,000
White Oak	480	13,175	6,324,000
Hemlock and Hardwoods	1,280	22,771	29,146,000
Hemlock	143	20,404	4,204,000
SWAMP TIMBER.			
Spruce	730	25,119	18,336,000
White Pine	3	44,728	134,000
Total	4,926	20,517	101,067,000

TABLE NO. 10.

MERCHANTABLE STAND.

Species.	Total Stand. Board Feet.
Hemlock	23,603,000
Chestnut	22,475,000
Sugar Maple	19,469,000
Spruce	9,745,000
White Oak	9,154,000
Red Oak	6,958,000
Basswood	3,132,000
Beech	2,500,000
Yellow Birch	2,432,000
Sweet Birch	1,338,000
Red Maple	491,000
Chestnut Oak	246,000
White Pine	276,000
Total	101,967,000

FOREST TREES.

Composition of Forests.

The forests of Garrett county, like those of Allegany county adjoining on the east, are rich in species. The following list includes most of the trees found in Allegany county[1] and has, in addition, a few trees not found there:

Conifers.

White Pine	*Pinus strobus.*
Pitch Pine	*Pinus rigida.*
Tamarack	*Larix laricina.*
Black Spruce	*Picea mariana.*
Red Spruce	*Picea rubens.*
Hemlock	*Tsuga canadensis.*

Hardwoods.

Butternut	*Juglans cinerea.*
Black Walnut	*Juglans nigra.*
Bitternut Hickory	*Hicoria minima.*
Shagbark Hickory	*Hicoria ovata.*
Mockernut Hickory	*Hicoria alba.*
Pignut Hickory	*Hicoria glabra.*

[1] See "The Forests of Allegany County," by Geo. B. Sudworth. Allegany County Report. Maryland Geological Survey, 1900.

FIG. 1.—VIRGIN FOREST NEAR GRANTSVILLE.

FIG. 2.—CULLED FOREST NEAR GRANTSVILLE.

FORESTS OF GARRETT COUNTY.

White Willow ..... *Salix alba.*
Aspen ..... *Populus tremuloides.*
Large-tooth Aspen ..... *Populus grandidentata.*
Yellow Birch ..... *Betula lutea.*
Sweet Birch ..... *Betula lenta.*
Hornbeam ..... *Ostrya virginiana.*
Blue Beech ..... *Carpinus caroliniana.*
Beech ..... *Fagus atropunicea.*
Chestnut ..... *Castanea dentata.*
White Oak ..... *Quercus alba.*
Chestnut Oak ..... *Quercus prinus.*
Red Oak ..... *Quercus rubra.*
Scarlet Oak..... *Quercus coccinea.*
Yellow Oak ..... *Quercus velutina.*
Barren Oak ..... *Quercus pumila.*
Slippery Elm ..... *Ulmus pubescens.*
White Elm ..... *Ulmus americana.*
Red Mulberry ..... *Morus rubra.*
Cucumber-tree ..... *Magnolia acuminata.*
Tulip-tree ..... *Liriodendron tulipifera.*
Papaw ..... *Asimina triloba.*
Sassafras ..... *Sassafras sassafras.*
Witch Hazel ..... *Hamamelis virginiana.*
Sycamore ..... *Platanus occidentalis.*
Sweet Crab ..... *Pyrus coronaria.*
Mountain Ash ..... *Pyrus americana.*
Serviceberry ..... *Amelanchier canadensis.*
Scarlet Haw ..... *Crataegus coccinea.*
Black Cherry ..... *Prunus serotina.*
Redbud ..... *Cercis canadensis.*
Locust ..... *Robinia pseudacacia.*
Staghorn Sumach ..... *Rhus hirta.*
Dwarf Sumach ..... *Rhus copallina.*
Mountain Maple ..... *Acer spicatum.*
Striped Maple ..... *Acer pensylvanicum.*
Sugar Maple ..... *Acer saccharum.*
Red Maple ..... *Acer rubrum.*
Basswood ..... *Tilia americana.*
Angelica-tree ..... *Aralia spinosa.*
Flowering Dogwood ..... *Cornus florida.*
Blue Dogwood ..... *Cornus alternifolia.*
Black Gum ..... *Nyssa sylvatica.*
Great Rhododendron ..... *Rhododendron maximum.*
Persimmon ..... *Diospyros virginiana.*
Black Ash ..... *Fraxinus nigra.*
White Ash ..... *Fraxinus americana.*
Red Ash ..... *Fraxinus pensylvanica.*
Sheepberry ..... *Viburnum lentago.*

Distribution of Forest Trees.

The trees of the county may be divided into two groups, the merchantable and the unmerchantable. The first group includes all trees reaching a suitable size for timber and furnishing material for manufacture. The second group includes the remaining smaller trees of the county, their principal use being as props, charcoal, or cordwood.

Merchantable Species.—This group includes the six conifers found in the county and 38 of the hardwoods. The trees that occur in measurable quantities (as shown in the preceding tables) and furnish the bulk of the merchantable timber are: White Pine, Black Spruce, Red Spruce, Hemlock, Yellow Birch, Sweet Birch, Beech, Chestnut, White Oak, Chestnut Oak, Red Oak, Sugar Maple, Red Maple, and Basswood.

The common trees of the upper slopes and ridges are: Chestnut, Red Oak, White Oak (Plate XXII, Fig. 2), Chestnut Oak, and Sweet Birch (Plate IX, Fig. 1), on the lower slopes and along the streams, Hemlock (Plate XXII, Fig. 2), Basswood, Beech, Sugar Maple, and Yellow Birch predominate, while in the swamps and mountain meadow lands Red and Black Spruce, White Pine and Red Maple are common.

Of the better class of timber trees occurring in the county, but not in measurable quantities, Black Walnut, the hickories, the elms, Cucumber-tree, Tulip-tree, and White Ash are found on the richer slopes and along the streams; Red and Black Ash and Black Cherry in the mountain meadow lands; and on the ridges and drier upper slopes Yellow Oak, Scarlet Oak and Black Locust. The latter occurs as a seedling growth following fire on cut-over lands.

A third class of merchantable trees of lesser importance (partly due to their poor development here) includes Pitch Pine, Tamarack, Butternut, White Willow, Aspen, Large-tooth Aspen, Sycamore, Flowering Dogwood, Black Gum, and Persimmon. With these may also be included Red Mulberry, Sassafras, Hornbeam, and Blue Beech, which are of slight importance and are used only by farmers and woodsmen for special purposes.

The Pitch Pine is a low, knotty tree of the cut and burned ridges, valueless as a commercial timber. The Tamarack is found only in the swamps in small quantities and poorly developed. The Sycamore occurs only on the larger streams and seldom reaches a large size. The other trees are more widely distributed and have a fair development.

Unmerchantable Species.—The trees of this group include seventeen species, and all are hardwoods. They are small trees, or in many localities merely shrubs. The common trees of the group found on the ridges and dry slopes are Barren Oak, Mountain Ash, the Sumachs, Angelica-tree, and Mountain Laurel; along the streams Papaw, Witch Hazel, Sweet Crab, Serviceberry, Scarlet Haw, Redbud, and Blue Dogwood occur; the Striped and Mountain maples are found on the steep river slopes and the Rhododendron and Sheepberry in the swamps.

The dense undergrowth and thickets in many parts of the county are formed by trees of this group. The Mountain Laurel and Rhododendron often make almost impenetrable thickets in the swamps and along streams. On the ridges and dry slopes the Barren Oak and Mountain Laurel have frequently taken complete possession of the ground after fire and form low, dense thickets. The Sweet Crab and Scarlet Haw also form thickets from 10 to 20 feet high in the moist level glade land along streams.

LUMBERING.

Garrett county has lumbering interests second to none in the state. Their rapid growth in the past few years is due to the activity of the mills cutting Hemlock. Three large mills are at work in the county, one is building (Plate XXVI, Fig. 2), and there is prospect of another. One of the mills has finished cutting its Garrett county holdings and brings logs from West Virginia. Two West Virginia companies secure part of their material from the slopes of Backbone Mountain. These large mills cut the hard and soft wood with the Hemlock, and thus lengthen their operations. Unless the mills acquire and cut the defective ridge forests, they will have to be closed within the next ten years.

The present annual cut of the mills of the county is about 25 million feet. The small portable mills, of which there are a number in the county, cut less than one-fifth of this annual output. The bulk of the lumber cut is Hemlock, while Spruce, White Pine, Chestnut, Oak, Maple, Beech, and Basswood furnish the remainder. The principal manufactured product is lumber and with it large quantities of lath, shingles and barrels are produced.

The object of the large companies is to cut and market as rapidly as possible all material on their tracts. The mills are located on streams and the logs are brought from the woods over logging railroads. In one case the haul is over 15 miles. The mills are connected with the Baltimore and Ohio Railroad by means of spurs and load their product for shipment direct from the yards.

The small mills do not run steadily and the quality of lumber produced is generally poor. Their cut is mainly hardwood and is, in many instances, from culled forest or small isolated bodies of fair timber. The logs are brought to the mills by teams and the manufactured lumber is hauled by wagons to shipping points. A few small mills are making soft-wood shingles, but find it difficult to obtain material for a continuous run.

The present unconservative methods of lumbering in the county are rapidly denuding the best timber lands. No attempt is being made to insure a future supply. The cut is as close as possible, and includes all material that can be marketed. Little care is exercised to prevent fires after lumbering and the greater part of the slashings are burnt over. The fires have been so severe in places as to completely kill all timber and other growth left on the land. This is especially noticeable on the Spruce and Hemlock slashings.

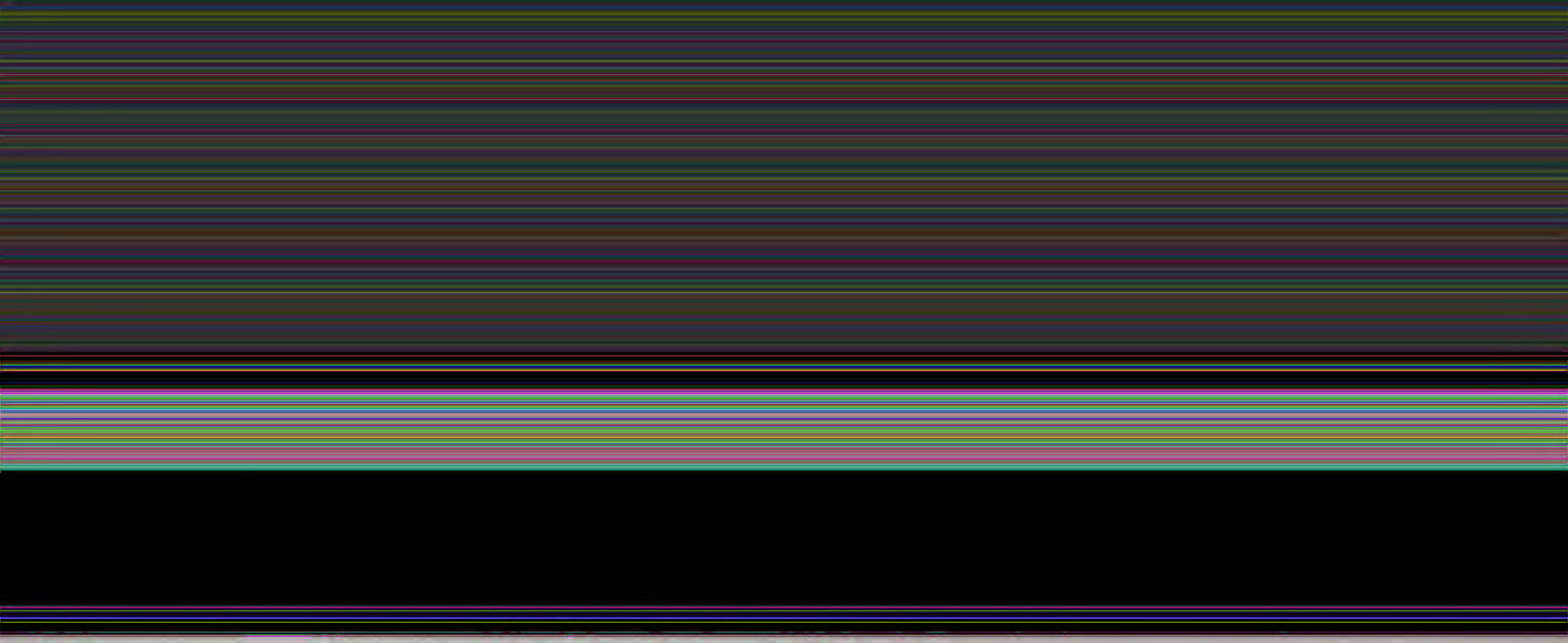
FOREST FIRES.

The future of Garrett county as a lumber producing region is not bright. This is due to the severe lumbering and to the prevalence of forest fires in the county. The problem of protecting the cut-over and culled forest lands is here, as in all the principal lumber regions of the United States, one of paramount importance. No single prob-

FIG. 1.—RIDGE TIMBER, CHESTNUT AND OAK, BACKBONE MOUNTAIN.

FIG. 2.—CUT AND CULLED FOREST, HEMLOCK LANDS, CASTLEMAN RIVER.

FORESTS OF GARRETT COUNTY.



lem confronting timber production in the county outranks this. Fires in the forest are usually the result of carelessness. In sections where logging companies employ locomotives, fires from carelessness are very common. The condition of the cut-over lands on the Youghiogheny river, Bear Creek, and Cherry Creek is a good illustration of the indifference of the lumber companies of the county to damage by fire. Thousands of young Spruce and much good material cut and skidded were destroyed or injured by fire last year in the cutting between Negro and Meadow mountains. Fires on the ridge have rendered the trees there defective and in places even the humus and thin layers of soil over the rock have been destroyed. A similar damage is also noticeable on the Hemlock cuttings along the Youghiogheny river and Bear Creek. Large areas of cutlled Chestnut and Oak lands in all parts of the county have been burned over and thrifty young sprouts and seedlings were killed and in many cases the stumps also. Repeated fires in some sections have completely destroyed the valuable trees, especially on the ridges where the burns are now waste tracts covered with only a low growth of Barren Oak, Mountain Laurel, and scattered patches of scrubby Pitch Pine.

Through neglect and indifference one of the county's chief sources of revenue is rapidly disappearing. Its growing industries will be seriously crippled if some action is not taken to prevent the cutting off of the local supply of wood materials.

USES OF WOOD.

The wood of Garrett county reaches the market in two forms, either as a manufactured product or as a raw material. The manufactured products are, lumber (including plank and square or dimension stuff), shingles, lath, barrels, and excelsior. The raw material marketed includes pulpwood, mining timbers, spars, railroad ties, fencing material, fuel and tanbark. In value and amount the manufactured products exceed the raw material.

LUMBER.—Most of the timber cut in the county goes to the mills and is sawn into boards, plank, or dimension stuff. The combined daily cut of the mills averages about 100,000 feet, board measure.

The coniferous lumber comes from Hemlock, Spruce, and White Pine. Oak and Maple furnish most of the hardwood lumber, while smaller amounts of Beech, Birch, and Basswood are manufactured.

Lath, Shingles, Barrels and Excelsior.—Some of the large lumber mills also manufacture lath and shingles from their softwood slabs, while a few small mills in the county make nothing but shingles. The annual output of the shingle mills is small compared with the lumber produced and the run of the mills is irregular owing to the scarcity of suitable material.

A barrel factory operated in connection with one of the large mills uses all of the good White Oak on the company's tract.

A small mill at Blaine is engaged exclusively in the manufacture of excelsior. Small but entire logs are used.

Pulpwood.—The trees commonly used for pulpwood are Spruce, Basswood, Cucumber-tree and Tulip-tree. There is, however, no extensive cutting in the county for pulpwood alone. Only small inferior trees and tops reach the pulp mills. Softwood slabs from the saw-mills are sometimes used for certain grades of pulp. The annual cut of pulpwood varies and is never large. The nearest market for this material is at Luke, Allegany county, on the Potomac river.

Mining Timbers.—The demand for these materials is a growing one and of considerable importance. The mines of the Georges Creek valley in Allegany county and those surrounding Piedmont are the principal users of mine timbers. Savage Mountain is being stripped of its timber to furnish these mines. Any sound tree six inches in diameter may be used for props. The culled forests and other sprout-lands yield a fair amount of prop timber. Further growth of the mining interests of the county will probably create a large demand for mine props and lagging, so that in the future the production of this timber is likely to be an industry of great importance to the county.

Spars.—Spruce is the only timber in the county used for spars. Formerly in cutting a tract of Spruce the spars were the first material removed, as only the very best of the trees could be used. The spar

industry, however, is practically at an end. The last body of Spruce fit for this purpose is being cut now, and the land from which the timber is being taken will probably be used for agriculture, so that it is not likely that a second crop of Spruce will be grown.

Ties.—The timber used for ties is mainly of small size, or of inferior quality. The logging and coal roads use most of the ties cut. Hemlock, Beech, Birch, and Maple are used by the logging roads, while a better class of ties are cut from White Oak, Chestnut Oak, and Chestnut for the Baltimore and Ohio Railroad. The cutting is done by farmers or small contractors during the winter or other dull seasons. The ridge and culled forests furnish most of this timber.

Fencing Material.—Farmers readily obtain plenty of good fencing material from the large areas of culled or virgin forests surrounding the agricultural valleys. Second growth Oak, Chestnut and Locust may be had on many of the culled areas, while the ridge forests furnish plenty of Oak and Chestnut for this use. Chestnut is preferred for rails, while White Oak, Chestnut Oak, and Locust are used for posts.

Fuel.—The use of wood for fuel is probably less in Garrett than in any other county in the state. Coal is very cheap and many farmers dig a supply on their lands. Coal is commonly used for all heating purposes and even for burning lime. This general use of coal for all domestic fuel makes it impossible to dispose of the waste hardwood tops left left by lumbermen. Thousands of cords of good Oak, Chestnut, and other hardwoods are left to rot in the woods, and this large amount of slash always adds to the fire danger. The future will probably see but little increase in the demand for fuel, and unless some industry using small and inferior material is introduced, the fullest utilization of the hardwood cut is impossible. Charcoal kilns, acid factories, and tool handle or spool mills, would be able to use the wood now going to waste in the county.

Tanbark.—All of the Hemlock and Chestnut Oak bark peeled in the county finds a ready market at the tanneries of neighboring counties. The nearest market is just across the Potomac in West Virginia. While the amount of Chestnut and Oak bark produced is

small, the lumber companies annually peel large quantities of Hemlock bark from the timber cut on their tracts.

The following table will give an idea of the yield of bark per acre of the types producing Hemlock. The present stand for the county is also shown:

TABLE NO. 11.

HEMLOCK BARK.

Trees 12 inches and over in diameter breast-high.

Sub-type.	Area. Acres.	Average Stand per acre. Cubic Feet.	Cords.[1]	Total yield. Cubic Feet.	Cords.
Hemlock	143	857.35	9.49	122,109	1,357
Hemlock and hardwoods	1,260	312.27	3.47	393,705	4,442
Spruce	730	287.56	3.20	210,138	2,336
White Pine	3	176.45	1.96	529	6
Total	2,136	330.73	3.77	732,473	8,141

FUTURE PROTECTION AND UTILIZATION.

Thus far only the present condition of Garrett county forests and the present crop and its removal have been considered. With the removal of the original stand of timber the owner of forest land usually ceases to consider a further yield. It is believed that this conception of a lumbered forest as a "dry well" is largely responsible for the poor condition of Garrett county forests. Fires are allowed to sweep across cut-over lands, killing sprouts and seedlings because the owner does not fully realize the amount of damage done. Therefore, if he endeavors to prevent fires on his lands it is chiefly because his fences, grain crops, or buildings are in danger, or he fears a law-suit, should the fire spread to a neighbor's land. As long as this view is held by forest owners the principles of practical forestry will never be seriously considered.

Possible Timber Production.

That the cut-over lands are, in most instances, capable of producing a never-failing amount of timber if properly managed is readily seen. If a given tract of land has in the past produced a forest and has not

[1] A cord of piled bark equals 90 cubic feet.

FIG. 1.—HEMLOCK LOGS ON SKIDWAY, CASTLEMAN RIVER.

FIG. 2.—NEW SAW MILL, CASTLEMAN RIVER.

been subjected to fire which may destroy its capacity to support, or delay the establishment of, tree growth, it is reasonable to suppose that it will again produce forest trees. The belief of the farmer in the crop-producing power of his land leads him to continue to plow, plant and cultivate a crop. The forester's belief in the continued productiveness of soil leads him to start and tend a crop of trees, using methods different from the farmer's methods only in the length of time needed to mature the crop. The axe, instead of the hand or hoe, is used in thinning and weeding, and the saw and wedge, instead of the scythe and reaper, at the harvest. The difference is in degree rather than in kind.

Management of Forest Lands.

If it is admitted that the lumbered areas are capable of again supporting tree growth, we have but to start a new crop (in many cases it is already started) and care for it until maturity in order to harvest a second crop. With care this process may be carried on from generation to generation and the land need never be idle.

The thought, however, of tending a crop that takes from thirty to sixty years to mature is one that seldom appeals to private individuals. The farmer gets returns from his crop in a few months, the orchardist in from five to ten years, while the forester seldom harvests a crop under thirty years. Although this may keep many from planting trees for timber, it need not prevent owners of forest lands with timber well along toward maturity from caring for and improving their growing crops. The small holder should never allow his forest to be completely cut over, if he is unwilling to wait a long period for the second crop. It is best for him to practice a selection system in which a certain amount of material is marketed every year and the cutting so regulated as to improve the condition of the remaining trees. For instance, if a farmer owns 100 acres of young Oak and Chestnut in a dense stand, thirty to forty feet high, he may remove some of the trees that will make posts, rails, or ties; these trees should be selected from different places in the stand not be taken from one spot. Single trees of suitable size

which are crowding others may be removed, giving the remaining trees a better chance to grow. If there is a sale for cordwood, mine props, or small material, the crooked, decayed, least desirable species, or injured trees may be removed, leaving the thrifty, straight, and more merchantable kinds for future cuttings. By following this method forests that are now full of broken, decayed, and stunted trees and undesirable species may later become woods of only steadily growing merchantable trees, with tall, clean stems. This improvement can be made with but little cost to the owner, and in many cases the thinnings will yield a revenue. If in the farmer's lifetime the remaining crop does not mature, he still has had abundant material for home use and for sale year by year, and the forest, worth perhaps $400 when he began to care for it, will when he dies have 200 to 400 trees per acre that will cut two ties per tree, and the crop at ten cents per tie will be worth $40 to $80 per acre. Instead of leaving to his children $400 worth of inferior woodland, he leaves them $4000 to $8000 of merchantable tie timber, which they may sell or further improve by caring for the trees until they reach larger timber sizes. In this calculation taxes may be disregarded, as the farmer seldom sells his wood land, but pays the taxes year after year on land producing poor timber crops, or none at all.

Fire Damage.

If a farmer decides to systematically improve his woodlands, considering them as an interest bearing investment, he should protect his forest crop. The greatest danger to which Garrett county forests are subjected is fire. The damage due to fire is never fully realized by the majority of forest owners, unless mature timber is killed outright. But every light surface fire running through the woods injures the growing crop. The fallen leaves are essential to the best development of the trees, for by their decomposition they return food material to the soil, form soil over rocky places, and prevent the evaporation of soil moisture by acting as a close covering or mulch in periods of little rain. Surface fires burn the leaves and in very dry seasons the partially decomposed leaves and twigs also that constitute the

upper layers of the soil, and, in rocky places, the only soil. Besides this damage, seedlings up to a few feet high are killed by surface fires, and, as in many cases, these are the trees which should furnish a new crop when the older ones are removed, the damage is a very serious one. Often the litter of leaves, branches and fallen trees is so great as to enable surface fires to injure the boles of the larger trees; the bark is killed on one side, decay enters, and later the whole tree becomes worthless from the spread of rot in the stem. Where sprout lands are burned, the damage is often even greater than in the older forest. Here the sprouts are killed, putting back the growth five or ten years, and often the stumps and young seedlings among them are destroyed, and the future stand, instead of being a dense one of Chestnut and Oak, is an open one or a low thicket of Mountain Laurel and Barren Oak. Repeated fires, especially on rocky, shallow ridge soils, destroy every vestige of tree growth, burn the humus from the soil, and leave the land in such a condition that for years it refuses to produce a forest cover.

Fire Protection.

To produce the best wood crops fire must be kept from forest lands. This is best done in the case of woodlands of a few hundred acres by surrounding the timbered area, if possible, with a belt of cleared land to prevent fires from reaching it from adjoining woods. By keeping the roads and trails through the woods free from brush and weeds and by cutting and burning along them once a year it is possible to confine surface fires started within the forest to small tracts, and to back-fire if necessary to check fires with much headway. After these precautions are taken, watchfulness during the dry season when fires are most prevalent will reduce the fire danger to a minimum. With the danger from fire removed, the wood crop of Garrett county is practically assured.

Care of the Forest Crop.

Besides fire protection, the amount of time and care spent by the owner on a forest property must be determined by his object in grow-

ing trees. If he desire simply cordwood or fencing, but little care will be needed beyond the removal of trees that are crowding and stunting the main crop. Work in the forest should be done gradually, as the material cut can be utilized and at a season of the year, as in winter, when farm work is light.

If the farmer desires better material from his woodlands than cordwood more care and attention will be necessary. To produce ties or lumber careful thinnings must be made and only those species allowed to reach maturity which yield such materials. The stem should be tall and free of limbs, necessitating a thick stand in youth to kill the lower limbs. As the trees mature thinnings must be made to induce a good diameter growth. A little thought and care on the part of the small forest owner will result in a much improved forest crop.[1]

The treatment of larger tracts not held in connection with farm lands or other revenue producing areas, as mines or quarries, should be similar to that for woodlots. The necessary annual expenditure for protection and taxes on large tracts of land, from which, owing to their burnt and cut-over condition no return can be expected for a long period of years, is the greatest drawback to this form of investment. For this reason large lumber firms and individual owners usually dispose of the better portions of their cut-over lands to adjoining property owners. The unsalable portions are neglected and often revert to the state through unpaid taxes.

Michigan, Pennsylvania and New York have found it wise to purchase and set aside as forest reserves large areas of these abandoned lands. The object of the reservation is to preserve the beauty of certain regions, furnish breeding grounds for game, prevent erosion and floods, and to furnish the wood consuming industries of the state

[1] If a more detailed plan of management is desired for the woodlot, the Bureau of Forestry, U. S. Department of Agriculture, is prepared to supply such a working plan, the terms of arrangement for which are outlined in Circular 21. The Bureau also offers tree planting plans, the terms of which are set forth in Circular 22. Copies of these circulars can be had by applying to the Bureau of Forestry, Washington, D. C.

with the necessary materials. The state rather than an individual can afford to hold and protect large areas of forest land from which no immediate revenue is obtained because of the indirect as well as the direct benefits derived. Pleasure resorts, game preserves, and protected watersheds are benefits for which the state is or should be willing to pay, while the individual is interested chiefly in the direct money returns from his investment.

Walter Mulford

MARYLAND STATE BOARD OF FORESTRY

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THE WOOD-USING INDUSTRIES OF MARYLAND

BY

HU MAXWELL, EXPERT
United States Forest Service

WITH A CHAPTER ON

MARYLAND'S LUMBER AND TIMBER CUT AND THE TIMBER SUPPLY

BY

F. W. BESLEY

PREPARED IN COOPERATION WITH THE UNITED STATES FOREST SERVICE,
UNDER THE DIRECTION OF F. W. BESLEY, STATE FORESTER, AND
H. S. SACKETT, IN CHARGE OF WOOD UTILIZATION,
UNITED STATES FOREST SERVICE

BALTIMORE, MD.
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INTRODUCTION

The Bureau of the Census, in cooperation with the United States Forest Service, compiles and publishes statistics annually showing the output of sawmills by States and for the whole country. The cut in Maryland in 1908 was 165,534,000 feet, board measure, reported by 384 sawmills. This was one-half of 1 per cent of the total cut in the United States for that year, and was a falling off of more than 21 per cent from Maryland's lumber cut for 1907. The decline was general throughout the country in that year, and for the United States was 17½ per cent. The lumber output as shown in these figures does not include pulpwood, tanbark, tanning extracts, cross-ties, telegraph and telephone poles, or cooperage and veneer stocks.

After lumber leaves the sawmill it serves many useful purposes. Some of it passes through no additional process of manufacture but goes into buildings with only the cutting and fitting which carpenters give it. Another part is further manufactured before it is used. Wood-working machines of many kinds change its form, and it is cut and fitted by skilled labor, and the rough lumber is converted into finished products, such as boxes, frames, doors, sash, vehicles, boats, baskets, musical instruments, furniture, brushes, toys, handles, novelties, and many more. This study has to do with that part of the lumber only which passes through further process of manufacture after it leaves the sawmill.

Heretofore, lumber has not been very carefully followed after leaving the saw, to ascertain what becomes of it, what new forms are given it, and into what commodities it enters. It has been known in a general way that some of it is used in its rough form, while some passes through additional processes of manufacture. The present study of the wood-using industries of Maryland was undertaken to supply information concerning the lumber which is not used in its rough form. The work has been done by the United States Forest Service in cooperation with the State of Maryland. Industries which manufacture

commodities partly or wholly of wood were asked to furnish data along their special lines, and this report is based on their replies, supplemented by independent investigation in all parts of the State.

Statistics thus collected and published are expected to be useful to both the growers and the manufacturers of wood. It is shown what part of the total demand, and the demand for each species, is met by forests and woodlots of the State, and what part is supplied from without. The kinds of wood demanded by the various industries are shown, together with the quantity of each species used, the prices paid at the factories, and into what commodity each wood is manufactured. With this information before them, the woodlot owners who are looking to the future can determine what kinds of timber promise best returns, and they can give preference to those kinds. Owners of timber can form an intelligent opinion as to where the best markets may be found for what they have to offer. On the other hand, the manufacturer who is in the market for woods of certain kinds will have the means to determine whether he can buy near home or whether he must look beyond the State; and a study of average prices paid by others will show whether or not he has been buying on an equal footing. A closer acquaintance between buyer and seller, with a better understanding of what one has to sell and the other wishes to buy, will be of mutual benefit. The utilization of factory waste is an important problem, and it was duly considered in this study. An attempt was made also to ascertain and note the smallest sizes of lumber that the various industries can profitably use.

A history of lumber operations and markets, and of past uses of wood in the State was not undertaken, though it would have brought out many interesting facts. It was deemed sufficient if present conditions were shown, thereby making it possible to formulate an intelligent policy for future operations.

MARYLAND'S
WOOD-MANUFACTURING INDUSTRIES

WOOD-MANUFACTURING IN MARYLAND

Maryland manufacturers converted 284,346,895 feet of rough lumber into finished products in 1909. These figures do not show the total quantity of wood of all kinds and for all purposes used in the State, perhaps not half of it. They deal only with that portion of the cut of sawmills which, after it leaves the saw, is further worked by machinery, or, at least, by the expenditure of considerable labor upon it before it takes its final form. Lumber which goes into what is generally known as rough construction is not included, nor are railroad ties, telegraph and telephone poles, mine props, wharf piles, fence posts, shingles, and clapboards. The mere cutting off or mortising of beams and planks to fit them in frames, trestles, and bridges, does not constitute sufficient manufacture to bring them within the scope of this study. Many finished commodities are shipped into the State ready for use, and these, too, are excluded from the tables which follow, because the manufacturing was not done in Maryland. Much furniture and woodenware fall in this class, and many vehicles. The distinction between commodities manufactured in Maryland and those made elsewhere and shipped in to be sold, excludes large quantities of planed and matched flooring which comes from mills in the South and West, and much interior finish and turned work.

The cost at the factory of the wood used by the Maryland manufacturers was $5,878,691, or an average price of $20.67 per thousand feet board measure. The average cost of state-grown wood was $14.44 per thousand, and of that shipped into the State from the outside, $22.25. The State supplied 57,530,500 feet, and the balance, or 226,816,395 feet, came from other States, and to a small extent from foreign countries—20 per cent being state-grown—at a total cost of $830,679.66, and 80 per cent from the outside at a cost of $5,047,952. No attempt has been made to ascertain or estimate the value of the finished commodities made of wood in the State. The market for these products is world-wide. In many instances a single manufacturer

ships to every continent, and there are few important commercial cities in the world to which articles wholly or partly of wood, and made in Maryland, do not go.

The principal primeval forests of the State were culled or cut out long ago, but new growth has been extensive and valuable. The cut

TABLE 1.—*Kinds of Wood used, Quantity of Each, with Total Cost, and the Per Cent grown in the State and out.*

Species.	Feet used. B. M.	Cost at factory.	Grown in Maryland. (Approximate per cent.)	Grown outside of Maryland. (Approximate per cent.)
Loblolly pine	130,699,500	$1,886,355	25	75
Longleaf pine	27,899,000	702,212	..	100
White oak	22,030,800	844,000	15	85
Cypress	19,274,500	519,465	..	100
Scrub pine	17,000,000	173,500	65	35
Yellow poplar	11,107,000	278,661	10	90
Tupelo	10,416,000	162,597	4*	96
White pine	8,711,000	277,129	5	95
Red oak	5,597,500	48,985	26	74
Basswood	5,490,050	148,143	1	99
Chestnut	3,719,000	78,096	37	63
Red gum	3,133,000	46,240	77	23
Sweet birch	2,434,000	68,980	4	96
Hemlock	2,002,000	48,082	..	100
Sugar maple	1,924,000	48,779	9	91
Beech	1,672,000	31,332	3	97
Sugar pine	1,360,000	53,950	..	100
Cottonwood	1,015,000	17,470	..	100
White elm	1,010,000	18,990	30	70
Locust	936,000	16,200	100	..
Ash	897,675	35,246	7	93
Spanish cedar	871,000	26,030	..	100
Spruce	713,000	23,990	..	100
Pitch pine	626,000	9,235	98	2
Hickory	557,000	25,227	50	50
Black walnut	548,500	48,210	1	99
Circassian walnut	506,500	101,125	..	100
Mahogany	483,500	76,775	..	100
Douglas fir	262,000	13,840	..	100
White cedar	252,000	10,660	..	100
Chestnut oak	220,000	4,400	75	25
Cherry	209,500	11,591	3	97
Yellow buckeye	200,000	4,000	..	100
Sycamore	160,000	2,350	62	38
White birch	152,000	3,090	..	100
Black gum	85,000	2,450	70	30
Red cedar	61,000	2,570	..	100
Balsam fir	50,000	1,000	..	100
Dogwood	16,000	390	100	..
Teak	10,200	2,540	..	100
Live oak	10,000	400	..	100
Lignum-vitae	7,070	3,300	..	100
Hackmatack	5,000	250	..	100
Rock elm	4,000	104	..	100
Cucumber	3,000	120	67	33
Red mulberry	2,000	56	..	100
Pin oak	2,000	60	50	50
Butternut	1,000	15	..	100
Rosewood	600	220	..	100
French walnut	500	125	..	100
Holly	350	36	..	100
Ebony	100	50	..	100
Tulip wood	25	5	..	100
Boxwood	25	5	..	100
Total	284,346,895	$5,878,631	20	80

* It is not improbable that some of the wood reported as tupelo was black gum.

of loblolly pine is larger than that of any other two species, and the greater part of the loblolly is second growth. Of the fifty-four woods reported by the Maryland manufacturers, twenty-seven were supplied wholly or in part by the State, while the country at large and the world were drawn upon for the twenty-seven others. Nine of the woods reported do not grow in commercial quantities in the United States. They are boxwood, tulipwood, ebony, French walnut, rosewood, lignum-vitæ, teak, mahogany, and Circassian walnut. Of the Maryland-grown pines, the largest use after loblolly was scrub pine (*Pinus virginiana*), a wood which was formerly seldom used for anything except fuel. The important place which it now occupies shows that efforts to utilize waste have been successful to an encouraging extent.

In compiling this report, a painstaking effort was made to keep species separate as far as it was practicable to do so. They were not grouped as "pine," "oak," "hardwoods," etc., but as white oak, red oak, live oak, longleaf pine, red gum, etc. The identification and listing were probably not successful in all cases, and in other instances, where use is confined almost exclusively to one species, though the genus includes others, a common term as "ash," or "hickory," was deemed sufficient. In Table 1, which follows, all the kinds of wood reported are brought together. In another part of this report, beginning on page 49, all the species are listed alphabetically, and the various uses reported for each are given.

The State produces two woods in sufficient amounts to meet the requirements of its manufacturers. These are locust and dogwood. They are not timber trees of first importance, yet they are of considerable value in Maryland. An exceptionally large use of locust was reported, the total being 936,000 feet, costing $16,300, while in 1908 all the mills in the United States reported an aggregate cut of only 1,327,000 feet. This should not be taken to mean, however, that Maryland produces and uses 70 per cent of the locust of the whole country. The figures are probably explained by the fact that the mills of the country reported only what they sawed into lumber, while the Maryland manufacturers included all the locust that came to them, only a very small part of which had ever been in a sawmill. Locust generally goes to the shop or factory as logs, billets, or treenails, and for this reason the report of sawmills includes only a small part of the country's total output of the wood. The sawmill output of dog-

wood in the United States in 1908 was 261,000 feet, and in 1909 the Maryland manufacturers used 16,000 feet, or 6 per cent of the reported total for the year before. The same explanation should perhaps apply to dogwood as to locust, namely, that much of the output goes to factories without passing through sawmills to be listed as lumber.

Industries.

Maryland manufacturers put more lumber into boxes and crates than into any other industry, and if interior finish for houses is excluded, the quantity required for crates and boxes exceeds the combined demand for all other industries that manufacture wood. A smaller amount is made into interior finish, but it is of higher grade than the box lumber and costs more. Nearly 48 per cent of all the wood is made into packing cases of various kinds, and the total cost exceeds $1,800,000. Interior finish takes 28 per cent, but its total cost exceeds $2,200,000. Box lumber is the cheapest, basket material next, while the most costly is for musical instruments, $50.90, while that required for tanks and silos is only a little less, $48.13.

Manufactures are grouped under thirteen headings, shown in Table 2. These might have been subdivided, but by so doing the amount of wood used by each would have been reduced, and no corresponding advantage would have resulted. Cooperage and baskets are very closely related in some of their features, and in others they are far apart. The chief reason for making a separate division for cigar boxes, rather than include all under the heading of boxes and crates, was that cigar box making is a distinct business, certain woods are used almost exclusively, and those who make boxes for cigars seldom make any other kind. The average price of lumber that went into ordinary boxes was $12.31 per thousand, while cigar box wood costs more than twice as much.

Table 2 sets forth in condensed form the comparative amount and value of the lumber that was required by the different industries. The quantity used by all was 284,346,585 feet, and the average price was $20.67 per thousand. If these figures are borne in mind the table will show at a glance which industries paid more and which less than the average, and the comparative as well as the absolute quantity of lumber used by each one will be shown. A second part of the table

TABLE 2.—*Wood-using Industries, Cost of Lumber at the Factories, Per Cent which Each Industry used of the Total Quantity, and the Amount and Average Cost of State-grown and Outside-grown Woods.*

Industries.	Total quantity of lumber used. (Feet B. M.)	Average cost per factory per M. (f. o. b.)	Total cost.	Apportionment of quantity of lumber among the industries. (Approximate per cent.)	Grown in Maryland.		Grown outside Maryland.	
					Feet.	Average cost per factory per M feet.	Feet.	Average cost per factory per M feet.
Boxes and crates	135,373,000	$13.31	$1,813,578	47.92	37,593,000	$11.69	98,980,000	$13.93
Interior finish	81,356,000	27.46	2,234,040	28.61	9,118,500	13.05	72,237,500	28.14
Furniture	17,774,675	29.33	521,108	6.25	593,100	21.36	17,182,675	29.59
Miscellaneous	14,876,870	26.78	398,393	5.33 +	1,268,750	18.73	13,608,139	27.53
Cooperage	8,563,000	30.23	261,780	3.05 —	2,467,000	9.45	6,196,000	38.64
Baskets	7,136,000	13.77	98,235	2.61 —	3,425,000	13.76	3,711,000	14.69
Boats	6,360,700	34.69	220,302	2.24 —	1,648,600	11.03	4,702,100	35.97
Tanks and silos	2,539,000	48.13	122,218	.89 +	.....	.....	2,539,000	48.13
Cigar boxes	2,374,000	29.87	70,920	.83 +	.....	.....	2,374,000	29.87
Horse vehicles	1,956,300	36.89	72,180	.69 —	1,083,050	39.96	873,250	59.95
Brushes	1,830,000	14.93	27,300	.64 +	600,000	7.50	1,230,000	18.54
Store and office fixtures	1,658,000	40.49	66,990	.58 +	.....	.....	1,658,000	40.49
Musical instruments	1,559,350	50.90	79,364	.55 —	24,500	34.61	1,534,850	51.26
Total	284,946,895	$30.67	$5,878,631	....	57,530,500	$14.44	226,816,395	$33.56

separates the wood for each industry into that grown in the State and that brought from without, and cost is figured on that basis. In every case the average cost of lumber from without was greater than that grown in the State, which is no cause for surprise since freight is in all cases added to the mill prices, and the longer the haul the higher the freight must be. The average cost in the State was $14.44 and outside $22.25. The difference in some instances is much greater than the difference in freight between the home and the outside haul. The wood for horse vehicles, for instance, costs $29.96 if grown in Maryland, and twice as much if brought from without. The reason for this can not be shown in a table condensed from hundreds of reports as this one is, but it is safe to conclude in all cases where the difference in cost is so great, that the higher price was paid for a much higher class of wood. The difference is even greater in the cost of wood for cooperage, and for the same reason. Perhaps the difference in cost between state-grown and imported box lumber very nearly represents the difference in freight, for there was little difference in the kinds of lumber used. It is worthy of note that three of the industries listed in the table reported the use of no Maryland-grown wood. These are tanks and silos, cigar boxes, and store and office fixtures.

Boxes and Crates.

Seventeen kinds of wood are used by the box makers of Maryland, who consume 136,000,000 feet a year or nearly 48 per cent of all the wood demanded by the manufacturers of the State for all purposes. Loblolly pine heads the list in quantity and cost, and scrub pine is second with 17,000,000 feet. The bulk of the cut of scrub pine in the State was bought by box makers, and it was their cheapest material. The Maryland product cost $8.18 per thousand feet, and the imported scrub pine, which came principally from Virginia, averaged $18.92. The Maryland-grown wood of this species was the cheapest of all the lumber reported by the manufacturers of the State. It has been extensively cut for fuel for many years, but its use for lumber is of a more recent date. The trees are usually small and knotty, and the logs are often sawed in wane-edge boards and go in that form to the box mills where they are run through edgers, and are then cut to required lengths for boxes and crates. The home-grown loblolly costs

$2 a thousand more than scrub, but that brought from without the State costs nearly $1 a thousand less, as is shown in Table 3.

A large portion of the demand for boxes comes from the fruit and vegetable growers in the eastern part of the State. Another large demand comes from the wholesale merchants of Baltimore who use great numbers of packing cases in which to ship dry goods and other merchandise. The two classes of boxes are quite distinct. Those for dry goods are of better material, are better made, are generally larger, and cost more. A large part of the pine bought outside the State by Maryland box makers goes into the merchandise-packing cases. It is more expensive than the home-grown pine.

TABLE 3.—*Boxes and Crates.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Loblolly pine	98,799,000	$13.30	$1,314,099	24,082,000	$12.97	74,717,000	$13.41
Scrub pine	17,000,000	10.21	173,500	11,000,000	8.18	6,000,000	13.92
Tupelo	7,790,000	13.69	106,680	360,000	13.93	7,430,000	13.68
White pine	4,195,000	20.31	85,202	365,000	14.17	3,830,000	20.89
Yellow poplar	3,558,000	15.98	56,865	586,000	14.42	2,972,000	16.29
Cypress	3,320,000	13.96	46,340	....	.....	3,320,000	13.96
Pitch pine	615,000	14.41	8,860	600,000	14.50	15,000	10.68
Longleaf pine	355,000	25.35	9,000	....	.....	355,000	25.35
Buckeye	200,000	20.00	4,000	....	.....	200,000	20.00
Basswood	100,000	23.00	2,300	....	.....	100,000	23.00
Red gum	100,000	23.00	2,300	100,000	23.00	....	.....
Chestnut	94,000	13.19	1,240	....	.....	940,000	13.19
Sugar maple	50,000	25.00	1,250	....	.....	500,000	25.00
Beech	50,000	20.00	1,000	....	.....	500,000	20.00
Cottonwood	25,000	28.00	700	....	.....	250,000	28.00
Hemlock	22,000	11.00	242	....	.....	220,000	11.00
Total	136,273,000	$13.31	$1,813,578	37,093,000	$11.69	99,180,000	$13.92

Many boxes are made of tupelo, and they are often preferred to pine for packing provisions. The wood is not liable to impart taste or odor to the contents of the packages, though in this respect it is not preferred to yellow poplar or basswood. It is probable that the tupelo reported by manufacturers as growing in Maryland was some other wood of similar appearance, as the commercial range of tupelo extends into Maryland very little, if at all.

White pine was once the chief box material in all regions where it grew. It was strong enough, was light in weight and handsome in appearance, and was so satisfactory that its gradually advancing cost was the only reason for the substitution of other woods. More than

4,000,000 feet a year are still used in Maryland, notwithstanding its high price—twice that of scrub pine. It is a favorite material for shoe boxes, and for packing provisions. There are woods, however, which are preferred to any of the pines as packing boxes for provisions and confectionery. Among these are yellow poplar, basswood, cottonwood, and buckeye. These are light in weight and fairly light in color, but what gives them their chief value is that they are not liable to impart stain or odor to articles packed in them. Practically all the buckeye reported was made into candy and chocolate boxes, and a considerable part of the yellow poplar went for the same purpose. The box makers drew largely from cypress, but they used low grades, as the price indicates. Its average cost was under that of piedmont pine box lumber grown in Maryland. It is worthy of note that pitch pine bought by box makers was one of the woods which cost less when brought from without the State than when cut within. The supply from without came from Pennsylvania.

Interior Finish.

Eleven per cent of all the wood manufactured into interior finish grew in Maryland, and the home-grown constituted 9 per cent of the total value. The next largest in quantity used was loblolly pine, about one-fourth of which grew in Maryland. The next two woods most extensively used were not supplied in any part by the State, but came wholly from the South. They were longleaf pine and cypress. Of the 81,000,000 feet of lumber manufactured into interior finish in the State, 66,000,000 feet, or 81 per cent, were soft woods. White oak headed the list of hardwoods with less than 8 per cent of the total, or about 40 per cent of the total of the hardwood lumber. Its average cost was exceeded by seven woods on the list, as shown in Table 4, and one of these was white pine. The state-grown white oak cost $21 a thousand more than the imported. An examination of the reports of the manufacturers fails to explain why this was so, on any other ground than that the home-grown wood was of better quality and was better suited to the purposes for which it was bought. One-fourth of the white oak was cut in Maryland. The output of all kinds of oak lumber in 1908 for Maryland was about 45,000,000 feet, and its value at the mills averaged $18.57 per thousand. The most of this

was white oak, but exactly how much of it is not known. It is evident that a comparatively small amount of it was made into interior finish, and that small amount was carefully selected.

Nearly one-third as much red oak as white oak was used, and strangely enough, that which was cut in the State was very cheap, and that brought from without was more costly than the imported white oak, or more than three times as expensive as the red oak grown at home. In fact, as may be seen in Table 4, the Maryland-grown red oak was the cheapest lumber bought by the makers of interior finish. The very low price is to some extent due to the practice of some makers of finish who buy the logs and do their own sawing, and figure that the cost is what they pay for logs delivered at their mills.

Twenty-three woods are listed as material for interior finish, ranging in amount from longleaf pine down to butternut, and in price from Circassian walnut at $900 a thousand to loblolly pine at $14.80. Eleven of these were cut in part in Maryland.

Sugar pine holds an important place in this industry, and is ninth as to quantity in the list of twenty-five woods, and ninth as to value. It comes from California and Southern Oregon, and resembles white pine. It is the only far-western wood listed among the interior-finish materials in Maryland. The whole importation of sugar pine into the State, except 50,000 feet, was used in this industry. It is made into blinds, doors, sash, and frames.

A small quantity of live oak was reported from Virginia and North Carolina. This wood has seldom been listed for any commercial purpose other than shipbuilding, and for that reason its newly-found place among interior-finish materials is important, though the amount used is not large. It emphasizes a tendency to find uses for timbers heretofore neglected.

All of the cucumber reported by the manufacturers in the State went into interior finish, and the quantity was small. The output of cucumber in the United States in 1908 was 21,000,000 feet, and the chief cut was in Pennsylvania and West Virginia, States bordering on two sides of Maryland. Being in such close proximity to the principal sources of supply, it is remarkable that so small a quantity found use in Maryland.

All the butternut reported in the State was made into interior finish,

and the amount was very small. This wood has never been of much importance for lumber, though of excellent quality, and its importance will probably grow less in the future because the tree is becoming more valuable for its nuts than for its wood.

Ninety-six per cent of all the black walnut manufactured in Maryland was made into interior finish, and not a foot of that made into finish grew in the State. Only two of the woods used were more costly, and they were imported—mahogany and Circassian walnut. The quantity of Circassion walnut was comparatively large, and 99 per cent of all that was imported was made into finish. In value it is seventh on the list, though in quantity it is thirteenth.

TABLE 4.—*Interior Finish.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Loblolly pine	23,390,000	$18.98	$444,028	5,263,500	$14.32	18,126,500	$20.34
Longleaf pine	22,945,000	23.69	543,600	....	.....	22,945,000	23.69
Cypress	14,261,000	27.46	391,630	....	.....	14,261,000	27.46
White oak	6,133,000	37.70	231,200	1,555,000	53.82	4,578,000	32.22
Yellow poplar	3,205,000	35.43	113,565	277,000	27.73	2,928,000	36.16
White pine	3,095,000	40.24	124,550	60,000	29.83	3,035,000	40.48
Red oak	1,993,000	20.00	38,875	1,318,000	12.73	675,000	34.07
Sugar pine	1,310,000	40.88	53,550	....	.....	1,310,000	40.88
Sweet birch	1,155,000	30.90	35,680	....	.....	1,155,000	30.90
Chestnut	1,055,000	27.48	28,990	580,000	25.13	475,000	30.35
Hemlock	980,000	20.24	19,840	....	.....	980,000	20.24
Black walnut	528,000	89.66	47,340	....	.....	528,000	89.66
Circassian walnut..	500,000	200.00	100,000	....	.....	500,000	200.00
Mahogany	224,000	188.61	42,240	....	.....	224,000	188.61
Spruce	182,500	27.52	5,022	....	.....	182,600	27.52
Sugar maple	140,000	36.78	5,150	30,000	25.00	110,000	40.00
Ash	107,000	36.96	3,955	11,000	19.54	96,000	38.95
Basswood	53,000	25.11	1,331	22,000	18.22	31,000	29.93
Fir	50,000	20.00	1,000	....	.....	50,000	20.00
Cherry	36,000	26.66	960	....	.....	36,000	26.66
Live oak	10,000	40.00	400	....	.....	10,000	40.00
Cucumber	3,000	39.66	119	2,000	33.50	1,000	52.00
Butternut	1,000	15.00	15	....	.....	1,000	15.00
Total	81,356,000	$27.46	$2,234,040	9,118,500	$22.05	72,237,500	$28.14

FURNITURE.

Lumber for furniture-making was third on the list in Maryland in quantity and cost. It was 22 per cent of the amount made into interior finish, 13 per cent of the box lumber, and 6¼ per cent of all the wood manufactured in the State. In value it was 29 per cent of box material, 22 per cent of interior finish, and a little less than 9 per cent of all the woods reported. The average cost per thousand was nearly $2 more than for interior-finish lumber, but was less than that

bought for cooperage, tanks, boats, wagons, office fixtures, and musical instruments. Of the twenty-five woods listed, only eight were bought in Maryland, and not one was wholly a State product. The total quantity was 17,774,675 feet, as shown in Table 5, and less than 600,000 feet of it grew in Maryland. Nearly half of the whole quantity was white oak, and it made up more than half the value. That which was imported into the State cost nearly $10 a thousand more than the home product, and was 98 per cent of the total. Twelve of the woods on the list cost more per thousand than the white oak, and twelve cost less. Its average cost was $2.54 per thousand more than the average for all.

Furniture makers paid 81 cents per thousand more for red oak than for white oak, and all the red oak came from without, from as far west as Indiana, as far south as North Carolina, but chiefly from Pennsylvania and West Virginia. This wood was second on the list in quantity and value, and more than half of all of it used in the State was made into furniture. Some of the furniture makers express no preference for white oak over red oak, particularly for tables.

Sugar maple holds an important place as a furniture wood, and 75 per cent of all reported by manufacturers in Maryland was used in furniture factories. Less than 10 per cent of it was home-grown, though the price paid for Maryland maple indicated that it was considered much superior to that from elsewhere. The price for the home product was $3.79 per thousand more. The average value of maple in the United States, at the mills and including the whole cut, was $16.30 in 1908. Based on this, it would appear that the Maryland furniture makers bought their maple at a very reasonable price. It is worthy of remark that the Maryland furniture manufacturers reported the purchase of maple lumber from all six of the New England States, and not a manufacturer of any commodity in the State reported a purchase of this wood from farther west than West Virginia. Nearly one-half of all the maple lumber of the United States is cut in Michigan, and that State is generally considered the chief source of supply, and no explanation has been found of the fact that Maryland manufacturers reported no purchases there.

The yellow poplar manufactured into furniture cost, on an average, $14.39 per thousand less than that made into interior finish. When used as finish it is the outside visible wood and is selected for its

appearance; but much of that employed in furniture is made into backs, sides, and bottoms of drawers, into shelves, pigeon holes, partitions and compartments in desks, chiffoniers, and sideboards, and high-grade lumber is not demanded. The average mill-run value of yellow poplar in the United States in 1908 was $25.30 per thousand feet. The Maryland furniture makers had theirs delivered at their factories at $4.46 less.

Chestnut was fifth in quantity and sixth in value in the list of furniture woods, and there was little difference in the cost per thousand of the home-grown and the imported lumber. The average mill-run value of chestnut in Maryland in 1908 was $14.39, and for the whole country $16.27. The manufacturers used this wood both as the outside, visible material, and as the hidden frames, and for that reason they can find a place for about all grades that come from the mills. The State supplied 17 per cent of chestnut used in this industry, and the principal part of the importations were from Pennsylvania and West Virginia.

The sweet birch reported was practically all from other States, and its price was nearly $10 a thousand higher than the average price of the wood at the mills for the whole country in 1908. It is the outside material when manufactured in furniture, and a good grade is demanded.

Basswood, which in quantity was next to sweet birch, and in average value was almost identical with it, is the inside material when made into such furniture as depends on appearance for value; but when used in kitchen and laundry furniture it frequently forms the entire article. Its white color, its freedom from odor, and the ease with which it may be kept in a sanitary condition, make it popular for kitchen and pantry safes, and for cupboards. The average mill-run value of basswood in 1908 for the whole country was $20.50. The Maryland furniture makers paid an average price of $26.08 for theirs. They bought it in the six States, Maryland, Kentucky, Tennessee, Wisconsin, Virginia, and West Virginia.

Little black walnut was made into furniture in Maryland. It was formerly in much demand for that purpose, but other woods have now taken its place, and the walnut goes to other industries. Of the twenty-five woods on the Maryland furniture list, black walnut is next to the least in quantity, French walnut alone falling below it. The amount

of cherry is also disappointing, as shown by Maryland reports, and is doubtless much smaller than it was several years ago, though there are no statistics to show it. Sweet birch has largely taken the place of cherry as a furniture wood. It has done so because it is cheaper. The Maryland furniture manufacturers paid $72.92 a thousand for cherry, and only $26.02 for birch.

Only three foreign woods were reported, mahogany, Circassian walnut, and French walnut, and in the aggregate they constituted only one-fifth of 1 per cent of the total furniture wood. No French walnut was reported for any other industry.

TABLE 5.—*Furniture.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
White oak	8,466,000	$31.86	$269,729	188,300	$22.41	8,277,700	$32.04
Red oak	3,177,500	32.67	103,825	......	.....	3,177,500	32.67
Sugar maple	1,441,000	23.96	34,525	136,000	27.39	1,305,000	23.60
Yellow poplar	1,166,000	20.84	24,303	60,000	17.41	1,106,000	21.03
Chestnut	1,040,000	18.41	19,151	177,000	18.02	863,000	18.48
Sweet birch	896,000	26.02	23,315	2,000	15.00	894,000	26.04
Basswood	650,000	26.08	16,950	......	.....	650,000	26.08
Beech	302,000	20.80	6,282	......	.....	302,000	20.80
White birch	150,000	20.00	3,000	......	.....	150,000	20.00
Tupelo	125,000	44.49	5,562	......	.....	125,000	44.49
Ash	72,175	22.88	1,651	3,300	16.66	68,875	23.17
Longleaf pine	66,000	31.09	2,052	......	.....	66,000	31.09
Sycamore	50,000	15.00	750	25,000	15.00	25,000	15.00
Loblolly pine	90,000	16.47	1,482	......	.....	90,000	16.47
Mahogany	30,000	144.33	4,450	......	.....	30,000	144.33
Cypress	10,000	48.00	480	......	.....	10,000	48.00
White pine	10,000	80.00	800	......	.....	10,000	80.00
Red gum	8,000	40.00	320	......	.....	8,000	40.00
Cherry	6,500	72.92	474	500	16.00	6,000	77.66
Sugar pine	5,000	80.00	400	......	.....	5,000	150.00
Circassian walnut..	5,000	150.00	750	......	.....	5,000	80.00
White cedar	5,000	90.00	450	......	.....	5,000	90.00
Black walnut	3,000	94.00	282	......	.....	3,000	94.00
French walnut	500	250.00	125	......	.....	500	250.00
Total	17,774,675	$29.32	$521,108	592,100	$21.36	17,182,575	$29.59

COOPERAGE.

It is not always an easy matter to distinguish between cooperage and basket-making on the one hand and box-making on the other. Coopers are divided into two general classes; those who make vessels to contain liquids, and those who manufacture barrels and kegs intended for dry articles, such as nails, sugar, flour, apples, and similar commodities. Tight cooperage is a term applied to the manufacture of vessels for liquids, and slack cooperage applies to the making of other

kinds. A much higher class of wood is required for tight cooperage than for slack, and comparatively few woods are suitable for the highest class vessels of all, those which are to hold spirituous liquors. White oak has long been considered the best available wood for such work, but the increasing scarcity of this timber of suitable grade has stimulated the search for substitutes, and some success has attended the search. There are different kinds of tight cooperage, and wood which can not be employed for one may answer very well for some other.

Slack cooperage is also of different kinds, and woods serving for one kind may not do for another. A resinous wood, strong with the odor of turpentine and readily imparting a disagreeable taste to absorbent articles of food brought in contact with it, would scarcely be made into flour and sugar barrels, but would be unobjectionable for nail kegs. The gradation is regular and unbroken from the highest class of slack cooperage down to vessels so open and flimsy that they will hold little else than vegetables and coarse merchandise, while one grade lower passes from cooperage to berry and fruit baskets, and vessels of a similar kind.

Table 6 gives a list of the eleven woods reported by Maryland coopers. These woods are used in both tight and slack cooperage, but the table does not distinguish between them; in fact, the distinction could not, in all cases, be made from the available data. The price paid for white oak indicates that the most of that shipped into the State, which was 95 per cent of the total amount used, was employed in tight cooperage. The cost of the Maryland-grown white oak was so low that it was evidently suitable for slack cooperage only. The same process of reasoning will place the loblolly, which was 82 per cent of the whole amount of wood reported, in the slack-cooperage list. The cottonwood was nearly all made into flour barrels, and the elm into lime and cement barrels, while the red oak was made into flour barrels and a good grade of fruit barrels. The cypress and the red cedar, though they were not largely used, were tight-cooperage woods. Both are excellent materials for cider and vinegar barrels. Yellow poplar is good for many kinds of slack-cooperage vessels, and is particularly suitable for tobacco hogsheads, and has been used for that purpose in Maryland for 200 years.

The coopers in the State paid a higher average price for white oak than was paid by any other industry, except tank builders, and a lower price for red oak. Red gum was the only wood wholly supplied by Maryland, while seven of the eleven on the list were supplied wholly from outside States. A striking difference is noted between the average cost of home-grown wood and that from without, the latter being more than four times as high. The State produced 28 per cent of all the wood used in the cooperage industry.

TABLE 6.—*Cooperage.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
White oak	3,024,000	$63.71	$192,675	157,000	$13.22	2,867,000	$66.48
Loblolly pine	2,720,000	9.91	26,950	2,220,000	8.99	500,000	14.00
Tupelo	1,015,000	13.37	13,575	....	....	1,015,000	13.37
Cottonwood	750,000	15.00	11,250	....	....	750,000	15.00
White elm	425,000	16.47	7,000	....	....	425,000	16.47
Yellow poplar	425,000	16.47	7,000	....	....	425,000	16.47
Red oak	230,000	9.78	2,250	50,000	15.00	180,000	8.33
Red gum	40,000	13.75	550	40,000	13.75	....	.....
Cypress	20,000	50.00	1,000	....	....	20,000	50.00
Longleaf pine	9,000	35.00	315	....	....	9,000	35.00
Red cedar	5,000	37.00	185	....	....	5,000	37.00
Total	8,663,000	$30.33	$262,750	2,467,000	$9.45	6,196,000	$38.64

BASKETS.

Tupelo was the only wood used by the basket makers of Maryland that was not supplied wholly or in considerable part by the forests of the State, as Table 7 sets forth. The entire cut of beech and maple came from Maryland, though the quantity of neither was large. The cost of the beech was very low and was based on logs delivered at the factories, and not on sawed lumber. Much of it was cut in veneer and was made into small berry baskets or light fruit baskets. In fact, most of all the wood reported by basket manufacturers was made into veneer, the exception to this being in the bottoms and bands, and in some cases in the covers.

The wood of highest average price was white elm, which is the common elm so largely planted for shade. Though the average price was highest of all the ten species in the list of basket woods, the high price applied only to the elm shipped into the State, while that grown in Maryland was only $7 a thousand, the same as beech. That price, as

in the case of beech, was based on logs, and not on sawed lumber. The elm from without cost more than four times as much, or $33 a thousand, and three-fourths of all came from without. Michigan furnished most of it, but shipments were reported from New Jersey, Ohio, Virginia, and West Virginia. The average price of elm for the whole country in 1908 was $18.40 per thousand. The Maryland basket makers paid $8.10 per thousand more. The toughness of the elm makes it suitable for hoops or bands round the tops of baskets, and a large part of it was so used. The demand for a cheaper wood for this purpose is extensively felt, and many substitutes have been tried. It is claimed that river birch, which grows plentifully in Maryland, answers fairly well, but no manufacturer reported its use for that purpose. Some of the sweet birch reported may have been used for hoops.

TABLE 7.—*Baskets.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Red gum	2,885,000	$14.30	$41,270	2,285,000	$14.04	600,000	$15.31
Loblolly pine	2,536,000	12.08	30,640	700,000	9.14	1,836,000	14.26
Tupelo	900,000	14.00	12,600	....	.....	900,000	14.00
Yellow poplar	255,000	14.22	3,625	155,000	13.06	100,000	16.00
Sweet birch	200,000	16.00	3,200	100,000	16.00	100,000	16.00
White elm	200,000	26.50	5,300	50,000	7.00	150,000	33.00
Sycamore	100,000	11.50	1,150	75,000	10.66	25,000	14.00
Beech	50,000	7.00	350	50,000	7.00	....	.....
Sugar maple	10,000	10.00	100	10,000	10.00	....	.....
Total	7,136,000	$13.77	$98,235	3,425,000	$12.76	3,711,000	$14.69

Red gum heads the list of Maryland basket woods in both quantity and value; in amount, 40 per cent, and in value, 42. Eighty per cent of the total was cut in Maryland, and the state-grown wood was $1.27 per thousand cheaper than the imported. Of the 600,000 feet shipped in, the chief part came from Virginia and North Carolina. The average price paid for red gum was $14.30, while in 1908 the average for the run of mills in the United States was $13.08. Though this wood is cut in commercial quantities in twenty-two States, its average price varies less than that of most lumbers, the difference between the highest, in Indiana, and the lowest, in North Carolina, being only $3.84. It is more used for veneers than any other American wood, and basket makers are among the largest users of the veneers.

Loblolly pine was second in quantity used and also second in total cost of Maryland basket woods. Twenty-nine per cent was cut in Maryland, and the importations came chiefly from Virginia. The 900,000 feet of tupelo reported was used principally for heavy baskets, and the smaller quantity of yellow poplar was employed in a similar way. The price of the yellow poplar indicates that it was not generally of a class suitable for the lumber market, and was probably cut from young trees. Maryland supplied 61 per cent of all the yellow poplar. Basket makers used 62 per cent of all the sycamore reported for Maryland, and of this amount, the State supplied three-fourths, at $10.66 per thousand, while the average price for sycamore in the United States in 1908 was $14.63.

Ships and Boats.

The building of ships and boats is an important industry in Maryland. The Chesapeake Bay and its tributaries afford a system of natural highways unsurpassed in the United States. The State contains an area of 2,350 miles of water, much of it navigable for the largest types of vessels, and nearly all for small craft. The number of pleasure boats upon this system of waterways is very large, but the fleets that are engaged in business are much larger. The fisheries of Maryland exceed in value those of every other Middle Atlantic State, and there are 40,000 fishermen in the State, besides many from Virginia, who are engaged in business upon Chesapeake Bay, which is the largest natural oyster-producing water in the world. Though its actual beds cover only 200 square miles, their yield of oysters annually is worth $3,000,000, or more than $23 an acre. Few wheat fields surpass that return in yearly crops. The annual catch of fish is worth $600,000. The shores of the bays and inlets of Chesapeake Bay are literally studded with communities dependent to a greater or less extent upon the fisheries. The oyster fleet of Maryland is a sort of naval police force that keeps a perpetual lookout for infringements of laws relating to State oyster fisheries.

Two and a quarter per cent of all the woods manufactured in Maryland in 1909 was bought by boat makers at an average price of $34.69 per thousand. The State supplied 26 per cent of it at an average cost of $31.02 per thousand, and 74 per cent was bought elsewhere at an average cost of $35.97. Eleven of the twenty-four woods on the

list came entirely from without the State, and four others, locust, hickory, pitch pine, and cherry, were supplied wholly by Maryland. Two were foreign woods, teak and mahogany, and they were the highest in price. The average cost of the boat lumber was exceeded by that used by four industries, tanks and silos, wagons, office fixtures, and musical instruments.

In amount and cost the list was headed by longleaf pine, which made 47 per cent of the total and 46 per cent of the value. The cost of longleaf pine by the run of the mill was $12.05 in 1908 in Louisiana, which was the chief producing State. The boat builders of Maryland used a grade better than the run of the mill, which accounts for their paying nearly three times the Louisiana and Georgia prices. Nearly 11 per cent of the longleaf pine imported by all the Maryland manufactures was for boats. Interior finish was the only industry which used a larger amount.

Next after longleaf pine was white oak with 26 per cent in quantity and 24 per cent in cost. Maryland supplied 81 per cent of it, and only 19 per cent was imported. The home-grown product was a little higher in price than the imported. White oak is the chief frame material of wooden vessels and is used where great strength and stiffness are required, while pine and other light woods make the sides, decks, and lining. Much oak is used for keels because it wears well and is capable of resisting severe shocks.

Cypress is a favorite finishing material for boats. Cabins are frequently built of it, and it is seen in railing and panels. The average price of cypress in 1908 for the whole country was $31.30, and the Maryland boat builders paid $37, but the grade they used was better than the run of the mills.

Douglas fir, of which 262,000 feet were bought by the boat builders of the State, is a Pacific coast wood, the shipments coming chiefly from Washington. It is a favorite wood for spars and masts, because it may be had in practically any size desired. It gives excellent service as siding for canal boats, and much of the Douglas fir brought to Maryland in 1909 was put to that use. It is often listed as Oregon pine, which name was formerly most generally applied to it. This far-western lumber is now found in practically all markets, and its annual cut is exceeded only by the combined cut of the yellow pines. Its average price at the mills is low, $11.97 in 1908, and even when the

freight incident to the transcontinental haul has been added, the boat builders in Maryland consider it economical and satisfactory for the purpose to which it is particularly adapted.

All the chestnut oak reported by the Maryland manufacturers was used for canal-boat frames. It is stronger than white oak, though not so stiff. Seventy-five per cent was supplied by Maryland at $20 per thousand, and that brought from without cost the same.

TABLE 8.—*Ships and Boats.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Longleaf pine	3,037,000	$34.14	$103,695	....	.....	3,037,000	$34.14
White oak	1,629,500	32.05	52,225	1,317,500	$32.39	312,000	30.61
Loblolly pine	388,000	28.49	11,055	29,000	26.03	359,000	28.69
Cypress	286,000	37.03	10,590	....	.....	286,000	37.03
Douglas fir	262,000	52.82	13,840	....	.....	262,000	52.82
Chestnut oak	220,000	20.00	4,400	165,000	20.00	55,000	20.00
Ash	209,000	35.72	7,465	4,000	28.75	205,000	35.85
Tupelo	103,000	30.00	3,090	100,000	30.00	3,000	30.00
White cedar	47,000	47.00	2,210	1,000	75.00	46,000	46.41
White pine	38,500	48.36	1,862	500	44.00	38,000	48.47
Red cedar	25,000	45.00	1,125	....	.....	25,000	45.00
Mahogany	22,000	150.00	3,300	....	.....	22,000	150.00
Chestnut	20,000	18.00	360	13,000	18.46	7,000	17.14
Spruce	17,000	49.41	840	....	.....	17,000	49.41
Red oak	11,000	33.18	365	....	.....	11,000	33.18
Teak	10,200	249.00	2,540	....	.....	10,200	249.00
Locust	6,000	50.00	300	6,000	50.00	......	.....
Hickory	5,000	64.00	320	5,000	64.00	......	.....
Pitch pine	5,000	35.00	175	5,000	35.00	......	.....
Hackmatack	5,000	50.00	250	....	.....	5,000	50.00
Yellow poplar	2,500	70.00	175	600	83.33	1,900	65.79
Cherry	2,000	60.00	120	2,000	60.00	......	.....
Total	6,350,700	$34.69	$220,302	1,648,600	$31.02	4,702,100	$35.97

The ash reported by boat builders was manufactured into frames for small craft, and into tillers and oars. Less than 2 per cent of it grew in Maryland.

White cedar's lightness and strength fit it for canoes and small boats, and the Maryland manufacturers drew their main supply from New Jersey and Virginia. A small quantity was reported from Maryland at $75 for the 1,000 feet bought. The red cedar reported was used for trim for yachts and launches, and that was the use to which the mahogany and the red oak were put. Teak, which is a foreign wood, and the highest priced bought for boats, was employed as decking. None of this wood was used by any other industry in the State. The amount of locust reported was small in comparison with

the use of other woods. All that was bought was made into treenails or wooden pins by which ship timbers are fastened together. Much more locust was formerly used for this purpose than at present, iron bolts, spikes, and nails now largely taking its place. Boat builders paid $20 per thousand more for their locust than was paid by vehicle manufacturers who used five times as much of it. The small quantity of hackmatack reported was bought in Maine, and its chief use was as knees for medium-sized vessels, while the cherry, yellow poplar, white pine, and tupelo were for finish and joiner work.

Horse Vehicles.

Maryland supplied all the black gum, locust, and pitch pine demanded by the manufacturers of horse vehicles in the State, while of four of the other woods no portion was state-grown. These four were sugar maple, cypress, longleaf pine, and loblolly pine. Two of these, maple and loblolly pine, grow in commercial quantities in Maryland. Sixteen woods in all were reported, ranging from white ash, the largest in quantity, to basswood, the smallest, and from white elm, the cheapest, to basswood, the highest in average price. The quantity of the latter was very small, and its exceptionally high price was probably due to the fact that it was selected for some special purpose and was of extra quality.

The three woods heading the list, white oak, hickory, and white elm, entered chiefly into frames, wheels, and poles and shafts of vehicles, while the yellow poplar, white pine, cypress, and the longleaf and loblolly pines were made into bodies and tops of farm wagons, business wagons, mail wagons, and buggies and carriages. The most of the yellow poplar was used for panels in buggies and carriages, and for buggy seats. It is one of the best available woods where fine finish and painting are demanded. Some of the finest decorative painting on carriage bodies is upon yellow poplar. It is as smooth as metal, and some prefer it because it is less liable than sheet metal to be injured by dints. In some instances aluminum is substituted for it.

Practically all the black gum reported was made into hubs. Its interlaced grain renders the wood very difficult to split. Hickory, elm, and locust were also manufactured into hubs, the latter chiefly

for buggies. Many hubs, particularly the larger sizes, were made of white oak. The chief properties of wood intended for hubs are strength to resist steady strain and sudden shocks, and sufficient hardness to withstand the tendency of the spokes to wear and enlarge the mortises in which they fit. The only pin oak reported by the industries of Maryland was the small quantity that went into vehicles. It was used for felloes. Half of it was cut in Maryland and half in West Virginia. All of the pitch pine reported by this industry was used for bottoms of wagon beds.

TABLE 9.—*Horse Vehicles.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
White oak	743,300	$37.13	$27,601	452,050	$22.64	291,250	$59.68
Hickory	552,000	42.12	24,907	269,500	58.75	282,500	32.12
White elm	385,000	17.38	6,690	250,000	10.56	135,000	30.00
Yellow poplar	86,500	68.25	5,904	7,000	69.21	79,500	55.47
Ash	41,500	51.33	2,130	19,500	34.82	22,000	65.91
Black gum	35,000	30.00	1,050	35,000	30.00	......	.....
Locust	30,000	30.00	900	30,000	30.00	......	.....
White pine	17,000	41.17	700	2,000	50.00	15,000	40.00
Sugar maple	15,000	20.00	300	......	.....	15,000	20.00
Loblolly pine	13,500	38.29	517	......	.....	13,500	38.29
Red oak	11,000	22.27	245	10,000	21.50	1,000	30.00
Cypress	9,500	58.94	560	......	.....	9,500	58.94
Longleaf pine	7,000	36.59	256	......	.....	7,000	36.59
Pitch pine	6,000	33.33	200	6,000	33.33	......	.....
Pin oak	2,000	30.00	60	1,000	30.00	1,000	30.00
Basswood	2,000	80.00	160	1,000	80.00	1,000	80.00
Total	1,956,300	$36.89	$72,180	1,083,050	$29.96	873,250	$59.95

The three woods, white oak, hickory, and white elm, made up 85 per cent in amount and 80 per cent in cost of the total vehicle woods reported in the State; and of the three woods, white oak was 38 per cent in quantity and the same per cent in cost; hickory was 27 per cent in quantity and 33 per cent in cost; and white elm was 20 per cent in quantity and 9 per cent in cost. The average reported cost of hickory for the United States in 1908 was $29.66, for the run of the mill. The Maryland vehicle makers paid $12.46 more for theirs. About one-half was procured in the State, and this was much higher in price than that bought outside, the cost of the former being $58.75, and the latter $32.12. The outside hickory came from Ohio, West Virginia, Pennsylvania, Virginia, and a small quantity was reported from Florida. Hickory is pre-eminently a vehicle and handle wood,

but in Maryland practically the entire amount reported was used in the manufacture of vehicles. The total for the State, for all purposes, was 557,000 feet, and all but 5,000 feet went into vehicles, and the 5,000 feet went into handles. The vehicle parts reported made of this wood were axles, shafts, poles, carriage frames, singletrees, spokes, and wheel rims.

The horse-vehicle industry in Maryland is made up of a few manufacturers of considerable size, and many that work on a small scale, but are scattered all over the State. The majority of blacksmith shops do more or less work on vehicles, either in making or repairing. It was not practicable, however, in compiling this report, to collect and include all statistics from blacksmith shops in cities, towns, and in rural communities. For that reason, the total figures shown should be understood to include only shops and factories where vehicle-making, and not blacksmithing, is the chief business carried on.

TANKS AND SILOS.

The builders of tanks and silos reported the use of only six kinds of wood, all of which were high-priced and not one foot of which grew in Maryland. Less than 1 per cent of the wood purchased by the manufacturers of the State was for this industry, but it constituted more than 2 per cent of the total cost. Only one industry, musical instruments, paid a higher average price for its lumber.

Cypress leads the list in amount, but is closely followed by white pine. The properties which fit cypress for its wide use as a tank and vat material are its freedom from chemicals by which contents of vessels might be injured, and the absence of knots and defects in much of the lumber. To this may be added its handsome appearance. Cypress tanks are built to contain acids, beer, cider, dyes, kraut, oil, pickles, starch, vinegar, water, wine, and whisky. Water tanks include those for swimming, threshing machines, sprinkling wagons, windmill towers, and railway water stations. Forty-seven per cent of all the lumber bought for this industry in 1909 was cypress, and it made up 50 per cent of the cost of all. The average price was $51.38, which was more than $30 higher than the average run-of-mill price of this wood for the whole country. Tank and silo builders used 6 per cent of all the cypress reported by the manufacturers in the State and paid 12 per cent of the cost of all.

The white pine bought for this industry cost $8.73 per thousand less than cypress and was used for the same purposes. In a number of industries, white pine has lost chief place because of its high price, but in this instance a more costly wood has gone ahead of it in quantity. The price paid by tank builders for white pine was more than twice the average run-of-mill cost for the whole country.

The use of white cedar was about one-fifth that of white pine and its cost per thousand was $3.10 less. It is usually regarded the equal of any wood for tanks, provided clear lumber can be had, but it is much more difficult to procure clear cedar of large dimensions than cypress and white pine, and for that reason it serves chiefly in tanks of smaller sizes. The same observation applies to red cedar, of which only a small quantity was used by Maryland tank builders, and it was next to the highest in price of all they used. The lowest in price was longleaf pine.

Table 10.—*Tanks and Silos.*

Species.	Quantity used annually. (Feet B. M.	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Cypress	1,276,000	$51.93	$66,255	.....	.....	1,276,000	$51.93
White pine	1,650,000	43.19	45,550	.....	.....	1,650,000	43.19
White cedar	200,000	40.00	8,000	.....	.....	200,000	40.00
White oak	50,000	110.00	5,500	.....	.....	50,000	110.00
Longleaf pine	50,000	35.00	1,750	.....	.....	50,000	35.00
Red cedar	11,000	60.00	660	.....	.....	11,000	60.00
Total	3,236,000	$48.13	$152,215	.....	.....	3,236,000	$48.13

The white oak demanded by this industry was of the highest class and cost more per thousand than the white oak used by any other industry. The average price paid for the 50,000 feet used exceeded the price paid for any other wood grown in the United States and reported by Maryland manufacturers, except for a single 1,000 feet of black walnut listed by the makers of office fixtures. The next below the white oak was holly at $102.

Cigar Boxes.

Six woods were made into cigar boxes in Maryland, but the industry used less than 1 per cent of the total amount of lumber manufactured in the State. Two of the species reported are veneer woods, and the

four others are chiefly cut into thin stock upon which the veneer is glued. Spanish cedar, imported principally from Mexico, is the largest in quantity and in total cost, though two others cost more per thousand—red cedar and tupelo. Thirty-seven per cent of all the cigar-box lumber is Spanish cedar. The largest use of inside wood, as backing for the veneer, was of yellow poplar at an average cost of $25.15 per thousand. Basswood was next, then tupelo, while red gum, with a total of 100,000 feet, was least. The highest-priced wood was tupelo at $42.46 per thousand, which was a higher price than any other industry reported for the wood except furniture. The amount used was nearly 8 per cent of the total for the industry. The red cedar was cut into veneer. It grew in Virginia. No part of the cigar-box wood was of Maryland growth, though four of the six species are found in commercial quantities growing in the State.

TABLE 11.—*Cigar Boxes.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Spanish cedar	871,000	$29.88	$26,030	......	.....	871,000	$29.88
Yellow poplar	680,000	25.15	17,120	......	.....	680,000	25.15
Basswood	520,000	19.77	10,280	......	.....	520,000	19.77
Tupelo	183,000	42.46	7,770	......	.....	183,000	42.46
Red gum	100,000	18.00	1,800	......	.....	100,000	18.00
Red cedar	20,000	30.00	600	......	.....	20,000	30.00
Total	2,374,000	$29.87	$63,690	......	.....	2,374,000	$29.87

BRUSHES.

Only two woods figured in the brush-making industry in Maryland, beech and chestnut, and none of the former was cut in the State, but 95 per cent of the chestnut was grown in Maryland. Seventy-two per cent of all the beech reported by the wood-using industries of the State was made into brushes. The value of this wood in 1908, averaged for the whole country for the run of the mills, was $13.50 per thousand. The Maryland brush makers paid $5 advance on that value. The chestnut bought in the State was low in price, $7.50 per thousand, which was based on logs delivered at the mills and not on sawed lumber. The chestnut brought from other States was $20 a thousand, which was $5.61 more than the run-of-mill value of Maryland chest-

nut in 1908, and $3.73 more than its run-of-mill value averaged for the whole country. When beech becomes thoroughly seasoned, it absorbs water very slowly, and this greatly increases its value for the backs of brushes that are used in damp places, such as scrub brushes. These are sometimes made wholly of wood, the backs of beech, and the bristles of palm leaf or some other wool fiber. Among other brushes of which beech is often the back or body are those for whitewashing, paperhanging, and painting. Many kinds are not supposed to encounter dampness, among such being clothes and hat brushes, floor sweepers, blacking brushes, and brushes for currying horses.

TABLE 12.—*Brushes.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Beech	1,300,000	$15.50	$20,200	.....	....	1,250,000	$15.20
Chestnut	850,000	6.10	5,200	600,000	$7.50	50,000	50.00
Total	1,300,000	14.92	87,400	600,000	7.50	1,300,000	15.54

STORE AND OFFICE FIXTURES.

The making of store and office fixtures is closely related to interior finish on the one hand and furniture on the other. The exact lines of separation are not always easy to determine. In the present instance the reports of manufacturers were accepted as given, and what they listed under the name of fixtures for office and stores were placed in that industry, though perhaps in some cases the commodities could with reason have been placed with furniture or with interior finish. Generally, however, fixtures in this class are show cases, counters, drug or sample cabinets, shelving, and certain kinds of seats and benches, and other articles for special uses, or made to order.

Only two industries in Maryland paid higher average prices for lumber than was paid by the makers of fixtures. Tank builders and makers of musical instruments paid more per thousand. The quantity of wood demanded for office and store fixtures was small in comparison with some of the other industries, but a very high grade was demanded for most of the kinds used. The highest-priced black walnut reported in the State was listed under this industry, but the quantity

was small. The sweet birch and sycamore here listed were also higher in price than under any other industry.

Yellow poplar constituted 26 per cent of all the lumber used, chestnut and white oak 24 per cent each. The amount of mahogany was comparatively large, and in total cost it was third, while yellow poplar was second, and white oak was first. The poplar was comparatively low in price, and much of it was used as interior work, shelving, drawers, etc., and not as the visible outside. The average run-of-mill value of yellow poplar for the whole country in 1908 was $25.30, while the fixture makers in Maryland paid only $1.72 more for theirs delivered at the factory.

Seventy-two per cent of all the cherry reported in the State was bought for this industry, and the price paid was more than double the average run-of-mill value for the whole country.

Of the eleven kinds of wood used by the fixture manufacturers of Maryland, ten grow in commercial quantities in the State, and yet not one foot was supplied by the State to the manufacturers.

TABLE 13.—*Store and Office Fixtures.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Yellow poplar	445,000	$27.82	$12,495	.....	.....	445,000	$27.82
Chestnut	400,000	23.31	9,325	.....	.....	400,000	23.31
White oak	400,000	46.82	18,730	.....	.....	400,000	46.82
Cherry	151,000	66.58	10,025	.....	.....	151,000	66.58
Mahogany	101,000	108.41	10,950	.....	.....	101,000	108.41
Sweet birch	100,000	40.00	4,000	.....	.....	100,000	40.00
Ash	44,000	58.64	1,280	.....	.....	44,000	58.64
Sycamore	10,000	45.00	450	.....	.....	10,000	45.00
White pine	5,000	65.00	325	.....	.....	5,000	65.00
Black walnut	1,000	150.00	150	.....	.....	1,000	150.00
Sugar maple	1,000	30.00	30	.....	.....	1,000	30.00
Total	1,658,000	$40.40	$66,960	.....	.....	1,658,000	$40.40

MUSICAL INSTRUMENTS.

The musical-instrument makers of Maryland pay a higher average price for the wood they use than is paid by any other class of manufacturers of wood in the State. More kinds of foreign woods are used in this industry than in any other, and they include the highest-priced woods reported in the State. The highest-priced are in very small quantities, but their uses are special and they are entitled to

places on the list. If they had been demanded in larger quantities perhaps the prices would have been much lower. Ebony at $500 per thousand feet headed the list for cost, but Circassian walnut, boxwood, and tulipwood were expensive. The Circassian walnut came from Russia, the ebony from Ceylon, the boxwood from Turkey, and the tulipwood from Australia, while a number of foreign countries supply mahogany, the largest amounts coming from Africa and from Central America. A little mahogany grows in Florida, and one manufacturer reported a shipment from that State, but it was not ascertained whether it grew there or was reshipped from some Florida port. Twenty-two per cent of all the mahogany reported for Maryland was made into musical instruments.

TABLE 14.—*Musical Instruments.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Spruce	363,500	$33.98	$12,353	......	.....	363,500	$33.98
Ash	324,000	47.95	15,535	23,000	$35.00	301,000	48.93
Yellow poplar	226,000	47.81	10,804	......	.....	226,000	47.81
Sugar maple	217,000	29.83	6,474	......	.....	217,000	29.83
White pine	151,000	75.63	11,420	......	.....	151,000	75.63
Mahogany	106,500	148.68	15,835	......	.....	106,500	148.68
Basswood	67,050	25.53	1,702	......	.....	67,050	25.53
White oak	52,000	50.38	2,624	......	.....	52,000	50.38
Cypress	20,000	48.00	960	......	.....	20,000	48.00
Black walnut	16,300	42.94	700	7,000	35.00	9,300	48.92
Cherry	14,000	34.71	486	4,500	32.00	9,500	36.00
Circassian walnut	1,500	250.00	375	......	.....	1,500	250.00
Holly	350	102.86	36	......	.....	350	102.86
Ebony	100	500.00	50	......	.....	100	500.00
Boxwood	25	200.00	5	......	.....	25	200.00
Tulip wood	25	200.00	5	......	.....	25	200.00
Total	1,559,350	$50.90	$79,364	34,500	$34.61	1,524,850	$51.26

More spruce was reported than any other wood, and its range of uses was wide, some being made into boxes for shipping the instruments, while some was put to the exacting and special use of sounding boards. The largest part of all the woods reported was made into pianos and organs, but many other instruments are on the list of manufacturers—violins, banjos, drums, harps, tambourines, dulcimers, guitars, and others. Some require small parts of wood, while others are nearly wholly of that material. All of the holly, ebony, boxwood, and tulipwood reported for the State went into musical instruments. Sixteen woods in all were listed, and only three were in any part supplied

by the forests of the State, and they only to a small extent. They were ash, black walnut, and cherry.

Frames and interior parts of instruments demanded chiefly spruce, ash, maple, white pine, basswood, and cypress, while outside woods were mahogany, black walnut, cherry, and Circassian walnut. Special uses, such as keys, and parts of actions, and other mechanisms, were made of ebony, holly, boxwood, tulipwood, white pine, and maple. Piano keys are sometimes made of select basswood, fine panels of yellow poplar, and cypress.

MISCELLANEOUS.

Nearly 15,000,000 feet of lumber, or about 5 per cent of the total quantity reported by the manufacturers of the State in 1909, are represented in Table 13. Twenty-four woods are listed, two of them foreign, rosewood, and lignum-vitæ, which occur nowhere else in this report. The latter is a product of the West Indies, and the shipments reported for Maryland were used for bowling balls and bearings for gudgeons. The rosewood, which comes from South America, was manufactured into gavels, small handles, and police clubs.

Twenty-six per cent of the lumber reported under the head of miscellaneous manufactures was basswood, and it made up 71 per cent of all the basswood manufactured in Maryland. It is the most important material in the State for the woodenware makers, and is largely used for ironing boards, bread boards, chopping bowls, trays, cloth boards, mirror frames, spice drawers, tea chests, sample cases, trunks, humidors, and a great number of other commodities. It imparts little or no stain or taste to articles of food brought in contact with it, and for that reason it has many uses where most other woods are not satisfactory. Cottonwood has been substituted for it in Maryland to a small extent, shipments for that purpose coming from Louisiana or other Southern States. Twenty-three per cent of the cottonwood reported for Maryland was in the miscellaneous list, and the chief part of it was substituted for basswood. Its average cost per thousand was $6.57 less than basswood.

Loblolly pine is next after basswood the highest in quantity under miscellaneous uses. Its amount is not large, however, compared with the total loblolly pine used in the State—about 7 per cent. The principal uses for that listed in the table were for picture and mirror

frames, and for scroll work. The longleaf pine listed with it was put to practically the same uses.

More than 1,500,000 feet of white oak, or 10 per cent of all the wood in Table 15, was reported under miscellaneous uses. It was manufactured into cold-storage doors, ice boxes, insulator brackets, hoops, ice chutes, and car frames.

Table 15.—*Miscellaneous.*

Species.	Quantity used annually. (Feet B. M.)	Average cost at factory per M (f. o. b.)	Total cost at factory (f. o. b.)	Grown in Maryland.		Grown outside Maryland.	
				Feet.	Average cost per M (f. o. b.)	Feet.	Average cost per M (f. o. b.)
Basswood	3,900,000	$29.59	$115,420	......	.....	3,900,000	$29.59
Loblolly pine	3,012,000	20.22	60,898	202,000	$15.04	2,810,000	20.58
White oak	1,533,000	29.02	44,500	87,500	31.43	1,445,500	28.86
Longleaf pine	1,430,000	29.06	41,550	......	.....	1,430,000	29.06
Yellow poplar	1,058,000	25.78	27,275	......	.....	1,058,000	25.78
Hemlock	1,000,000	28.00	28,000	......	.....	1,000,000	28.00
Locust	900,000	16.66	15,000	900,000	16.66	......	.....
Chestnut	480,000	29.37	14,130	1,250	18.00	478,750	29.47
Tupelo	300,000	20.00	6,000	......	.....	300,000	20.00
Cottonwood	240,000	23.00	5,520	......	.....	240,000	23.00
Red oak	175,000	35.71	6,250	37,000	50.29	138,000	31.81
Cypress	170,000	40.29	6,850	......	.....	170,000	40.29
Spruce	150,000	38.50	5,775	......	.....	150,000	38.50
White pine	150,000	46.80	7,020	......	.....	150,000	46.80
Ash	100,000	32.50	3,250	......	.....	100,000	32.50
Sweet birch	83,000	33.55	2,785	......	.....	83,000	33.55
Beech	70,000	21.43	1,500	......	.....	70,000	21.43
Sugar maple	50,000	25.00	1,250	......	.....	50,000	25.00
Black gum	50,000	28.00	1,400	25,000	28.00	25,000	28.00
Dogwood	16,000	24.37	390	16,000	24.37	......	.....
Lignum-vitae	7,070	466.76	3,300	......	.....	7,070	466.76
White birch	2,000	45.00	90	......	.....	2,000	45.00
Rosewood	600	366.66	220	......	.....	600	366.66
Black walnut	200	100.00	20	......	.....	200	100.00
Total	14,876,870	$26.78	$398,393	1,268,750	$18.73	13,608,120	$27.53

Yellow poplar was the only wood listed in Maryland for automobiles, and the quantity used for that purpose was small. Among other miscellaneous uses to which it was put was in making photograph albums, spice drawers, whiskbroom holders, wooden pumps, and scroll-work.

The locust placed in this list was manufactured into chucks, insulator pins, and brackets. Nearly the whole amount was made into insulator pins for telephone and telegraph lines.

Chestnut to the amount of nearly 500,000 feet was used in the manufacture of coffins, frames for pictures and mirrors, cold-storage doors, ice chests, and refrigerators.

The tupelo listed in Table 15 was made into large sheets of veneer

and was used to wrap picture-frame stock, molding, and scrollwork for shipment.

The red oak in the table was manufactured into picture and mirror frames, usually of a larger size than those made of pine.

Ash was manufactured into dowels for bending in reedwork. It was also made into brackets, picture frames, and woodenware.

Beech and black gum were manufactured into mine rollers, dogwood into mauls and spindles, and white birch into dowels, and mirror and picture frames.

Maryland met the demand for two of the woods in Table 15, locust and dogwood, and five others in part, loblolly pine, white oak, chestnut, red oak, and black gum. Nine others grow in the State, but the demand for them was met by importations. Ninety-one per cent of all the wood used came from the outside.

AMOUNTS BY COUNTIES.

Table 16, which follows, is a partial recapitulation intended to show the quantity and cost of wood manufactured in those counties of the State where the amount exceeded 500,000 feet. Fifteen counties are in the list, and eight are omitted because they fell below the 500,000 mark. It is seen that Baltimore City and County exceed in quantity and cost of material all the other counties combined.

TABLE 16.—*Counties that Manufactured More than 500,000 feet, and the Total Cost of Lumber.*

Counties.	Quantity of wood manufactured.	Cost at factory.
Baltimore and Baltimore City	159,020,870	$3,323,840
Wicomico	26,888,000	396,425
Washington	25,294,000	801,371
Harford	12,069,500	163,665
Somerset	10,343,000	160,755
Caroline	8,819,000	114,090
Anne Arundel	7,695,000	116,595
Dorchester	7,389,000	107,770
Worcester	6,017,000	135,603
Frederick	5,285,000	145,765
Allegany	3,205,500	91,984
Talbot	1,860,000	44,200
Cecil	1,796,000	63,300
Montgomery	1,280,500	17,190
St. Mary's	925,000	21,475

Lessening the Waste.

Many of the Maryland manufacturers of wood report a tendency to lessen waste in shops and factories by finding uses for small pieces which formerly were thrown away. Such pieces are worked into salable commodities, and much that can not be reworked at a profit is put on the market as kindling wood and finds sale at fair prices. A few of the methods of utilizing waste are mentioned below. They have been gleaned from reports of manufacturers in all lines of wood working.

Some furniture makers glue together small, clear pieces, down to an inch wide and a foot long, and find that they serve very well for the interior frame work of bureaus, chiffoniers, sideboards, and similar articles.

Wheelwrights save the ends cut from spokes and shape them in lathes for chisel, gimlet, auger, and other small-tool handles. Wagon builders occasionally make use of scraps of hardwood for lining brake blocks. Sash and blind makers save their scraps for the match factories, or if pieces are large enough, they are worked into corner blocks, rose blocks, and balusters. Coopers recut broken or defective staves of the larger sizes and make kegs or smaller vessels of them. Small headings are economically manufactured in that way. Occasionally defective staves and headings are made into dowels. Basket makers save the cores from which veneer has been cut, and saw them into thin slats for baskets and crate covers. Brush manufacturers have made some headway in using waste from furniture factories, but the pieces are of so many sizes and of such irregular shapes that success has been only partial. A small porch-chair shop has been able to draw a considerable part of its raw material from the waste of boat factories.

Some of the makers of interior finish work their odds and ends of softwoods into small boxes, and the hardwood scraps are made into parquet flooring. Planing mills work scraps and broken pieces, unsalable in that form, into boxes for apples, medicines, and other articles, and into brackets, balusters, roseblocks, and small quarter-round molding.

FORMS IN WHICH WOOD REACHES FACTORIES.

The wood-using industries of Maryland manufacture nearly 300,000,000 feet of lumber a year, and the raw material reaches the factories in nearly all sizes and grades known to the sawmill business. It is seldom practicable for all the factories and shops which make the same kind of wares to specify certain sizes and grades of material desired, and take nothing else. There are, however, limits to the varieties which they can make use of, because their business demands that the lumber purchased must meet certain requirements, and if it does not meet them, it can not be profitably used, though it might suit some other industry very well.

In collecting the statistics which have been compiled and condensed in Tables 3 to 15, both inclusive, the Maryland manufacturers of wood were asked to state the forms and grades in which the raw material was desired at their factories, and also the smallest sizes that could be profitably used. A summary of replies received shows that there is little agreement among them on these points, even among those who make the same class of commodities. For example, what one box maker demands, another can not use. It depends upon the kind of boxes each is making, and unless the fact is stated each time a certain size or grade of lumber is specified, the information can be of no value to others. Six smallest sizes that could be used were listed in the replies of the box makers, and no two of them were the same. It is evident that a maker of confectionery boxes could find places for sizes of lumber that would have no place in the factory of a piano-box maker. Six box makers reported that they bought the log run of lumber, while eighteen bought certain specified grades. The smallest sizes that could be employed by makers of interior finish were almost as numerous as the firms reporting. This record was greatly exceeded by boat builders, for nineteen sizes were listed, every one of which was the limit for some one of the manufacturers. The grades listed were not so numerous, but seventeen boat makers bought rough lumber, five bought dressed, while eleven bought first grade, four bought second, and twelve bought all. The makers of horse vehicles showed no uniformity in size, grade, or kind, some purchasing logs, some rough lumber, some both kinds, while in sizes almost everything known to the lumber trade was reported. The requirements of the makers of different kinds of

vehicles differ greatly. The manufacturer of stone wagons and dirt carts finds little use for the thin, yellow-poplar panels and the elastic hickory spokes which exactly meet the requirements of the makers of high-grade buggies, and yet both are vehicle manufacturers.

It may, therefore, be summed up that no industry, including all the firms engaged in it, calls for particular grades and sizes of lumber, but that every manufacturer, whether he makes boats, boxes, finish, furniture, or something else, selects the material most suitable and economical in his particular line, and the selections made by him are no guide to what other manufacturers will demand.

Reported Sources of Woods.

The Maryland manufacturers drew the supplies of lumber from thirty-four States and thirteen foreign countries. Twenty States furnished white oak. Of the fifty-four species of wood reported twenty-six came in part from Maryland. The largest contributors in the number of species outside of Maryland were: Virginia twenty-four, West Virginia twenty, and Pennsylvania fifteen. The States from which Maryland drew supplies were, Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, Oklahoma, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, Washington, Wisconsin, and West Virginia. The foreign lands were Africa, Australia, Brazil, Canada, Ceylon, Cuba, France, Honduras, India, Mexico, Russia, Turkey, and West Indies.

The particular States and foreign countries from which the woods were received are shown below:

Ash—Connecticut, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, North Carolina, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia.

Balsam fir—Pennsylvania.

Basswood—Kentucky, Maryland, Tennessee, Wisconsin, Virginia, West Virginia.

Beech—Maryland, Pennsylvania, Tennessee, Virginia, West Virginia.

Black gum—Maryland, North Carolina, Virginia.

Black walnut—Maryland, Missouri, Pennsylvania, West Virginia.

Boxwood—Turkey.

Butternut—Maryland.

Cherry—Maryland, Pennsylvania, Virginia, West Virginia.

Chestnut—Maryland, New York, North Carolina, Pennsylvania, Tennessee, Virginia, West Virginia.

Chestnut oak—Maryland, Pennsylvania.

Circassian walnut—Russia.

Cottonwood—Louisiana, Maryland, Virginia.

Cucumber—Maryland, West Virginia.

Cypress—Alabama, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, Tennessee, Virginia.

Dogwood—Maryland.

Douglas fir—Oregon, Washington.

Ebony—Ceylon.

French walnut—France.

Hackmatack—Maine.

Hemlock—Maryland, North Carolina, Pennsylvania, Virginia, West Virginia.

Hickory—Florida, Maryland, Ohio, Pennsylvania, Virginia, West Virginia.

Holly—North Carolina.

Lignum-vitæ—West Indies.

Live oak—North Carolina, Virginia.

Loblolly pine—Maryland, North Carolina, Virginia.

Locust—Delaware, Maryland, Virginia.

Longleaf pine—Alabama, Florida, North Carolina, South Carolina.

Mahogany—Africa, Cuba, Florida (?), Honduras, India, Mexico.

Pin oak—Maryland, West Virginia.

Pitch pine—Maryland, Virginia, West Virginia.

Red cedar—Maryland, North Carolina, South Carolina, Virginia.

Red gum—Arkansas, Maryland, North Carolina, Virginia.

Red mulberry—Maryland.

Red oak—Indiana, Kentucky, Maryland, North Carolina, Pennsylvania, Tennessee, Virginia, West Virginia.

River birch—Maryland.

Rock elm—Michigan.

Rosewood—South America.

Spanish cedar—Cuba, Mexico.

Spruce—Maine, Maryland, Pennsylvania, West Virginia.

Sugar maple—Connecticut, Maine, Maryland, Massachusetts, New Hampshire, New York, Pennsylvania, Rhode Island, Vermont, West Virginia.

Sugar pine—California, Oregon.

Sweet birch—Maryland, Massachusetts, Michigan, New York, North Carolina, Pennsylvania, Virginia, West Virginia.

Sycamore—Maryland, Tennessee, Virginia.

Teak—India.

Tulipwood—Australia.

Tupelo—Alabama, North Carolina.

White birch—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont.

White cedar—Maryland, New York, North Carolina, South Carolina, Virginia.

White elm—Maryland, Michigan, New Jersey, Ohio, Virginia, West Virginia.

White oak—Alabama, Arkansas, Delaware, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Mississippi, Missouri, New York, North Carolina, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia.

White pine—Canada, Michigan, Minnesota, Pennsylvania, Tennessee, Virginia, West Virginia, Wisconsin.

Yellow buckeye—Tennessee, West Virginia.

Yellow poplar—Indiana, Kentucky, Maryland, Michigan, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia.

Uses by Species.

The manufacturers in Maryland reported the use of fifty-four different woods. The principal purposes for which each is employed in the State are shown in the list which follows:

Ash—Antique furniture, balusters, brackets, cabinets, carriage bodies, cart shafts, ceiling, chiffoniers, china closets, cupboards, dowels for bending in reedwork, extension tables, fixtures for stores and offices, flooring, frames for boats, library tables, molding, organs, pianos, stair work, tillers for canal boats, wagon frames, wheels.

Balsam fir—Doors, house-trim, sash.

Basswood—Boxes, carriage bodies, cigar boxes, cloth boards, flooring, house finish, humidors, interior finish for cars, interior of furniture, ironing boards, mirror frames, molding, outside car finish, organs, pianos, sample cases, siding, spice drawers, tables, tea chests, trunks, whiskbroom handles.

Beech—Baskets, boxes, brushbacks, china closets, cupboards, extension tables, kitchen cabinets, kitchen ware, library tables, mine rollers.

Black gum—Chucks, hubs, mine rollers.

Black walnut—Brackets, gavels, grilles, interior finish, organs, pianos, store and office fixtures.

Boxwood—Pipe organs.

Buckeye—Candy and chocolate boxes.

Butternut—Ceiling, flooring, siding.

Cherry—Boat finish, china closets, cupboards, extension tables, interior finish, library tables, mantels, organs, pianos, store fixtures.

Chestnut—Barrel hoops, boxes, brush backs, canal-boat hatches, caskets, china closets, church finishing, coffins, cold-storage doors, couch frames, counters, crates, fixtures for stores, furniture, horse vehicles, ice chests, interior finish, library tables, mantels, molding, Morris chairs, picture frames, refrigerators, sash, slack cooperage.

Chestnut oak—Canal-boat frames.

Circassian walnut—Furniture, interior finish, pianos, plumbers' woodwork.

Cottonwood—Boxes, cloth boards, flour barrels, ironing boards.

Cucumber—Car finish, ceiling, floor, siding.

Cypress—Boats, boxes, carriage panels, furniture, interior finish, mantels, organs, porch posts, silos, tanks, wagon bottoms.

Dogwood—Mauls, spindles.

Douglas fir—Boat sides, canal-boat combing, ceiling, masts, race planks for canal boats, spars.

Ebony—Gavels, handles, organs, police clubs.

French walnut—Furniture.

Hackmatack—Boat knees, lighters.

Hemlock—Boxes, house finish.

Hickory—Axles, buggy shafts, carriage frames, carts, handles, singletrees, spokes, wagons, wheel rims.

Holly—Pianos, pipe organs.

Lignum-vitæ—Bowling balls, bearings for steamboat wheels, gudgeon bearings.

Live oak—Interior finish.

Loblolly pine—Basket bottoms, beer-bottle boxes, boats, cart bodies, crates, flooring, frames for doors and windows, fruit boxes, garden boxes, interior finish, nail kegs, oyster boxes, seats for boats, siding, staves, store fixtures, wagon beds, balusters, brackets, chiffoniers, mantels, molding, picture frames, railing, sash, scroll-work, sideboards, siding.

Locust—Brackets, chucks, hubs, insulator pins, treenails.

Longleaf pine—Boat planking, canal-boat cabins, canal-boat hatches, cart beds, door casing, doors, elevators, flooring, interior finish, mantels, tanks, tank stands, trunks, wagon bodies, window frames.

Mahogany—Antique furniture, fixtures for offices and stores, furniture, gavels, grilles, interior finish, joiner work in boats, organs, pianos, police clubs, table legs.

Pin oak—Wagon felloes.

Pitch pine—Boats, cupboards, desk shelves, doors, extension tables, house trim, ice chests, kitchen cabinets, sash, spring-wagon bodies, table frames, wagon bottoms.

Red cedar—Boats, cigar boxes, tanks.

Red gum—Berry baskets, butter dishes, cigar boxes, slack cooperage, trunk crates.

Red mulberry—Boats.

Red oak—Boat finish, bodies for wagons and carriages, church finish, flour barrels, frames for wagons, furniture, house finish, mantels, mirror frames, molding, picture frames, wheel stock.

River birch—Hoops.

Rock elm—Coiled hoops.

Rosewood—Gavels, handles, pianos, police clubs, table legs.

Spanish cedar—Cigar boxes.

Spruce—Cold-storage doors, interior finish, organs, pianos, spars.

Sugar maple—Architectural mantels, baby-buggy seats, barrel hoops, baskets, bed springs, buffets, butter dishes, chairs, chiffoniers, china closets, couch frames, cupboards, duck pins, furniture, hall racks, ice chests, interior finish, kitchen cabinets, office fixtures, organs, pianos, reed-chair seats, rockers, slack cooperage, table sides, tenpins, Turkish chairs, wardrobes.

Sugar pine—Blinds, doors, furniture, interior finish, sash.

Sweet birch—Brackets, chairs, china closets, counters, cupboards, extension tables, interior finish, grilles, kitchen cabinets, Morris chairs, parlor suits, picture frames, plumbers' woodwork, sample cases, store fixtures, table legs, trunks.

Sycamore—Baskets, corework.

Teak—Joiners' work in boats.

Tulipwood—Pipe organs.

Tupelo—Barges, basket bottoms, boats, candy boxes, chiffoniers, china closets, cigar boxes, crates, cupboards, extension tables, furniture, kitchen cabinets, packing boxes, picture frames, screws, spice boxes, tea chests, tug tenders, veneer for wrapping molding for shipment.

White birch—Dowels, mirror frames, molding, picture frames.

White cedar—Boats, cigar boxes, deck ceiling, lining for couches, planking, tanks.

White elm—Baskets, chucks, flour barrels, wagon hubs.

White oak—Architectural mantels, axles, balusters, bent rims, boat keels, cabinets, canal-boat bottoms, car floats, cart frames, chiffoniers, church furnishing, closets for china, cold-storage doors and chutes, couch frames, cupboards, dressers, fly screens, frames for boats, frames for bed springs, furniture, guards for boats, hoops, ice boxes, insulator brackets, interior finish, kitchen cabinets, organs, plumbers' woodwork, sideboards, stairwork, stares, store and office fixtures, tanks, Turkish chairs, wagon bottoms, wagon sills, wheels for wagons and carts.

White pine—Beehives, boat bottoms and decks, brackets, bread boxes, caskets, coffee boxes, coffins, doors, fly screens, finish for boats, frames, interior finish, mantels, molding, office fixtures, organs, patterns, pianos, sash, silos, tanks, yeast boxes.

Yellow buckeye—Candy boxes, spice drawers, tea chests.

Yellow poplar—Antique furniture, architectural mantels, automobiles, bakers' wagon bodies and shelves, baskets, boat seats, brackets, buggy bodies and seats, candy boxes, chiffoniers, china closets, cigar boxes, cornice, crates, cravat holders, cupboards, doors and door frames, flour barrels, furniture, hatracks, house siding, humidors, interior finish, mantels, molding, organs, photograph albums, pianos, porch pillars, sash, scrollwork, sideboards, spice

drawers, store and office fixtures, table tops, tea boxes, trunks, wagon beds, whisk-broom holders, window frames, wooden pumps.

WOOD MANUFACTURERS.

Below is a list of Maryland manufacturers who supplied data on which this report is based. The names are grouped by industries, and if a name appears under more than one industry it indicates that the firm manufactured more than one commodity.

BASKETS.

Maryland Veneer & Basket Co....Baltimore
Cambridge Manufacturing Co....Cambridge
Eden Manufacturing Co.........Eden
Nanticoke Manufacturing Co....Federalsburg
G. A. Bounds..................Hebron
E. W. Goodwin.................Marion
Petey Manufacturing Co........Pittsville
Powelsville Manufacturing Co...Powelsville
Phillips & Douglas............Preston
Prince Anne Milling Co.........Princess Anne
Somerset Lumber Co............Princess Anne
S. E. W. Friel................Queenstown
Thomas L. D. Swing & Co........Ridgeley
Huston Sons Co................Salisbury
D. J. Elliott..................Salisbury
Dickerson & Co................Salisbury
E. G. Davis....................Willards
Pocomoke Manufacturing Co.....Willards
D. J. Elliott..................White Haven

BOXES AND CRATES.

The C. C. Lurssen's Sons Co....Baltimore
Canton Box Co.................Baltimore
H. D. Dreyer & Co.............Baltimore
J. H. Duker Box Co............Baltimore
Charles Fortenbaugh ....Baltimore
H. F. Badecke & Sons..........Baltimore
J. H. Thiemeyer...............Baltimore
Acme Box Co...................Baltimore
Becker Brother & Son..........Baltimore
East Brooklyn Box Co..........Baltimore
Henry Louis ....Baltimore
United Trunk & Box Co.........Baltimore
J. C. Eichman Mfg. Co.........Baltimore
Wm. Suchting & Sons...........Baltimore
Reinle-Salmon Co. ....Baltimore
Reliable Furniture Mfg. Co....Baltimore
J. T. Wright..................Cambridge
Cambridge Manufacturing Co....Cambridge
W. C. Muir & Co...............Crisfield
The A. B. Cochrane Co.........Crisfield
Crisfield Mfg. & Packing Co....Crisfield
Parker & Rowe.................Denton
G. T. Redden & Co.............Denton
Eden Manufacturing Co.........Eden

BOXES AND CRATES.—Cont.

Nanticoke Manufacturing Co....Federalsburg
R. E. Poole...................Federalsburg
Delmar Lumber Co..............Havre de Grace
G. A. Bounds & Co.............Hebron
G. A. Thompson & Son..........Hurlock
S. L. Webster & Son...........New Market
Asburton, Childs & King........Pocomoke
Powelsville Manufacturing Co...Pocomoke
Phillips & Douglass...........Preston
The Cohen & Bock Co...........Princess Anne
Thomas L. Day, Swing & Co....Ridgeley
E. S. Adkins & Co.............Salisbury
L. E. Williams & Co...........Salisbury
Disheroon & Co................Salisbury
D. J. Elliott..................Salisbury
Huston Sons Co................Salisbury
The Corddry Co................Snow Hill
Nanticoke Mills ....Vienna
Petey Manufacturing Co........Whaleyville
W. C. Todd....................Williston

CIGAR BOXES.

Otto Begemer ....Baltimore
George S. Feurst..............Baltimore
J. H. Henschen................Baltimore
J. Henry Fisher...............Baltimore
K. Hendricks' Sons............Baltimore
The C. C. Lurssen's Sons Co....Baltimore
John Lohr ....Hagerstown

COOPERAGE.

Frederick Albrecht ....Baltimore
W. G. Wackerhauser & Sons....Baltimore
Kimball-Tyler Co. ....Baltimore
Baltimore Cooperage Co........Baltimore
The L. D. Bohrer Co...........Baltimore
Lynch & Shriver...............Girdletree
The Edwin Bell Co.............Hebron
C. Weisbrod & Sons............Lutherville
W. C. Tarr....................Pocomoke
Bowen Lumber Co...............Showell
The Oysterman Barrel Co.......Stockton
D. J. Elliott..................White Haven
W. H. C. Kemp.................Williamsport

FURNITURE.

Hughes Furniture Mfg. Co.....Baltimore
Goldstrom Brothers .....Baltimore
James McDonough & Co.....Baltimore
Henry Boesser & Son.....Baltimore
Bagby Furniture Co.....Baltimore
D. Willson & Sons.....Baltimore
M. Pitzer & Co.....Baltimore
C. P. Meiskin & Co.....Baltimore
Monumental Carriage Factory...Baltimore
George Spindler .....Baltimore
Prettiest Brothers .....Baltimore
Reliable Furniture Mfg. Co.....Baltimore
Levinson & Zenitz.....Baltimore
Atlantic Furniture Co.....Baltimore
George Chipman & Son.....Baltimore
A. Friedberg .....Baltimore
John C. Knipp & Sons.....Baltimore
Cumberland Furniture Co.....Cumberland
Easton Furniture Co.....Easton
Hagerstown Mantel & Furn. Co...Hagerstown
Hagerstown Furniture Co.....Hagerstown
Main Furniture Co.....Hagerstown
Hagerstown Lounge Co.....Hagerstown
Brandt Cabinet Works.....Hagerstown
Hagerstown Table Works.....Hagerstown

HORSE VEHICLES.

W. H. Feldmeyer.....Annapolis
Jacob H. Tracy.....Antietam
Frank Dietz .....Baltimore
Peters Wagon Works.....Baltimore
Marx & Haggard.....Baltimore
William Bowers & Son.....Baltimore
George W. Hubbard.....Baltimore
Leonhardt Wagon Mfg. Co.....Baltimore
E. Lehnert & Sons.....Baltimore
Herman Born & Sons.....Baltimore
Baltimore Hub Factory.....Baltimore
E. Stinson Manufacturing Co....Baltimore
J. L. Brooks & Co.....Baltimore
Charles W. Berndt.....Baltimore
Carl Sagner's Sons.....Baltimore
F. Winter & Son.....Baltimore
Charles O. White.....Baltimore
The Penfold Wagon Co.....Baltimore
Charles A. Sefton.....Baltimore
Nodel & Schmidt.....Baltimore
F. W. Sandrock.....Baltimore
William Foetter .....Baltimore
F. Meyd & Brother.....Baltimore
O. B. Stenbaugh.....Baltimore
John Stiehl .....Catonsville
Davis & Satterfield.....Chestertown
J. P. Tracy.....Cockeysville
J. W. Yook.....Crisfield
Marion G. Anderson.....Cumberland
Hagan Brothers .....Frederick
J. Jacobs & Son.....Gaithersburg
Hess Carriage Co.....Hagerstown
Hagerst'n Wagon & Carriage Co..Hagerstown

HORSE VEHICLES—Cont.

Burns Brothers .....Havre de Grace
Shafer, Rockville & Co.....Kensington
E. W. Cranmer.....Pocomoke
B. W. B. Adkins & Sons.....Salisbury
E. S. Adkins & Co.....Salisbury
Herr & Baldwin.....Westminster

INTERIOR FINISH.

Parrish-Meredith Co. .....Annapolis
Joseph Thomas & Son.....Baltimore
Baltimore Sash & Door Co.....Baltimore
Heise & Bruns Co.....Baltimore
M. Salmon Fly Screen Co.....Baltimore
Otis Dixon & Co.....Baltimore
George Zaselmann Co.....Baltimore
John C. Knipp & Sons.....Baltimore
Hartzmeier Lumber Co.....Baltimore
F. A. Breidbent.....Baltimore
George A. Staub.....Baltimore
The National Mantel & Tile Co..Baltimore
Lafayette Mill & Lumber Co....Baltimore
John H. Geis & Co.....Brooklyn
E. J. Casey.....Cambridge
J. T. Wright.....Cambridge
Cambridge Manufacturing Co....Cambridge
W. S. & A. M. Culp.....Chestertown
The A. B. Cochrane Co.....Crisfield
Tawes & Gibson.....Crisfield
Eastern Door & Sash Co.....Cumberland
South Cumberland Planing Mill..Cumberland
William D. Bowers Lumber Co..Frederick
Wilkerson & Brown.....Frederick
P. G. Fox.....Friendsville
Westside Lumber Co.....Hagerstown
Danner Lumber Co.....Hagerstown
Beck Brothers .....Hagerstown
H. L. Ockham & co.....Hagerstown
George Sack & Sons.....Laurelville
Joseph F. North.....Leonardstown
William T. Sigler.....Lobe
C. M. Rathbun & Sons.....Mt. Lake Park
Ashcraft, Childs & King.....Pocomoke
Young & Son.....Pocomoke
Phillips & Douglas.....Preston
Princess Anne Milling Co.....Princess Anne
C. W. Smith & Son.....Ridgeley
Morris Brothers .....Salisbury
T. H. Mitchell.....Salisbury
Jackson Brothers .....Salisbury
Hytson Saw Co.....Salisbury
E. S. Adkins & Co.....Salisbury
Dickerson & Co.....Salisbury
L. R. Williams & Co.....Salisbury
The Cordrey Co.....Snow Hill

MUSICAL INSTRUMENTS.

William Knabe .....Baltimore
William Stiehle .....Baltimore
Adam Stein .....Baltimore
M. P. Moller.....Hagerstown

SHIPS AND BOATS.

Oliver Beebe & Sons.....Baltimore
Bone Brothers .....Baltimore
Speddex Shipbuilding Co.....Baltimore
The Nilson Yacht Building Co.Baltimore
Charles L. Bobbe & Sons Co.....Baltimore
Charles S. Boseller & Co.....Baltimore
J. L. Beachman & Brother.....Baltimore
William E. Woodall & Co.....Baltimore
Maryland Boat & Launch Works..Baltimore
Cambridge Manufacturing Co....Cambridge
George T. Johnson.....Cambridge
Webster-Richardson Car Marine
Railway .....Cambridge
J. B. Nelson.....Crisfield
Charles A. Dana .....Crisfield
Canal Towage Co.....Cumberland
M. A. Mintic.....Cumberland
Darlington Boat Works.....Darlington
J. Z. Tyler.....Dorchester
Henry Diebert Burge Bldg. Co.. Elkton
D. Diebert & Brothers.....Elkton
Susquehanna Marine Works Co..Havre de Grace
James W. Brooks & Son.....Madison
Orford Ship Building Co.....Orford
E. James Tull.....Pocomoke City
L. A. Price.....Rock Point
M. M. Davis & Son.....Salisbury
Salisbury Marine Railway Co....Salisbury
P. R. Smith.....South River
John Branford .....Upper Fairm't

SIGNS AND TANKS.

Baltimore Cooperage Co.....Baltimore
John Zepler .....Baltimore
Rosemary Silo & Mfg. Co.....Frederick

STORE AND OFFICE FIXTURES.

Reible-Schrom Co. .....Baltimore
M. L. Himmel & Son.....Baltimore
Oscar Hermann .....Baltimore

MISCELLANEOUS.

Jacob H. Tracy.....Antietam
William Swisbling & Sons.....Baltimore

MISCELLANEOUS—Cont.

The Steiner Mantel Co.....Baltimore
Fred Bergner & Co.....Baltimore
John Dittmar & Sons.....Baltimore
C. J. Dunn Co.....Baltimore
James Bates' Son.....Baltimore
Lafayette Mill & Lumber Co.....Baltimore
Sanford & Brooks Co.....Baltimore
Williamson Veneer Co.....Baltimore
J. C. Eichman.....Baltimore
Franke-Schwab Co. .....Baltimore
Henry R. Hall, Jr.....Baltimore
Walbrook Mill & Lumber Co....Baltimore
E. A. Cold Co.....Baltimore
Conrad Hamp & Co.....Baltimore
Furst Brothers & Co.....Baltimore
Carriage & Toy Co.....Baltimore
United Trunk & Box Co.....Baltimore
Kinzonba Pump Works.....Baltimore
Baltimore Hub Factory.....Baltimore
George Easelmann Co.....Baltimore
Geo. A. Stanb.....Bedlsville
The Brunswick Furniture Co....Brunswick
J. R. Stewart.....Cambridge
J. T. Wright.....Cambridge
Cambridge Manufacturing Co....Cambridge
Town & Gibson.....Crisfield
F. Merten's Sons.....Cumberland
Wilcoxon & Brown.....Frederick
The Ox Fiber Brush Co.....Frederick
W. J. Valentine.....Hagerstown
Jones Cold Store Door Co.....Hagerstown
L. H. Wiebel.....Hagerstown
H. L. Coffman & Co.....Hagerstown
Hagerstown Woolen Ware Mfg.
Co. .....Hagerstown
S. C. Johnson & Co.....Henderson
Somerset Lumber Co.....Princess Anne
Princess Anne Milling Co.....Princess Anne
The Cohen & Bock Co.....Princess Anne
C. C. Ricards.....Ridge
D. J. Elliott.....Salisbury
Huston Sons Co.....Salisbury
Poco Wire Manufacturing Co....Willards
E. G. Davis.....Willards

MARYLAND'S LUMBER AND TIMBER CUT AND THE TIMBER SUPPLY

BY

F. W. BESLEY, STATE FORESTER

MARYLAND'S LUMBER AND TIMBER CUT AND THE TIMBER SUPPLY.

The foregoing report upon the "Wood-Using Industries" of the State shows the kinds, amounts, and prevailing prices of wood material used. This information should be of great value both to the grower and consumer of wood products. In the following chapter it is proposed to supplement that report with recently acquired facts concerning (1) the present lumber and timber cut of the State; (2) the timber resources, and (3) the relation of the present stand of timber to the demand. Such information should be of special value to the wood user as showing him to what extent he may reasonably expect to depend upon the local supply for the future. With the county forest maps soon to be published by the State Board of Forestry, he may definitely locate the timbered areas from which he might secure suitable material.

It has been shown that in 1909 over 284,000,000 feet, board measure, of rough lumber was converted into manufactured wood products in the State. This does not include the lumber brought into the State in its finished form, or that used in rough construction, which would at least double the quantity given. Of the total amount of the lumber, the Maryland sawmills furnished in 1908 approximately 240,000,000 feet, board measure. Maryland is, therefore, a large importer of lumber, notwithstanding the fact that 35 per cent of the land area of the State is wooded and the climate and soil conditions are exceptionally well adapted for good timber growth. It is evident that present conditions can not continue for any length of time since the Southern forests are being rapidly depleted of their surplus timber and the only other large source of supply is the Pacific Coast which, because of the high freight charges, can not be expected to lessen the difficulty materially. In short, the State must eventually furnish nearly all the common grades that are used, and will import from a distance only such material as can not be grown here.

TABLE 1.—*Cut of Lumber, Lath, and Shingles for 1908.*

County.	No. of mills.	Lumber.				Lath.		Shingles.	
		Hardwood. M bd. ft.	Pine. M bd. ft.	Total. M bd. ft.	Total value.	Thousands.	Value.	Thousands.	Value.
Allegany	32	8,700	6,474	15,183	$353,708	1,411	$4,487	6,500	$3,080
Anne Arundel	35	3,600	1,415	4,915	83,260	.....	.....	375	1,460
Baltimore	44	6,657	130	6,747	139,401	88	280	1,000	4,160
Calvert	16	2,000	2,350	5,350	79,330	.....	.....	100	416
Caroline	67	3,658	13,045	16,698	321,681	413	1,313	280	1,202
Carroll	8	2,400	.....	2,400	43,730	.....	.....	200	832
Charles	15	2,000	2,900	4,900	70,400	109	318	400	1,664
Cecil	7	1,600	500	2,000	31,700	.....	.....	200	832
Dorchester	49	2,231	14,942	17,173	319,015	625	1,669	80	208
Frederick	43	6,483	634	7,117	123,005	1,807	6,746	7,792	32,414
Garrett	70	47,758	11,367	59,130	986,407	2,457	7,814	1,100	4,950
Harford	19	4,611	30	4,641	80,656	145	461	640	2,662
Howard	12	1,884	93	1,977	34,051	.....	.....	1,068	4,443
Kent	11	1,540	339	1,460	24,713	.....	.....	100	416
Montgomery	46	8,836	337	9,113	160,587	1,538	4,859	4,200	17,497
Prince George's	20	4,333	1,081	5,401	89,904	135	398	153	636
Queen Anne's	8	780	2,365	3,133	42,108	.....	.....	200	832
St. Mary's	30	3,000	3,570	6,570	96,540	200	626	200	832
Somerset	41	2,951	10,582	13,463	178,656	65	207	50	208
Talbot	33	3,067	3,236	6,303	76,493	130	382	60	208
Washington	33	1,459	7,295	8,754	113,474	1,400	4,463	900	3,744
Wicomico	41	1,677	13,480	30,357	354,613	705	2,342	200	832
Worcester	44	1,600	18,600	20,000	348,700	1,240	3,943	500	2,080
Total	690	121,095	119,596	240,661	$3,600,110	13,389	$30,307	30,363	$84,608

Lumber and Timber Cut.

The lumber and timber cut of the State was made the subject of a special study by counties during the seasons of 1908 and 1909 to determine, as nearly as possible, the amount of forest products of all kinds that are annually taken from our forests. Most of the sawmills of the State are of the portable class which, as a rule, do not run continuously throughout the year, but usually suspend operations during the summer season when work on the farms is more urgent. The summary given in Table I shows the cut of lumber, lath, and shingles by counties for 1908, representing the cut of 690 mills.*

Under the cut of pine is included some hemlock and a little spruce in the mountain counties, and a little cypress in Wicomico and Worcester counties; but pine constitutes 80 per cent of the cut of conifers. The hardwood cut consists of about 60 per cent of oak of the various species, 20 per cent of chestnut, and a great variety of other species of which maple, yellow poplar, hickory, red gum, and beech are the most important. The average value per thousand feet board measure for the different kinds of undressed lumber at the mills was about as follows: yellow pine, $11.50; oak, $18.50, and chestnut, $14.50.

Lath is made principally from pine, but a number of the softer hardwoods are also used. The average price at the point of production is $0.18 per thousand.

Shingles are made in the central part of the State almost exclusively from chestnut. In other sections where chestnut is less abundant, a variety of woods is used, principally pine, yellow poplar, and cypress. The average price is $4.16 per thousand feet at the mills.

Timber and Wood Consumption for 1908.

Outside of the sawmill products, immense quantities of timber and wood are utilized for various purposes, chiefly for railroad ties, piling, poles, mine props, cordwood, pulpwood, charcoal, and tanbark. The bulk of this material is handled by a large number of small operators who do not make it their principal business, but get out this class of material in connection with other operations, or as in the case of railroad ties and cordwood, much of it is gotten out by farmers during the winter months. Complete data was unobtainable, but a careful estimate, supported by a large amount of data, is submitted.

*The cut of 384 mills reported by the Bureau of the Census for 1908 was taken as a basis, and this cut supplemented by 306 mills not reporting to the Census, makes the full report.

TABLE II.—*Cut of Miscellaneous Forest Products for 1908.*

Kind of product.	Quantity.	Value.
Mine props	5,186,000 cu. ft.	$320,000
Cordwood	99,155 cords	297,345
Piling	2,907,940 lin. ft.	290,000
Railroad ties	299,336	149,670
Poles	53,660	107,320
Pulpwood	21,895 cords	103,480
Tanbark	10,620 tons	100,890
Charcoal	286,100 bushels	34,320
Export woods	100,000 cu. ft.	30,000
Total value		$1,433,025

This does not include the immense amount of wood, fencing and other material used on the farms, but only that which is cut and sold.

If the cut of all forest products enumerated in the above table be reduced to cubic feet, and the cut of lumber, lath, and shingles be likewise reduced to the same unit for comparison, the total forest production for 1908 will represent 77,565,000 cubic feet.

THE TIMBER RESOURCES.

One of the serious handicaps to the universal practice of forestry is the lack of information concerning our forest resources. There has been for a long time in every State more or less speculation about the amount of standing timber. The estimates have differed so widely as to leave much room for doubt, and it has discredited the ability of anyone to speak with authority in advocating a forest policy that is in accord with the existing facts. This lack of exact knowledge has been most keenly felt for several years, so that now a survey of our forest resources has become a recognized necessity. Maryland has made excellent progress in this work, and now has completed accurate forest surveys for eighteen counties, with partial surveys of the other five, which serve as a fair basis for estimating so that very reliable information is at hand. The following tabular summary (Table III) shows the extent of our forest resources as compiled from these surveys.

This table shows that 35 per cent of the land area of the State is wooded. Of this wooded area scarcely 1 per cent is virgin forest, the rest is cut-over land in various stages of growth, some good and much of it very poor, depending upon the extent of the cutting, the time that has elapsed since it was cut over, and the care it has received, especially in regard to forest fires.

The present stand of saw timber of all classes, 10 inches and over in diameter measured at breast height, or approximately 12 inches in diameter on the stump, is 3,316,023,000 feet board measure. Of this 67 per cent is hardwood, principally oak, chestnut, gums, poplar, and hickory, and the balance of 33 per cent almost entirely pine, with a very little hemlock. There are four different pines found commonly in the State, each more or less confined to a given section. Spruce pine, which is the most abundant species, is found in southern Maryland, and in the upper Eastern Shore counties. Loblolly pine is found only in the lower Eastern Shore counties, and to some extent in lower St. Mary's and Calvert counties on the Western Shore. Pitch pine is found in commercial quantities in the upper southern Maryland counties, and also in the mountain counties. White pine is confined to isolated patches in the mountain counties.

The standing timber varies greatly in value in different sections of the State, depending upon kind, quality, and distance from transportation lines, but the total approximate value is estimated at $13,145,650.

TABLE III.—*Wooded Area, Amount and Value of Standing Timber in Maryland.*

(Includes all species of trees 10 inches and over in diameter, measured at breast height, 4½ feet from the ground.)

County.	Wooded area.	Percentage of county wooded.	Total stand. (10" and over in diameter.)			Approximate stumpage value.
			Hardwoods.	Pine.	Total.	
	Acres.		*M bd. ft.*[3]	*M bd. ft.*[3]	*M bd. ft.*[3]	
Allegany	163,650	51	134,948	24,164	159,112	$ 409,862
Anne Arundel	92,647	34	112,745	5,814	118,559	474,236
Baltimore	103,525	26	197,355	11,988	209,343	837,372
Calvert	62,390	45	70,638	7,717	78,355	314,552
Caroline	63,142	30	30,284	64,013	94,297	441,201
Carroll[2]	32,422	11	61,464	100	61,564	246,256
Cecil[1]	73,931	31	62,304	420	62,724	250,896
Charles[2]	147,840	50	121,968	40,656	162,624	650,496
Dorchester	140,742	38	83,762	311,444	395,206	1,892,268
Frederick[2]	50,928	12	61,020	94	61,114	244,456
Garrett	273,357	64	365,698	[4]45,234	410,932	1,095,181
Harford	81,872	29	147,204	148	147,352	589,408
Howard	37,130	24	99,605	190	99,795	399,180
Kent	33,755	17	50,129	149	50,278	201,261
Montgomery	68,851	28	123,133	7,523	130,656	522,624
Prince George's	127,200	41	107,838	8,720	116,558	446,292
Queen Anne's	59,279	25	65,558	11,019	76,577	327,059
St. Mary's	119,080	50	83,831	61,823	145,654	603,338
Somerset	68,371	25	30,898	166,304	197,202	955,112
Talbot	45,812	29	29,673	123,140	152,813	734,392
Washington[2]	73,168	20	73,000	168	73,168	219,672
Wicomico	111,513	47	26,606	97,639	124,245	540,713
Worcester	134,627	43	94,796	93,099	187,895	749,883
Total	2,165,232	35	2,234,457	1,081,566	3,316,023	$13,145,650

[1] Wooded area measured but stand estimated.
[2] Wooded area and stand of timber estimated.
[3] Doyle log measure used.
[4] Includes hemlock.

Relation of Present Stand of Timber to the Demand.

A comparison of the annual cut of all classes of material with the present volume of standing timber shows emphatically that we are using up our forest capital rapidly. The present average growth on the woodlands of the State is probably not over 15 cubic feet of merchantable wood per acre per annum. This is a very low production, due to present condition, where destructive methods of cutting are the rule, and repeated forest fires prevent a valuable second growth. Comparing the annual consumption and the annual growth, it is apparent that we are using our forests nearly two and one-half times as fast as they are growing, and this excess of consumption over growth increment has to be taken each year out of our forest capital. At the present rate our forests will be stripped of all merchantable material in about sixteen years. The actual exhaustion of our forests will not likely occur, because as timber becomes more scarce the values will advance to such an extent that practically every woodland owner will take better care of his property, thereby increasing production and stopping unnecessary waste. It can not be too strongly emphasized, however, that improved methods of forest management must be practiced now if a serious timber shortage with exorbitant prices is to be avoided in the future. Trees can not be grown in a year or in ten or twenty years. The crop that is started now, will require nearly a generation in which to reach maturity, hence the importance of looking ahead. Fortunately, most of our woodland is already stocked with young growth which requires but a comparatively few years of good care to produce a merchantable crop, and the owner may be assured that when the growing crop is ready for harvest the price of timber will have advanced to such an extent as to make it a valuable crop, much more valuable than the same quality of timber is rated to-day.