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DEPARTMENT OF GEOSCIENCES

NORTH CAROLINA GEOLOGICAL AND ECONOMIC SURVEY

JOSEPH HYDE PRATT, State Geologist

ECONOMIC PAPER No. 40

FOREST FIRES IN NORTH CAROLINA
DURING 1914

AND

FORESTRY LAWS OF NORTH CAROLINA

BY

J. S. HOLMES, State Forester



RALEIGH

E. M. UZZELL & Co., STATE PRINTERS AND BINDERS

1915



Allen E. W. Hulley

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LETTER OF TRANSMITTAL.

CHAPEL HILL, July 15, 1915.

To His Excellency, HONORABLE LOCKE CRAIG,

Governor of North Carolina.

SIR:—I have the honor to submit for publication as Economic Paper No. 40 of the reports of the North Carolina Geological and Economic Survey a report on the *Forest Fires in North Carolina During 1914* and on the *Forestry Laws of North Carolina*.

Since the passage of the forestry laws by the General Assembly of 1915, there has already been an increased interest shown in regard to the forests of the State and their preservation. It is believed that these laws can be made effective and that they will be the means of greatly reducing the loss due to forest fires.

Yours very respectfully,

JOSEPH HYDE PRATT,

State Geologist.

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FOREST FIRES IN NORTH CAROLINA DURING 1914

INTRODUCTION.

Public interest in forest fire prevention in North Carolina is increasing year by year. This is reflected in the State press, which chronicles and comments upon forest fires and the loss suffered by them to a much greater extent than formerly. It is also seen in the recent action of the State Legislature, which enacted an excellent forest fire law. However, the fact that the appropriation to make this law effective was denied shows that even yet public opinion is not insistent enough or definite enough to secure from the representatives of the people in the General Assembly adequate State assistance in fire protection.

The only possible reason for this condition is that our people themselves are not well enough informed on this subject. They do not yet realize the pressing necessity for a permanent supply of timber for our industries and for the people as a whole. They do not yet understand that where seedlings and young trees of our more valuable species are killed by fire our future forests will be of greatly reduced value; that burnt-over forests yield the minimum returns in timber, while protected forests yield the maximum; that unburnt forests pay the highest returns to the owners, to the community, and to the State.

Forest fires result largely from the indifference and consequent carelessness of the people. Half the fires in this State are said to be due to the carelessness of the individual. By changing this indifference into strong, active opposition to burning the woods, much of the criminal carelessness now existing in regard to forest fires will be done away with. It is with the idea of keeping the public informed as to the real conditions of the forests throughout the State, and so arousing them to the need of definite action, that these annual reports continue to be prepared and issued to the people of the State. Previous publications of the North Carolina Geological and Economic Survey in this series are "Forest Fires in North Carolina During 1909," Economic Paper No. 19; "Forest Fires in North Carolina During 1910," Economic Paper No. 22; "Forest Fires in North Carolina During 1911," Economic Paper No. 25; "Forest Fires in North Carolina During 1912," Economic Paper No. 33; and "Forest Fires in North Carolina During 1913," Economic Paper No. 37. Each of these reports contains a large amount of information about the nature of the damage done by forest fires, the causes

of fires, the various methods suggested and plans put into force to prevent them, and the laws of the various States and of the United States for their control. Copies of most of these Economic Papers can be had free upon application.

THE WEATHER.

Extremely dry weather has often been spoken of as a frequent cause of forest fires. This, however, is a misapprehension. Dry weather can no more cause a fire in the woods than a loaded gun can cause the death of a friend. It is the careless individual in both cases who causes the trouble. If carelessness could be eliminated, the forest fire "caused by dry weather" and the death caused by the gun which was "not loaded" would not occur.

But carelessness can only be overcome with thoughtfulness. In order, therefore, to reduce the number of fires, knowledge of the damage done by them must be spread and emphasized so that the general public will learn to think, and so will learn to exercise increased watchfulness and care.

The relation of carelessness and dry weather to forest fires in 1914 is seen in a casual perusal of the State press; though even now, when a knowledge of the value of our forests would seem to be almost universal, some newspapers, which claim to be leaders of public opinion, scarcely notice even the worst fires. The great majority of our State papers, however, are quick to point a lesson from each destructive fire. It is seen, by referring to the annual summary of the United States Weather Bureau reports, that the precipitation over North Carolina for the past year was "2.79 inches below normal," a deficiency of about 51½ per cent. January was a dry month, there being only about two-thirds the normal amount of rainfall. From the 4th to the 24th practically no rain fell. A very destructive fire occurred near Ridge Crest which was caused, it was said, by "careless handling of fires in the woods."

During February rainfall was about normal, but in March there was only two-thirds of the usual amount. It was, however, well distributed, and few fires were reported. The April rainfall was normal, most of it occurring, however, before the 21st of the month. From that date up to the middle of June precipitation was exceptionally light. May was the driest on record, with the exception of 1911, an average of only 1.38 inches falling, compared with a normal rainfall of 4.11 inches. The western district, usually the wettest, was drier than the central or eastern sections, and precipitation was unevenly distributed. Forest fires were reported by the newspapers from the Linville section of the mountains

and from many of the southeastern coastal plain counties. The June rainfall averaged 3.28 inches, being about 2 inches below the normal. Though rain was general about the middle of the month, forest fires raged around Beaufort up to about the 20th. They were, also, exceedingly destructive on Mount Mitchell. July was also dry, and though scattered showers fell in most places, destructive fires still continued over the greater part of the coastal plain region.

The rainfall through August and September was still below normal, but no fires were reported in the daily papers.

The last three months of the year were the only ones in which the precipitation was above the average, the December rainfall being easily the heaviest yet recorded. Early in November fierce fires were raging around the Black Mountains and at other places in the State, but the fall fires were less numerous than usual.

TABLE 1.—RELATIVE MONTHLY AND SEASONAL FIRE RISKS IN 1914 AND AVERAGE FOR FOUR YEARS IN PERCENTAGES.

	1914.	Average.		1914.	Average.
March.....	15	16.5	Spring.....	52	53.5
April.....	20	23			
May.....	17	14			
June.....	11	6.5	Summer.....	21	17
July.....	5	6			
August.....	5	5			
September.....	4	5	Fall.....	21	22.5
October.....	7	7			
November.....	10	10.5			
December.....	1	3	Winter.....	6	7
January.....	1	1			
February.....	4	2.5			

ANNUAL STATEMENT OF FOREST FIRES IN 1914.

The following tables were compiled from more than six hundred replies from voluntary correspondents all over North Carolina. Though five counties only are unrepresented, less than half the townships of the State were reported for, and most of these by only one person. Nevertheless, the figures here given, though undoubtedly much less than the actual amount of fire damage, will convey to the reader some idea of the destruction annually occurring in our State, largely as a result of carelessness.

FOREST FIRES IN NORTH CAROLINA.

TABLE 2.—FOREST FIRES IN NORTH CAROLINA DURING 1914. COMPARATIVE STATEMENT; SUMMARY OF REPORTS FROM CORRESPONDENTS BY REGION.*

	MOUNTAIN.		PIEDMONT.		COASTAL PLAIN.		STATE.	
	1914.	Average for Six Years.	1914.	Average for Six Years.	1911.	Average for Six Years.	1914.	Average for Six Years.
Total number of townships in region.....	166		451		370		990	
Number of townships reporting.....	85	68	234	196	129	128	448	390
Number of replies received.....	117	83	348	240	161	128	626	452
Number of forest fires reported.....	176	170	212	230	281	238	669	639
Total area burnt over, in acres.....	76,000	141,000	60,000	101,000	159,000	155,000	295,000	397,000
Total standing timber destroyed, in M feet, board-measure.....	18,000	23,000	6,000	11,000	23,000	22,000	47,000	56,000
Value of timber destroyed.....	\$ 29,000	\$ 58,000	\$ 17,000	\$ 33,000	\$ 83,000	\$ 63,000	\$129,000	\$ 155,000
Area of young growth destroyed, in acres.....	31,000	47,000	21,000	32,000	48,000	42,000	100,000	122,000
Value of young growth destroyed.....	\$ 67,000	\$ 68,000	\$ 42,000	\$ 59,000	\$111,000	\$ 77,000	\$220,000	\$ 207,000
Value of forest products destroyed.....	\$ 87,000	\$ 73,000	\$ 26,000	\$ 54,000	\$ 72,000	\$ 81,000	\$185,000	\$ 212,000
Value of improvements destroyed.....	\$ 22,000	\$ 17,000	\$ 13,000	\$ 22,000	\$ 31,000	\$ 26,000	\$ 66,000	\$ 66,000
Total damage reported.....	\$205,000	\$218,000	\$ 98,000	\$170,000	\$297,000	\$253,000	\$600,000	\$ 641,000
Number of lives lost.....								2
Cost to private individuals to fight fires.....	\$ 4,400	\$ 6,000	\$ 1,900	\$ 4,400	\$ 9,000	\$ 8,100	\$ 15,000	\$ 18,600

TABLE 3.—FOREST FIRES IN NORTH CAROLINA DURING 1914. SUMMARY OF REPORTS FROM CORRESPONDENTS BY COUNTIES.

County.	MOUNTAIN REGION.											
	Total Number of Townships in County.	Number of Townships Reporting.	Number of Replies.	Number of Fires.	Total Number of Acres Burnt Over.	Merchantable Timber Destroyed, M.	Value Timber Destroyed.	Acres of Young Growth Destroyed.	Value of Young Growth Destroyed.	Value of Products Destroyed.	Value of Improvements Destroyed.	Cost of Fighting Fires.
Alleghany.....	8	1	1				\$		\$	\$	\$	\$
Ashe.....	15	4	2	4	500			500	2,000		100	100
Avery.....	7	3	4	3	200			150	1,000	1,000	500	50
Buncombe.....	13	6	9	16	4,100	15,000	10,000	4,080	3,762	10,000		130
Cherokee.....	6	2	3	13	1,100	10	25	500	500			25
Chay.....	5	4	11	19	5,500	272	1,200	3,450	9,500			100
Graham.....	3	2	2	3	4,000	109	300	3,000	1,000			
Haywood.....	13	5	6	12	3,700	620	3,000	200	200	4,500	600	1,050
Henderson.....	8	6	7	1	100			3	25		150	
Jackson.....	15	3	4	9	6,650	35	6,175	200	3,000			1,273
Macon.....	11	8	14	18	11,515	25	85	1,708	4,008		11,204	182
Madison.....	16	11	13	6	3,155	523	2,075	320	1,052	780	1,050	135
Mitchell.....	9	5	8	3	300	25	190	50	40	100	100	
Swain.....	5	3	3	13	16,600	116	250	6,500	7,400	7,000	1,000	575
Transylvania.....	9	7	10	46	3,050	1,025	4,120	2,615	8,000	13,170	100	100
Watauga.....	12	6	6	3	200	50	250					25
Yancey.....	11	9	14	7	16,530	373	1,130	7,530	25,800	51,000	7,050	590
Totals.....	166	85	117	176	76,250	18,174	\$28,800	30,806	\$67,287	\$87,550	\$21,854	\$ 4,335

TABLE 4.—FOREST FIRES IN NORTH CAROLINA DURING 1914—SUMMARY OF REPORTS FROM CORRESPONDENTS BY COUNTIES.

County.	Total Number of Townships in County.	Number of Townships Reporting.	Number of Replies.	Number of Fires.	PIEDMONT REGION.								
					Total Number of Acres Burnt Over.	Merchandise Timber Destroyed, M.	Value Timber Destroyed.	Acres of Young Growth Destroyed.	Value of Young Growth Destroyed.	Value of Ponds Destroyed.	Value of Improvements Destroyed.	Cost of Fighting Fires.	
Alamance.....	13	8	12				\$		\$				
Alexander.....	8	7	8	3	12				10	25	150	100	
Anson.....	8												
Burke.....	12	5	6	4	21,200	1,250	2,500	11,200	25,200	25			300
Cabarrus.....	12	7	11	1	5	5	25	5	10	35			
Caldwell.....	12	3	4	15	11,100	300	1,500	1,000	1,000	3,000			
Caswell.....	9	5	7	4	129				250	50			
Catawba.....	8	7	11										
Chatham.....	14	4	5	6	170				135	695			
Cleveland.....	11	7	10	5	218	20	48	217	55	250			20
Davidson.....	17	6	8	1	12	15	30	12	100	100			10
Davie.....	7	7	15	2	310	12	60	8	75	400			
Durham.....	6	2	2										
Forsyth.....	14	10	13	4	41	10	50	30	275	350			12
Franklin.....	10	4	9	6	131	250	850	99	216	100	100		50
Gaston.....	6	4	8	4	195	6	24	135	650	225			70
Granville.....	9	5	9										
Guilford.....	18	8	10	2	85		100	60	150				
Iredell.....	16	6	10	1	860	100	500	200	150	300	450		75
Lee.....	7	2	2	10	623			603	760				
Lincoln.....	5	3	4	2				50	100		800		
McDowell.....	11	5	6	25	1,420	1,000	3,003	410	205				150
Mecklenburg.....	15	10	18										
Montgomery.....	11	7	8	23	8,920	15	30	130	440	491	25		170
Moore.....	9	7	15	11	4,130	103	410	1,800	1,750	2,350			280
Orange.....	7	2	2										
Person.....	9	4	4										
Polk.....	6	6	8	9	3,140	20	2,410	2,300	2,600	1,500	600		75
Randolph.....	19	7	8	6	1,000	100	300	200	500				
Rockingham.....	11	4	5	11	27	10	40	21	205	100	1,000		100
Rowan.....	14	9	12	12	760	1,000	1,100	320	1,300	650	5,300		130
Rutherford.....	12	3	3		50			50	100	10			10
Stanly.....	8	2	2	2	10	20	75	6	50	250	2,000		100
Stokes.....	8	4	5	3	3,501	100	500	200	500				50
Surry.....	14	12	15	4	540	202	410	510	625	35			75
Union.....	9	7	9	2	204	75	200	75	200	400	500		
Vance.....	9	5	7	2	7			4	30				
Wake.....	19	2	2	1	10	5	15	10	50				
Warren.....	12	5	10	13	150	100	300	95	1,175	2,500	75		55
Wilkes.....	21	15	26	13	990	915	2,415	800	2,750	12,300	1,000		185
Yadkin.....	8	8	19	5	200	100	100	210	25		1,035		
Totals.....	454	234	348	212	60,190	5,733	\$16,995	20,905	\$42,216	\$25,571	\$12,985		\$ 1,917

TABLE 5. FOREST FIRES IN NORTH CAROLINA DURING 1914. SUMMARY OF REPORTS FROM CORRESPONDENTS BY COUNTIES.

County.	COASTAL PLAIN REGION.											
	Total Number of Townships in County.	Number of Townships Reporting.	Number of Replies.	Number of Fires.	Total Number of Acres Burnt Over.	Merchandise Timber Destroyed, M.	Value Timber Destroyed.	Acres of Young Growth Destroyed.	Value of Young Growth Destroyed.	Value of Products Destroyed.	Value of Improvements Destroyed.	Cost of Fighting Fires.
Beaufort	6	2	3	10	2,000	2,000	\$8,000	2,000	\$ 6,000	\$6,000	8	\$ 1,000
Bertie	9	7	10	6	1,860	115	335	710	820	1,100	200	100
Bladen	15	1	1	1	200	10	40	100	300			50
Brunswick	6	1	2	2	1,200		6,000		3,000			
Camden	3	1	1	1								
Carteret	9	2	2	1								250
Chowan	4	2	2									
Columbus	14	8	11	24	12,600	775	1,600	6,600	500	3,100	3,000	1,085
Craven	9	2	2		2,000							
Cumberland	11	4	4	14	52,000	3,050	9,150	10,500	25,550	10,100	5,000	1,150
Currituck	5	3	4	11	5,002			2	50		510	
Dare	5											
Duplin	13	5	5	2								
Edgecombe	14	2	2	2	200	50	25	5	50	100	500	25
Gates	7			1								
Greene	9	3	3	4	350	3	3	75				
Halifax	12											
Harnett	13	8	10	5	1,800	200	550	25	250	1,300	100	25
Hertford	6	1	1									
Hoke	5	1	1	1	1,000							20
Hyde	4	2	4									
Johnston	17	7	12	12	750	50	150	700	1,500		50	
Jones	7	2	2	3	1,000	100	200	1,000	500			100
Lenoir	12	7	8	8	400	4	16	300	650	8	200	10
Martin	10	2	2	2	10,000	100	200					
Nash	14	6	8	47	2,300	1,580	7,600	1,700	12,150	21,150	15,300	1,100
New Hanover	4			4								
Northampton	9	5	6	6	860			150	300	2,500		300
Onslow	5	3	4	26	14,000	2,500	11,500	4,500	24,500	1,000	400	1,100
Pamlico	4	2	2	6	2,325	1,500	4,000	100	1,600	1,500	2,000	10
Pasquotank	6	1	1	1	100	50	300	100	300	300		
Pender	10	1	6	20	13,250	\$85	1,780	6,050	16,050	640	300	300
Perquimans	5	2	2									
Pitt	11	3	6	9	12,200	30	90	3,000	6,500			10
Richmond	7	1	1	2	500					500	500	100
Robeson	19	7	10	22	10,700	2,800	8,000	9,250	7,600	14,000	1,500	1,010
Sampson	16	8	7	18	9,250	5,010	21,010	700	1,500		100	1,225
Scotland	4	2	2	2	250		2,000			3,500		
Tyrrell	5	1	1	1	100	100	200	400	500			50
Washington	4	3	4	1	50			50	250			
Wayne	12	6	7	1	10	2,000	5	5	20	20		25
Wilson	10	2	2	5	100	100	200	25	200	2,000	1,000	
Totals	370	129	161	281	158,657	22,962	\$82,954	48,347	\$110,940	\$71,818	\$30,660	\$ 9,045

TABLE 6.—FOREST FIRES IN NORTH CAROLINA DURING 1914. COMPARATIVE STATEMENT OF AVERAGES BY REGIONS FOR 1914 AND FOR SIX YEARS

	MOUNTAIN.		PIEDMONT.		COASTAL PLAIN.		STATE.	
	1914.	Average for Six Years.	1914.	Average for Six Years.	1914.	Average for Six Years.	1914.	Average for Six Years.
Percentage of townships reporting.....	51	41	52	43	35	34	45	39.5
Average area of each fire, in acres....	448	898	305	447	583	656	462	624
Average damage by each fire.....	\$1,209	\$1,412	\$ 491	\$ 729	\$1,092	\$1,082	\$ 939	\$ 1,016
Average area burnt over per township reporting, in acres.....	896	*1,649	254	*717	1,230	*1,292	657	*984
Average damage per acre burnt.....	\$ 2.70	\$ 1.50	\$ 1.62	\$ 1.65	\$ 1.87	\$ 1.79	\$ 2.03	\$ 1.60
Average damage per township reporting.....	\$2,417	\$3,302	\$ 411	\$ 861	\$2,297	\$1,565	\$1,335	\$ 1,657

*No township figures for 1910.

TABLE 7.—CAUSES OF FOREST FIRES IN NORTH CAROLINA IN 1914 BY REGIONS, COMPARED WITH SIX YEARS, IN PERCENTAGES.

	1914.				Average for Six Years.
	Moun- tain.	Pied- mont.	Coastal Plain.	State	
Farmers burning brush, grass, rubbish, etc.....	12	7.5	4	7	11
Hunters.....	19	7.5	8.5	11	11.5
Cigars, cigarettes, matches, etc.....	3	4.5	5	4	3
Carelessness.....	15	13	15	14	18
Railroad locomotives, sparks from.....	8	35	14	20	18.5
Logging locomotives, dummy engines, etc.....	5	2	18	8.5	7
Sawmills, etc.....	3	4.5	2	3	4
Traction engines.....		2		1	.5
Accidental, caught from burning building, etc.....			2	1	.5
To improve the range.....	5	8	7	7	4
Set by chestnut gatherers, root diggers, etc.....	1			.5	1
Without object, "to see it burn".....	3		1	1	3
Malice or incendiary.....	12	4.5	8.5	8	7
Unknown causes.....	5	4.5	10	7	8
Lightning.....		3	4	2.5	1
Loafers, trespassers, etc.....	1	2	1	1.5	1
Campers.....	8	1		2.5	1
Tar kilns.....		1		.5	

The foregoing tables show a total reported damage from forest fires in 1914 of \$600,000, half of which occurred in the coastal plain counties. This is slightly less than the average loss for the past six years, though very near the average in most particulars.

The most encouraging feature is the reduction of 25 per cent in the reported area burnt over, and this in spite of the fact that there were more than the average number of fires. This would indicate that more general efforts are being made to extinguish fires after they have started;

and this is corroborated by the various newspaper accounts of the fires. This interpretation, however, is not borne out by figures of cost to private individuals, who are reported to have spent less money than during the previous year in fighting fires and considerably less than the average amount. The incompleteness of the reports is responsible for this apparent contradiction. For example, a devastating fire occurred in the northern parts of Camden and Gates counties at the end of July, which was not mentioned in the voluntary reports, yet large private expense was incurred in efforts to control it. The *New Bern Journal* says:

"Several hundred men have been rushed to the scene by the Richmond Cedar Works, John L. Roper Company, and Camp Manufacturing Company, principal owners of the timber in the forest tract, to fight the spread of the fire. All operations in near-by camps were suspended by the Cedar Works Company yesterday and 150 men rushed to the fire on special trains."

It seems safe to assume, from all indications, that the people are rapidly becoming more actively opposed to forest fires, and that their changed attitude is already having some effect. Yet there is much to be done by North Carolinians, both as private landowners and as citizens of a sovereign State. In the former rôle there is a large field of usefulness in the practice of coöperative fire protection, while in the latter capacity one of the first duties is to spread a knowledge of and respect for the State forestry laws.

ORGANIZED FIRE PROTECTION.

That organized fire protection, whether private, as was recently practiced on the Biltmore estate, or coöperative, as is now being worked out in Virginia, Kentucky, and other States, or governmental, *i. e.*, State and Federal, can be successfully practiced in North Carolina is being demonstrated afresh on and near the National Forests in the western part of the State. Not only have the local forest officers extinguished many fires on the lands under their charge, but they have fought fires on surrounding lands with the primary object of preventing their spread to the National Forests.

Two extracts taken from the State press show the importance of having experienced men in the neighborhood who can organize and lead fire-fighting forces, who know exactly what to do, and have the authority to go ahead and do it. Speaking of a Buncombe County fire, occurring in January, one newspaper says:

"The fire started near midnight Friday night and had gained great headway before the alarm was spread and the corps was organized to fight it. All the available men in the adjacent territory were organized under the direction of

United States Forester Young and scattered over the district threatened by the leaping flames. Fighting with grim determination and never giving up hope for a single moment, this force finally confined the spreading flames in a certain area, although at times in the early morning it seemed that every residence in a radius of several miles would be destroyed."

Of a November fire in the same region, another newspaper says:

"Forest fires which have been raging in various sections of the mountains around Black Mountain during the greater part of the week are reported to have done considerable damage, the greater number of the outbreaks being reported from the Craggy Mountains. For a while fear was entertained that the flames would get on the immense watershed holdings of the city of Asheville, but reports from the intake are to the effect that but little damage has been suffered by the municipality. Mr. Bishop of Marion, representing the Government, is in charge of a force of 100 men in the Bee Tree section, and back-firing has been resorted to in checking flames."

RESULTS OF FEDERAL PROTECTION IN NORTH CAROLINA.

A striking tribute to the value of organized fire protection is brought out by some figures in Table 6. It is seen that the average area burnt over by each fire in the mountain region during the past year was exactly half the average for the past six years, while in the other regions of the State there has been only a comparatively small reduction. The only way to account for this is that the assistance and example of the Federal forest officers have had a decided effect in reducing the amount of burnt land areas.

This explanation is supported by the figures compiled by the forest officers themselves:

TABLE 6.—FOREST FIRES IN THE SOUTHERN APPALACHIAN PURCHASE AREAS IN NORTH CAROLINA, 1914.

NAME OF FOREST.	AREA OF FOREST.	NUMBER OF FIRES.				LOCATION.				NATIONAL FOREST LANDS.		
		Under 1 Acre.	Under 10 Acres.	Over 10 Acres.	Total.	Fires Originating—				Area Burned Over.	Value of Timber Destroyed.	Value of Reproduction Destroyed.
						On National Forest Lands.	On Private Lands.	Entered Forests.	Confined to Outside Areas.				Inside Forest.	Outside Forest.
Mount Mitchell.....	66,213	4	6	11	21	5	.....	1	15	372	\$ 36	\$ 169
Pisgah.....	86,700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nantahala.....	36,973	.....	10	12	22	.....	.....	7	15	.....	.....	.....
Savannah N.....	34,808	1	1	.....	2	.....	.....	2	.....	.....	.....	.....
Totals.....	224,694	5	17	23	45	5	.....	9	1	30	\$ 36	\$ 170

The above table was prepared from the Federal Forest Examiners' annual reports. It shows the number of fires of different classes occurring within the Federal Purchase Areas in 1914 and the amount of National forest land burnt over.

It will be seen that only six fires occurred on the National Forest lands in North Carolina. The rest probably threatened the Government lands, but were extinguished before they crossed onto them. These six fires burnt over only 372 acres, or an average area for each fire of 62 acres.

RESULTS OF PARTIAL PROTECTION.

Through the coöperation of the Federal Forest officials in western North Carolina accurate information in regard to forest fires in twenty townships or parts of townships surrounding the National Forests was supplied and it is incorporated with all the foregoing tables except the last. Because of the comparative completeness of this information, and in view of the fact that efficient fire protection was practiced over parts of the townships in question, these auxiliary reports have also been compiled by themselves to show the result of partial fire protection.

The Government lands lying within these townships are thoroughly patrolled, and only six fires occurred on them, as shown in Table 8. Private land within the National Forests or outside the forests but within the purchase areas, namely, within the limits set by the Government for making further additions to the National Forests, are not patrolled, but forest officers usually assist in extinguishing fires, especially if Federal lands, or lands which have been offered to the Government, are threatened. There were thirty-nine such fires reported in 1914. The remaining thirty-five fires included in Table 9 probably occurred beyond the Government rangers' field of duty, and so were extinguished in the ordinary way, namely, by private citizens, by rain, or by burning themselves out. The following table, therefore, shows the results of partial protection in the comparison of these figures with the average ones for the mountain region found in Table 6.

TABLE 9.—GENERAL FIRE DAMAGE IN THE MOUNTAINS DURING THE PAST SIX YEARS COMPARED WITH THAT IN PARTIALLY PROTECTED TOWNSHIPS.

	In Townships and Parts of Townships Partially Protected, 1914.	In the Moun- tain Counties as a Whole, Average for the Past Six Years.
Average area of each fire, acres.....	148	898
Average damage by each fire.....	\$ 514.00	\$ 1,412.00
Average damage per acre burnt.....	3.46	1.50
Average cost of fighting fires, per fire.....	11.00	35.00

From the above table it can be seen that the average fire, where only partial protection was given, was one-sixth the size of the average fire of the region, or a saving in the eighty fires reported by the forest officers of 60,000 acres not burnt over. At an average damage of \$1.50 per acre, this means an actual saving of \$90,000.

The saving in cost of fighting fires is just as startling. While it is often said that fire fighting is now done voluntarily in North Carolina, the average cost to fight fires in the mountains is \$35 per fire, borne by landowners and private individuals. In this partially protected area under discussion the cost to private owners and the Government combined has been reduced to \$11 per fire. This seems to be indisputable evidence that organized fire protection will and does pay.

FORESTRY LAWS OF NORTH CAROLINA.*

INTRODUCTION.

The General Assembly of 1915 enacted more legislation for the conservation of our natural resources than any previous one in the history of the State. The eastern fisheries, part of which had been protected, but the greater part exploited almost without restriction, were all put under a State-wide Fisheries Commission. This law ought to insure the growth of our fishing industry which for a long while has been steadily declining. The Highway Commission bill, though not, strictly speaking, a conservation measure, is one of the most complete and effective laws for the encouragement and construction of good roads now in force in the South; and good roads are so closely connected with conservation that it is difficult to separate them.

The new laws connected with forest conservation, though not as complete and effective as the two already mentioned, because unsupported by any appropriation, cover, however, a wider field, and definitely commit the State to two policies, new in North Carolina, though well tried and permanent in many other States of the Union. These policies are: (a) State protection of the private as well as public forest lands of the State from fire, in the same way that cities and towns provide for the protection of the property of their citizens; (b) the purchase and administration of forest land by the State for the purposes of demonstration and experiment, for the recreation, health, and pleasure of its citizens, and for the protection of its streams.

In order that a clear understanding may be had of the administration of the new forest fire law and the "State forest" law, the enforcement of which is intrusted to the State Geological Board, the law creating this board is here introduced.

THE STATE GEOLOGICAL BOARD.

The General Assembly of 1905 reorganized the State Geological Survey, enlarging its scope and changing its name to the State Geological and Economic Survey. At the same time the Survey was given additional powers and duties to those it already possessed dealing with the investigation and development of the natural resources of the State.

*See Press Bulletin No. 147, N. C. Geol. and Econ. Survey, "Forestry Laws of North Carolina."

LAW CREATING THE NORTH CAROLINA GEOLOGICAL AND ECONOMIC SURVEY.*

SECTION 4429. *State Geologist appointed by Governor.* The Governor shall appoint a suitable person as State Geologist to conduct, under the supervision of a board of managers to be known as the Geological Board, a geological and economic survey of the State.

SEC. 4430. *Geological Board, how appointed; meetings.* The Geological Board shall consist of the Governor (as chairman), four citizens of the State, two for a period of two years and two for a period of four years from March 1, 1905, the same to be appointed by the Governor by and with the advice and consent of the Senate, and their successors to be in like manner appointed each for a period of four years. In case of the death or resignation of either of said citizens, his successor shall be appointed by the Governor. The Geological Board shall meet twice each year, once in January and once in June, in the city of Raleigh, on the call of the Governor, except that the board may change the time and place of meeting as circumstances may require.

SEC. 4431. *Experts and assistants.* The State Geologist shall appoint, subject to the approval of the Geological Board, such experts and assistants as may be found necessary to enable him to carry out successfully and speedily the work of the Survey.

SEC. 4432. *Objects of Survey.* The Survey shall have for its objects:

1. An examination of the mineral, forest, fishery, and other material resources of the State.
2. An examination of the geological formations of the State with reference to their economic products.
3. An examination of the road-building materials and the best methods of utilizing the same.
4. An examination and classification of the soils, the forests, and other physical features of the State, with special reference to their bearing upon the occupation of the people.
5. An examination of the streams and water-powers of the State, with special reference to the development for manufacturing enterprises and the preservation of the sources of these streams through the protection of the forests.
6. The consideration of such other scientific and economic problems as in the judgment of the Geological Board shall be deemed of value to the people of the State.
7. The preparation of such reports, illustrations, and maps as may be deemed necessary in placing the results of these investigations before the public.
8. And the State Geologist, with the approval of the Geological Board, is hereby authorized to arrange for and accept such aid and coöperation from the several United States Government bureaus and other sources as may assist in completing the topographic surveys of the State and in carrying out other provisions of this chapter.
9. An examination of the water supplies of the State, with special reference to the sinking of deep or artesian wells.

SEC. 4433. *Reports.* The Geological Board shall cause to be prepared and submitted to each Legislature a report showing the progress and expenditures

*Chapter 94, Revisal of 1905.

of the Survey; it shall also cause to be prepared for publication such other reports, with necessary illustrations and maps, as will adequately set forth the geology and material resources of the State, all such reports, illustrations, and maps to be printed and distributed as the Geological Board may direct in editions of 3,000 copies each at the expense of the State as other public documents.

Sec. 4434. *Appropriation.* The sum of \$10,000 annually, or so much thereof as may be necessary, is hereby appropriated out of any moneys in the Treasury not otherwise appropriated for the purpose of carrying out the provisions of this chapter.

Soon after the passage of this law and the general reorganization of the Survey by the new State Geologist, Joseph Hyde Pratt, three important divisions, *i. e.*, the Highway, the Fisheries, and the Forestry divisions, were made; other interests of the Survey, such as the geological and mining work, were not delegated to any particular division.

The Highway Division has organized and pushed the good roads movement in this State by holding meetings, furnishing speakers in support of local road bond issues, and founding and assisting the North Carolina Good Roads Association. It has administered and carried out the provisions of the highway assistance law (chapter 915, Public Laws 1909) which enables the Geological Board "to advise with the township and county authorities in the building and improvement of the public roads, by sending to the township or county a competent road engineer, who will assist them in locating their improved roads, advise them," etc.

The Fisheries Division has supervised the administration of the old fish commission law (chapter 277, Public Laws 1907), which protected the northern part of Pamlico Sound and the inner waters of Albemarle Sound. It has consistently urged the extension of this law to the whole coast, which, owing to its unceasing efforts, has just been accomplished.

The Forestry Division, which was regularly organized in 1908, has examined and reported on the forests of the State, studied the forest fire question, and continuously urged forest fire legislation, and has effectively aided in the organization and support of the North Carolina Forestry Association. It has taken part in meetings, has issued publications and statements to the press, and carried on general propaganda work. It has at several different times received the coöperation of the United States Department of Agriculture in investigative forestry work.

It seems, therefore, only natural and appropriate that the administration of the forestry law, which has for eight or ten years been unceasingly advocated by the Survey and the need for which has been set forth in most of its forestry publications, should be committed to it. The Forester of the Survey is the only technical forester employed by the

State. He is in close touch with all the forestry work, and especially with the forest fire conditions over the State, as no other man can be.

It has always been the custom for the Governor to appoint the members of the Geological Board without any special reference to their political affiliation, but because of their ability and their knowledge of conditions with which they have to deal. The State Geologist is likewise appointed with the one idea of his fitness for the position, and the employees of the Survey are employed in like manner. The State Geological and Economic Survey is therefore known as a nonpolitical organization, and for this reason is especially suited for carrying on work of a technical character, which, as all experts agree, must for its fullest efficiency be absolutely divorced from politics.

LAWS FOR THE PROTECTION OF THE FORESTS FROM FIRE.

North Carolina is said to have had the first law against setting fire to woods of any State in the Union. Certain it is that in 1777 "at a General Assembly, begun and held at New Bern, on the Eighth Day of April in the Year of Our Lord One Thousand Seven Hundred and Seventy-seven, and in the First Year of the Independence of the said State: Being the first session of this Assembly," Richard Caswell, Esq., being Governor, a law was passed to prevent burning the woods.

This law, here quoted in full from The State Records of North Carolina, vol. 24, has remained in force up to the present year with the exception of those changes made necessary by the freeing of the slaves and by the passing of the whipping-post. This latter institution might even yet be found an effective method of dealing with "vagrant persons."

THE LAW OF 1777.

AN ACT TO PREVENT BURNING THE WOODS.

I. Whereas the frequent burning of the Woods is found to be destructive to Cattle and Hogs, extremely prejudicial to the Soil, and oftentimes of fatal Consequences to Planters and Farmers, by destroying their Fences and other Improvements: For Prevention of which Evils,

II. *Be it Enacted by the General Assembly of the State of North Carolina, and it is hereby Enacted by the Authority of the same,* That it shall not be lawful for any Person whatsoever to set Fire to any Woods except it be his own Property, and in that Case it shall not be lawful for him to set Fire to his own Woods, without first giving Notice to all Persons owning Lands adjacent to such Wood Lands intended to be fired at least Two Days before the time of setting such Woods on Fire, and also taking effectual Care to extinguish such Fire before it shall reach any vacant or patented Lands, contiguous to or adjacent such Lands so fired.

III. *And be it further Enacted, by the Authority aforesaid,* That every Person offending against this Act shall forfeit and pay the sum of Ten Pounds, to be recovered by Action of Debt, Bill, Plaint or Information, to the Use of the Person who shall sue or prosecute for the same; and shall also be further liable to the Party injured by such unlawful firing of the Woods, for all damages that may accrue therefrom.

IV. *And be it further Enacted, by the Authority aforesaid,* That if any Slave, Free Negro or Mulatto, or vagrant Person, unable to pay the fine aforesaid, shall be convicted of setting fire to any Woods, contrary to the true Meaning of this Act, such Person, on Conviction thereof, shall have and receive on his bare back Thirty Nine Lashes, well laid on, at the Public Whipping-Post.

Hon. Francis D. Winston, in his recent address before the North Carolina Pine Association, in speaking of the work of the North Carolina Forestry Association, emphasized the fact that this law was not enacted for the purpose of protecting the forests, but of preventing injury to live stock ranging in the vast areas of then unowned and unoccupied land. He says:

"Not a word is said about the destruction of timber by fires. A century and a half ago our ancestors were enacting laws against the destruction of hogs in the woods by fires. Today the North Carolina Forestry Association is seeking enactments to protect the woods from the hogs by a general stock law. Our association recognizes that a year's supply of timber on the farm is as necessary as the year's supply of corn and meat. We are seeking to convince the people who own lands that in the place of every tree removed for any cause a new tree should be planted. We have in view the establishment of experimental forestry farms about the State. The North Carolina Geological and Economic Survey is fostering this work."

In 1885 a law forbidding wagoners and other campers to leave their camp-fires without totally extinguishing them was passed. There has been, however, no very general enforcement of either of these laws, though there have been no others covering what we now consider these very serious offenses. These two laws (sections 3346 and 3347, Revisal of 1905) have now largely been incorporated in the new forest fire law, in slightly amended form.

MORE RECENT ATTEMPTS TO SECURE EFFECTIVE LAWS.

In 1909 an effort was made to obtain increased protection for our mountain forests by the passage of a law (chapter 89, Public Laws 1909) which allows "any owner or owners of wooded land situated in North Carolina above contour line 2,000 feet" to apply to the Governor for the establishment of such land as a "State forest." The owners pledge them-

selves to cut the timber conservatively, and to pay annually one-half cent for each acre of such proposed State forest into the county school fund. In return for this the rangers employed by the landowner are to be appointed State forest wardens, with power to arrest without warrant violators of the State laws relating to the care of forests. The owners of the land which is thus proclaimed a State forest must, of course, pay the salary and expenses of their own wardens. This law, which requires a man, in addition to bearing all the costs of fire protection, to pay out half a cent an acre for all the land protected, none of which is used for fire protection, is so manifestly one-sided that no advantage has yet been taken of it, and probably none ever will be. In contrast with this, forest fire protective associations are now being organized in several of the Appalachian States whose maximum annual assessment is only half a cent an acre. For this amount the lands are being successfully protected against fire.

There have been many other attempts, both before and since, to secure more adequate State assistance in the prevention and extinguishment of forest fires. As early as 1887, Hon. Francis D. Winston reminds us, he himself introduced a bill for this purpose into the State Senate, but it did not get out of the committee. At each regular session of the Legislature for the past eight years the State Geological and Economic Survey has proposed and urged the passage of definite legislation to reduce the enormous annual loss by forest fires, but with no definite result. The public demand throughout the State has not been strong enough to overcome the natural reluctance of such a conservative body as the General Assembly to enact restrictive laws.

But year by year, as the annual loss from fires has become better known and appreciated, the demand for protection has become more insistent, until the Legislature of 1915 responded by the enactment of an excellent law, though without appropriation.

A law to meet certain particular cases, where logging was being done on land adjoining city watersheds, was passed two years ago.* Though fairly effective in the cases to which it applies, this law, it is thought, has not yet been invoked. It can probably be effectively enforced, however, in connection with the new forest fire law.

In the following pages the forestry laws of the State are given, each accompanied by comments explaining the objects and operations of the law.

*See page 33.

THE NEW FOREST FIRE LAW.*

AN ACT TO PROTECT THE FORESTS OF THE STATE FROM FIRE.

The General Assembly of North Carolina do enact:

SECTION 1. That the State Geological Board may take such action as it may deem necessary to provide for the prevention and control of forest fires in any and all parts of this State, and it is hereby authorized to enter into an agreement with the Secretary of Agriculture of the United States for the protection of the forested watersheds of streams in this State.

SEC. 2. That the forester of the State Geological and Economic Survey, who shall be called State Forester, and shall be *ex officio* State Forest Warden, may appoint, with the approval of the Geological Board, one township forest warden and one or more district forest wardens in each township of the State in which the amount of forest land and the risks from forest fires shall, in his judgment, make it advisable and necessary.

SEC. 3. The State Forester, as State Forest Warden, shall have supervision of township and district forest wardens, shall instruct them in their duties, issue such regulations and instructions to the township and district forest wardens as he may deem necessary for the purposes of this act, and cause violations of the laws regarding forest fires to be prosecuted.

SEC. 4. Forest wardens shall have charge of measures for controlling forest fires; shall make arrests for violation of forest laws; shall post along highways and in other conspicuous places, copies of the forest fire laws and warnings against fires, which shall be supplied by the State Forester; shall patrol during dry and dangerous seasons under the direction of the State Forester, and shall perform such other acts and duties as shall be considered necessary by the State Forester for the protection of the forests from fire. The township forest warden of the township in which a fire occurs shall within ten days make such a report thereof to the State Forester as may be prescribed by him. The township forest warden of the township in which a fire occurs shall within ten days make such a report thereof to the State Forester as may be prescribed by him. Each district forest warden shall promptly report to township wardens any fire in his district.

SEC. 5. Any person who shall maliciously or willfully destroy, deface, remove, or disfigure any sign, poster, or warning notice, posted by order of the State Forester, under the provisions of this act or any other act which may be passed for the purpose of protecting the forests in this State from fire, shall be guilty of a misdemeanor, and upon conviction shall be punishable by a fine of not less than \$10 nor more than \$50, or imprisoned not exceeding thirty days.

SEC. 6. Forest wardens shall prevent and extinguish forest fires in their respective townships and enforce all statutes of this State now in force or that hereafter may be enacted for the protection of forests and woodlands from fire, and they shall have control and direction of all persons and apparatus while engaged in extinguishing forest fires. Any forest warden may arrest, without a warrant, any person or persons taken by him in the act of violating any of the said laws for the protection of forests and woodlands, and bring

*Chapter 243, Public Laws 1915. See Press Bull. 147, N. C. Geol. and Econ. Survey.

such person or persons forthwith before a justice of the peace or other officer having jurisdiction, who shall proceed without delay to hear, try, and determine the matter. During a season of drought the State Forester may establish a fire patrol in any township, and in case of fire in or threatening any forest or woodland the township or district forest warden shall attend forthwith and use all necessary means to confine and extinguish such fire. The said forest warden may summon any male resident of the township between the ages of 18 and 45 years to assist in extinguishing fires, and may require the use of horses and other property needed for such purpose; any person so summoned, and who is physically able, who refuses or neglects to assist or to allow the use of horses, wagons, or other material required, shall be liable to a penalty of not less than \$5 nor more than \$50. No action for trespass shall lie against any forest warden or person summoned by him for crossing or working upon lands of another in connection with his duties as forest warden.

SEC. 7. Forest wardens shall receive compensation from the Geological Board at a rate of not to exceed 20 cents per hour for the time actually engaged in the performance of their duties; and reasonable expenses for equipment, transportation, or food supplies incurred in fighting or extinguishing any fire, according to an itemized statement to be rendered the State Forester every month, and approved by him. Forest wardens shall render to the State Forester a statement of the services rendered by the men employed by them or their district wardens, as provided in this act, within one month of the date of service, which said bill shall show in detail the amount and character of the service performed, the exact duration thereof, the name of each person employed, and any other information required by the State Forester. All accounts of the forest wardens must be duly sworn to before a justice of the peace, notary public, or other officer qualified to witness such papers within the county in which the expenses were incurred. If said bill be duly approved by the State Forester, it shall be paid by direction of the Geological Board out of the funds hereinafter provided for.

SEC. 8. If any person shall intentionally set fire to any grass land, brush land, or woodland, except it be his own property, or in that case without first giving notice to all persons owning or in charge of lands adjoining the land intended to be fired, and also taking care to watch such fire while burning and taking effectual care to extinguish such fire before it shall reach any lands near to or adjoining the lands so fired, he shall for every such offense be guilty of a misdemeanor and shall be fined not less than \$10 nor more than \$50, or imprisoned not exceeding thirty days. This shall not prevent action for damages sustained by the owner of any property from such fires.

SEC. 9. Any wagoner, hunter, camper, or other person who shall kindle a camp-fire or shall authorize another to kindle such fire, unless all combustible material for the space of 10 feet surrounding the place where said fire is kindled has been removed, or shall leave a camp-fire without fully extinguishing it, or who shall accidentally or negligently by the use of any torch, gun, match, or other instrumentality, or in any manner whatever start any fire upon any grass land, brush land, or woodland without fully extinguishing the same, shall be guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than \$10 nor more than \$50, or imprisoned not exceeding thirty days.

SEC. 10. All persons, firms, or corporations who shall burn any tar kiln or pit of charcoal or set fire to or burn any brush, grass, or other material, whereby any property may be endangered or destroyed shall keep and maintain a careful and competent watchman in charge of said kiln, pit, brush, or other material while burning. Any person, firm, or corporation violating the provisions of this section shall be punishable by a fine of not less than \$10 nor more than \$50, or imprisoned not exceeding thirty days. Fire escaping from such kiln, pit, brush, or other material while burning shall be *prima facie* evidence of neglect of these provisions.

SEC. 11. For the purposes of this act woodland is taken to include all forest areas, both timber and cut-over land, and all second-growth stands on areas that have at one time been cultivated.

SEC. 12. All laws and clauses of laws in conflict with this act are hereby repealed.

SEC. 13. This act shall be in force from and after its ratification.

Ratified this the 9th day of March, A. D. 1915.

Administration.

By placing the administration of the forest fire law with an already existing office of the State Government the tedious and often difficult task of bringing together a new organization has been obviated. In view of the fact that no appropriation accompanies the new law, this provision is shown to be a wise and statesman-like action. The State Geological and Economic Survey, which unfortunately yet has only a small appropriation for its support, is enabled to spend as much as can be spared of its appropriation for the carrying out of the provisions of the law. In the actual work of fire prevention and extinguishment very little can be done without an appropriation, but along other lines the Survey has already taken active steps, chiefly toward informing the public as to what the law is and in what ways it should be observed.

Coöperation.

The latter half of section 1 contemplates a coöperative agreement with the United States Department of Agriculture under the Weeks law, whereby the State can receive very material assistance in the prevention of fires. Section 2 of the Weeks law* reads as follows:

SEC. 2. That the sum of \$200,000 is hereby appropriated and made available until expended, out of any moneys in the National Treasury not otherwise appropriated, to enable the Secretary of Agriculture to coöperate with any State or group of States, when requested to do so, in the protection from fire of the forested watersheds of navigable streams; and the Secretary of Agriculture is hereby authorized, and on such conditions as he deems wise, to stipulate and agree with any State or group of States to coöperate in the

*36 Stat., 961. See Press Bul. 117, Appendix.

organization and maintenance of a system of fire protection on any private or State forest lands within such State or States and situated upon the watershed of a navigable river: *Provided*, that no such stipulation or agreement shall be made with any State which has not provided by law for a system of forest fire protection: *Provided further*, that in no case shall the amount expended in any State exceed in any fiscal year the amount appropriated by that State for the same purpose during the same fiscal year.

As no appropriation is made by the State for fire protection, this law can be invoked at present only to a very limited extent. Under the rulings of the United States Forest Service the legal regular apportionment of State moneys paid out for fire preventive measures can be counted in the same way as a direct appropriation. The State Geologist has recently arranged for an expenditure of \$2,000 per year for the next ten years for this purpose. As a result of this arrangement, an annual apportionment of Federal funds up to the same amount has been secured; to be used, according to the ruling of the United States Department of Agriculture, for patrol and lookout work on forests covering the headwaters of streams in the western part of the State.

In addition to this, there are now being advanced tentative plans for a scheme of coöperation with county and township governments, or with groups of private landowners, whereby they may be able to obtain the benefits of the new law without any large State expenditure.

Appointment of Forest Wardens.

The township and district forest wardens, whose appointment by the State Forester is permitted under section 2, should be men of known fitness for the work which they are to undertake. They should be residents of the county and township in which they are to work, should be familiar with all parts of their district, should be men used to the woods, experienced in fighting fires, on good terms with their neighbors, strong, healthy, absolutely honest, and able to make out intelligently such few reports as will be required of them. Where such men are willing to devote a part of their time to the service of the State, receiving only such compensation as is provided in the law, the number of fires will undoubtedly be greatly reduced, as has been the experience under similar conditions in many other States.

It is not proposed to appoint wardens in every township or county in the State, because in many their services are not required, the small areas of woodland and the attitude of the public against forest fires making the services of a forest warden unnecessary. During the past six years in which figures on forest fires have been collected the greatest

part of the destruction has occurred in the mountain and coastal plain counties. These counties would, therefore, require the larger number of forest wardens. Many of the piedmont counties, however, have suffered considerably from fires, and where this has been the case, and the people are willing and anxious to cooperate in trying to prevent fires, the appointment of wardens would probably be made. As a general proposition, it may be stated that in townships containing less than 60 per cent of forest land forest wardens would not be needed, while in those having more than this proportion wooded a considerable number of them might be expected to need wardens.

Even when an appropriation is made by the State for the carrying out of this part of the law no indiscriminate appointment of wardens will be made. Each township will be considered upon its own merits, and only after careful consideration of local conditions and public sentiment, as well as of the fitness of the man proposed, will an appointment be made.

Prosecutions.

The object of this law is not the persecution of private citizens, but the prevention of forest fires. The majority of fires are caused by carelessness, and in most localities these can be gradually lessened by bringing before the people various kinds of reminders to be careful. When carelessness becomes gross or criminal a prosecution is often the only reminder that will have any effect.

But some fires are started intentionally, in plain violation of law. In such cases it is the evident duty not only of the law officers, but of every law-abiding citizen, to do everything possible to bring the offender to justice.

Though the enforcement of the forestry laws is the special duty of the forest wardens for whose appointment provision is made in the new law, prosecutions can also be taken up in the ordinary way. In fact, over the greater part of the State law enforcement will have to come through the regular county and township officers.

Where evidence is obtainable, any citizen or officer of the law can swear out a warrant before a justice of the peace which will be immediately executed by the law officer. The offender will then be tried in the magistrate's court, following the usual procedure. Should a sheriff, deputy sheriff, or township constable discover some one in the act of violating the law, he should arrest him without warrant, take him immediately before a justice of the peace, where the necessary papers would be made out and the trial proceed with the arresting officer as witness.

Forest wardens have the same power as constables and sheriffs to arrest without warrant those taken in the act of violating the forestry laws. In all other cases they must swear out warrants before a magistrate, just as a private citizen would be required to do. They cannot serve a warrant, but it must be turned over to the constable and served in the regular way.

It will, however, be the special duty of the forest warden to work up evidence against all persons suspected of violating the forestry laws. His knowledge of the region and of the people of the region will give the warden a great advantage in this respect. He should be able to find out the cause of a fire without delay, and it is his duty to do so. He must then secure sufficient evidence, swear out a warrant, and, if necessary, appear himself as a witness in the case. Forest wardens are appointed to protect the forests of the State from fire, and this they must do to the utmost of their ability, carrying out the laws enacted for that purpose.

Forest Wardens.

The regulations and instructions contemplated in section 3 will cover such duties as are not specifically mentioned in the law. Included in them would be the manner of procedure in case of fire; instructions as to the best methods of fighting fires in various cases; the organization of a fire-fighting force; the necessary preparations for a fire season; the time when patrol must be undertaken; methods of investigation into the causes of fires; the collection of evidence for prosecutions; and many other things in regard to the daily duties of the wardens.

The duties of fire wardens mentioned in section 4 are those which are universally recognized as the usual duties of such officers. Other duties and acts may be necessary in certain cases, or as conditions which are not now foreseen arise from year to year. These other duties will be such as any employer of help might require of those under him, and will of course be in strict accordance with this and all other laws of the State.

The reports required from forest wardens are necessary not only that the State Forester may be in close touch with the wardens and with fire conditions in the various districts, but also as a check on the monthly accounts sent in by the wardens, which have to be paid after approval by the State Forester. The reports will be as simple and brief as is consistent with the information desired. Blank forms will be printed, so that only a small amount of writing will be necessary. These reports will form the basis of the annual report of the State Forest Warden

as to the number of fires, the area burnt over, the damage done, and the cost to the State in preventing and extinguishing fires. In districts where wardens are appointed these reports will supersede the voluntary reports now sent in in regard to forest fires.

Patrol.

Patrol is an important duty of the forest warden. Patrol means prevention, for usually the officer who patrols prevents as many fires as he extinguishes. By traversing the forests under his charge during excessively dry weather, the patrolman is often not only able to detect and extinguish fires before they get beyond control, but the likelihood of his presence at any place will in all probability deter many who might otherwise either carelessly, negligently, or intentionally start fires. Patrol is such an important part of modern forest fire prevention that the Federal Government stipulates that the money expended by it in coöperative fire protection with the various States must be spent to a large extent in the employment of patrolmen and lookouts.

Patrol is now practiced wherever effective fire protection is attempted. The new State law requires the forest wardens to patrol during dry and dangerous seasons, and, in addition, gives the State Forester full power to establish and direct such patrol whenever in his judgment this is advisable or necessary. By referring to Table 1 it will be seen the "dry and dangerous seasons" are most likely to occur in spring and fall, and it is in these two seasons that most of the patrol work would be carried on. However, local conditions or exceptional seasons might make it necessary to establish patrols at any time of the year.

By virtue of a coöperative agreement recently (June 9, 1915) entered into between the State Geological Board and the United States Department of Agriculture, a number of patrols will be established in the mountainous parts of the State during the fall fire season of 1915, and each fire season thereafter, as long as the arrangement continues. These men will be State Forest Wardens. They will work under the direction of the State Forester, but will be paid by the United States Government. Honest, energetic, intelligent men are required for this work; men who are familiar with the region which they will have to patrol, who have done woods work and have had experience in fighting fire.

The Power of Arrest.

No law can be effective unless it is enforced. The great weakness of the old law against burning the woods was that there was no special system of enforcement. The present law provides that system, and it must be made as effective as possible.

It is well known that many of our worst fires are of incendiary origin. They are started by irresponsible and often vicious men, who are determined to injure their neighbors, or even one particular neighbor, or else are indifferent to the loss sustained by property owners and the community at large. Experience has shown that it is usually very difficult to apprehend such offenders, because they operate in wild, uninhabited country, and often at night. It would be folly to employ men to prevent forest fires, require them to find out who started the fires, and then, when they come up with the offender, compel them to return many miles for the purpose of securing a warrant for the arrest of such offender. It is difficult enough to find the man who burns the woods, but it would be next to impossible to make arrests if such a procedure were required. It has, therefore, always been found necessary to give forest wardens the power of deputy sheriffs, namely, the power to arrest without a warrant those caught in the act of violating the law. This power is not likely to be abused, for it is the policy of the forest warden service to maintain the closest relations of fairness and good-will with all the law-abiding citizens of the district. A forest warden who presumed to misuse his power in this direction would at once be complained of so bitterly that his removal would be accomplished without delay. The whole object of the present law is to prevent and extinguish forest fires, and all other motives must and will be strictly excluded from the operations of the law.

Assistance in Fighting Fires.

The power to summons necessary assistance for fighting fires is given to forest wardens and a small penalty provided for refusal to serve. This means that unless some reasonable excuse can be given for declining to assist in extinguishing fires the persons summoned will be liable to a fine. If a reasonable excuse should be given, and the forest warden should decline to accept such excuse—a contingency hardly likely to occur—the justice of the peace before whom any action would come would undoubtedly decide that such excuse was valid and that the warden was not justified in declining to accept it. This adequately safeguards the power of summons.

Compensation of Forest Wardens.

One of the most frequently advanced arguments against State forest protection has been that by employing men to extinguish fires they were being induced to set out fires in order that they might be reimbursed for extinguishing them. Perhaps the simplest answer to such an argument is that only the worst men in a community would attempt such a

practice, and that the forestry law contemplates the employment of the best men in the community. It would be a poor policy indeed for any forest warden to attempt such a practice, because there are always a large number of people ready to report any failure in duty of a State employe. It is certain that any forest officer who attempted such a thing would get dismissed without delay. On the other hand, should some irresponsible party attempt to practice firing the woods in order to secure employment under the forest warden, the warden would be quick to suspect and discover any such criminal practice. Where such laws are enforced there has been little or no trouble from this source, though the same argument has been advanced against the operation of a like provision of law in nearly every State where it has been tried.

It has occasionally been urged that it is useless to pay men for fighting fires, because in many communities any number of men could be found in an emergency to fight fires without compensation. It would not only be unfair to the citizens of the community to expect them to carry on this most exhausting work without pay, but it would be exceedingly ineffective and would defeat the object of the law. The function of fire protection is to prevent fires rather than to extinguish them. That is, fires should not be allowed to start; and if they do get started, they must be put out before they become large fires. The first rule for the fire fighter is to get to the fire as soon as possible. A small fire is more easily extinguished and does infinitely less damage than a large fire. Now, only the large fire offers sufficient inducement for the average man to leave his regular work and go out and spend half a day or a whole day fighting to stop its advance. A small fire is apt to be neglected in the usually vain hope that it will burn itself out or some one else will extinguish it. The State cannot afford to risk such haphazard methods.

ADDITIONAL PROTECTION TO CITY WATER SUPPLIES.

The State Geological and Economic Survey has consistently advocated the effective protection from fire of the forested watersheds of cities and towns. It has stood and still stands ready at any time to examine such areas with the object of recommending methods for protecting them from forest fires and consequent contamination.

A number of such examinations have already been made and reports submitted. Two such reports have been published, those for Marion and Asheville.*

Following the suggestions contained in these reports, and especially in a letter written by the State Forester and published in the *Asheville*

*See Biennial Reports of the State Geologist, 1909-10, p. 86, and 1911-12, p. 57.

Gazette-News, as well as in editorial comments by that paper. Senator Weaver of Buncombe drew up and introduced into the General Assembly of 1913 a bill which is now one of our important forestry laws.

THE LAW FOR THE PROTECTION OF CITY WATERSHEDS.

The following law, while only applying to municipal watersheds, has an important and increasing usefulness in this State, because of the recent rapid development of the forested watershed idea:

AN ACT TO PROTECT WATERSHEDS OWNED BY CITIES AND TOWNS FROM DAMAGE BY FIRE.*

The General Assembly of North Carolina do enact:

SECTION 1. That any person, firm, or corporation owning lands or the standing timber on lands within 400 feet of any watershed held or owned by any city or town, for the purpose of furnishing a city or town water supply, upon cutting or removing the timber, or permitting same to be cut or removed, from lands so within said 400 feet of said watershed, or any part thereof, shall, within three months after cutting, or earlier upon written notice by said city or town, remove or cause to be burned, under proper supervision, all tree-tops, boughs, laps, and other portions of timber not desired to be taken for commercial or other purposes within 400 feet of the boundary line of such part of said watershed as is held or owned by such town or city, so as to leave such space of 400 feet immediately adjoining the boundary lines of such watershed so held or owned free and clear of all such tree-tops, laps, boughs, and other inflammable material caused by or left from cutting such standing timber, so as to prevent the spread of fire from such cut-over area and the consequent damage to such watershed.

SEC. 2. That any such person, firm, or corporation violating the provisions of this act shall be guilty of a misdemeanor.

SEC. 3. That this act shall be in force from and after its ratification.

Ratified this the 6th day of March, A. D. 1913.

Pure water means health. A protected watershed insures unpolluted water. An abundant supply of pure water is the best advertisement a city can have. To secure and maintain such a supply is the best investment a city can make.

Many cities and towns in North Carolina own their own "catchment areas" or watersheds; others secure their water from small streams whose drainage area is owned by private individuals. In both cases the State insists that certain general precautions be taken by the city authorities to prevent pollution of their waters, and monthly inspection patrol is insisted upon for this purpose.

The most obvious and most effective measure to prevent pollution of streams, namely, the protection of the woodlands on their watersheds

*Chapter 56, Public Laws 1913.

from fire, has until very recently received no attention from the State, and only in certain noteworthy instances, particularly those of Asheville and Marion, from the municipal authorities themselves.

A bare, hard soil surface, such as is left by burning the woods, allows the rainfall to collect and run directly to the streams, carrying with it small particles of soil, decaying vegetable or animal matter or other material, often laden with typhoid and other disease germs. If, however, the woods are protected from fire, there will be a good coat of leaves on the ground, held together by grass, weeds, and bushes. This makes an absorbent cover to the soil which acts as a sponge, soaking up the rain as it falls and at the same time keeping the soil soft and permeable so that the rainfall will nearly all of it be soaked into the ground. In this way all impurities are filtered out, and the springs are supplied regularly with clear, pure water.

The movement for more complete control by cities and towns of their water supplies has grown very rapidly in North Carolina. At the 1915 session of the Legislature a number of our mountain towns secured the necessary permission to purchase or enlarge their watersheds, Waynesville, Asheville, Hendersonville, Tryon, and Old Fort being among them. These municipal forests must be protected from fire as well as from other dangerous and deleterious influences. Municipal authorities should see that this law is enforced wherever it is applicable. In addition, they should assist the responsible officers in every possible way in the strict enforcement of the general forest fire law.

Watersheds on which part or all of the land is in private ownership may have to be further protected by the enactment of a law to prohibit parties burning over even their own land. Possibly, however, the State Board of Health has already sufficient power to control this.

LAWS FOR THE CREATION OF STATE FORESTS.

NEED FOR DEMONSTRATION IN FORESTRY.

Two-thirds of the land area of North Carolina is in woods and only one-third is cultivated. The woodland, however, yields a much smaller revenue to its owners than does the cleared land. Why? Is it not, at least in part, because we bestow so little thought and labor on the two-thirds which is in forest? No one will work in the woods unless he gets immediate returns in the form of sawlogs, ties, cordwood, etc. Yet much forethought and labor without direct result is expended on the cultivated land. Is it not worth while to know how such forethought and work can be made to increase the value and yields of two-thirds the total area of the State? How has our State Government set about improving

agriculture in North Carolina? Not only by publishing bulletins, instructive but all too little read; not only by providing for talks at farmers' institutes; it is not even satisfied with providing splendid colleges and high schools where young men can be taught both the theory and practice of agriculture. But our active and progressive Department of Agriculture has purchased seven test farms in different regions of the State, where crop varieties are grown, and where it is shown which varieties and what methods are most suitable for certain soils and climates. In addition to these and in a way combining the college and the test farm, farm-life schools are being established in nearly every county in the State. But the arguments which above all else bring home to the adult farmers the possibility, even the necessity, of practicing better methods are brought out on the demonstration plats maintained by the Department of Agriculture, and the demonstration crops supervised by State and county demonstration agents.

Does not this suggest the value of State experiment and demonstration forests in carrying out a forest policy for the State? The Department of Agriculture has set a precedent which the Forestry Department should not only be allowed, but required to follow.

THE LAW GOVERNING THE ACQUIREMENT AND ADMINISTRATION OF STATE FORESTS.

The following law, passed at the recent session of the Legislature, is the first step in the inauguration of such a policy. While it does not provide funds for the purchase of forest lands, it does recognize the principle of State experiment and demonstration forests, and places the authority to purchase such forests, when money for that purpose may be available, with a responsible and competent department of the State Government. It also provides that State forests may be organized and administered without any further legal enactments, where gifts of land can be secured for this purpose.

AN ACT TO ALLOW THE ACQUIREMENT BY THE STATE OF STATE FORESTS.*

The General Assembly of North Carolina do enact:

SECTION 1. That the Governor of the State is authorized, upon recommendation of the Geological Board, to accept gifts of land to the State, the same to be held, protected, and administered by said board as State forests, and to be used so as to demonstrate the practical utility of timber culture and water conservation, and as refuges for game. Such gifts must be absolute except in such cases as where the mineral interest on the land has previously been sold. The State Geological Board shall have the power to purchase lands in the name of the State, suitable chiefly for the production of timber, as State

*Chapter 253, Public Laws 1915.

forests, for experimental, demonstration, educational, park, and protection purposes, using for such purposes any special appropriations or funds available. The Attorney-General of the State is directed to see that all deeds to the State of land mentioned in this section are properly executed before the gift is accepted or payment of the purchase money is made. Said State forests shall be subject to county taxes assessed on the same basis as are private lands, to be paid out of moneys in the State Treasury not otherwise appropriated.

SEC. 2. That all moneys received from the sale of wood, timber, minerals, or other products from the State forests shall be paid into the State Treasury and to the credit of the Geological Board; and such moneys shall be expended in carrying out the purposes of this act and of forestry in general, under the direction of the Geological Board.

SEC. 2½. That nothing in this act shall operate or be construed as authority for the payment of any money out of the State Treasury for the purchase of lands or for other purposes unless by appropriation for said purpose by the General Assembly.

SEC. 3. That all laws and clauses of laws in conflict with this act are hereby repealed.

SEC. 4. That this act shall be in force from and after its ratification.

Ratified this the 9th day of March, A. D. 1915.

Though this is a new departure for North Carolina, it is by no means a new idea, as State experiment and demonstration forests have been consistently advocated by the North Carolina Geological and Economic Survey for a number of years (see Economic Paper No. 22, p. 42; Press Bulletins Nos. 130, 142, 145). A number of States to the north and west of us are now operating such forests. The Forestry Committee of the Fifth National Conservation Congress reported two years ago a total of sixty-three State forest experiment stations in eleven States, more than three-quarters of them being in the two States of Pennsylvania and Ohio. In some cases regular State forests, or parts of them, are used as experiment forests, while in other cases separate and smaller areas are procured. Ohio, for example, has fourteen experiment forests and no State forests, while Michigan has fifty-two State forests and only one experiment forest. However, all organized and administered State forests cannot help but be demonstration forests to a greater or less extent, because they show to the citizens how the State manages its own forest lands. Whether these are managed in the right or wrong way depends on the knowledge and money available, and the knowledge depends, at least in part, on experiments which should be made on those or similar forest areas.

Gifts of Land for State Forests.

There are, no doubt, many public-spirited citizens of North Carolina who, if they realized the need for demonstration and experiment forests,

would gladly give to the State enough forest land to adequately serve such a purpose. Not only is low-priced land suitable for this purpose, but valuable land is most unsuitable. Agricultural land is not wanted, though a small percentage of such might be included in the place. What is needed is to show how forest which is to remain in woods should be managed. There is land in nearly every county which will pay better to keep in woods than to clear. This is certainly worth less to the owner than the average land in the neighborhood. At the same time it would suit forest demonstration purposes better, because it is absolute forest land, *i. e.*, land which should remain permanently in woods.

Demonstration forests, however, should be accessible. As their chief use is to show by actual practice what can be done in forestry, they should be where as large a number of people as possible can see them; for instance, near a main line of railway or on an improved and well traveled highway.

Again, they must contain fairly average samples of at least one important type of forest of the region, and if possible all the important types should be represented. For instance, a demonstration forest in the eastern piedmont region should have some hardwood and pine forest, some old-field pine, and some pure hardwood forest, with a fair representation of most of the important timber trees of the region.

Purchasing State Forests.

The above law provides for two other methods of securing State forests besides by gift. The State Geological Board is allowed to purchase State forests either with money specially appropriated by the General Assembly for the purpose or with other funds which may be available. Section 21½ is designed to make clearer the purpose of this provision. It says that money cannot be withdrawn from the State Treasury for the purchase of land without special appropriation by the Legislature. However, when such appropriation is made the Geological Board cannot only purchase land, but it can administer it as a State forest; protect it from fire and trespass; do necessary cutting and thinning; plant trees or sow seed; dispose of surplus timber or other products, and make experiments in improved forest management.

Specific instructions as to the management and care of such land are not necessary in bills appropriating money to buy State forests, because general permission to properly administer them is given by this present law.

The State Geological Board is also allowed to purchase State forests "for experimental, demonstration, educational, park, and protection purposes," using any funds available. There is not likely to be very much

of the regular appropriation for the work of the Board available, but the Board is able to accept subscriptions or donations of money from private individuals or organizations for the purpose of buying State forests. In fact, this is clearly contemplated by law. A State forest of a few hundred or even thousand acres would be a worthy monument to any individual or event. Why should not one or more of North Carolina's patriotic and public-spirited organizations take the lead in a movement to accumulate funds for such a purpose? Will not Mount Mitchell State Park be a nobler and more enduring monument to Dr. Elisha Mitchell than any one which could be erected to him in metal or stone? There is room in this State for a number of such monuments, and the permanent benefit from their establishment would be incalculable.

SOME PROBLEMS TO BE SOLVED.

Some idea of the variety of questions which can be solved most satisfactorily by the State or National Governments can be gathered from the following quotation from Press Bulletin 142, "Demonstration Forests for North Carolina," North Carolina Geological and Economic Survey:

There are five principal forest regions in North Carolina, (1) The Spruce, (2) Mountain Hardwoods, (3) Piedmont Region, (4) Coastal Plain, (5) The Banks. Some of these can well be divided again into smaller subdivisions.

(1) The Spruce forests on the slopes of our highest mountains are of the greatest importance in regulating stream flow and for park purposes. Lumbering operations as at present practiced result in their total destruction. It will pay the State to demonstrate that lumbering can be done in these forests without such devastating waste. A State forest in this type could at the same time be used as a State park, and for the protection of the important mountain streams.

(2) The Mountain forests, which now contain the greater part of our old-growth hardwood supply, are being cut in such a way that the more valuable kinds of timber trees are rapidly disappearing. Landowners should be shown how to cut so that the proportion of the poplar, chestnut, linn, and other valuable species will be increased in the second growth, rather than diminished.

(3) The original growth pine has been so largely removed from what were the mixed hardwood and pine forests of the Piedmont region that the second growth now consists almost entirely of the much slower growing oak. How best to increase the proportion of young pine timber in these woods is a problem which can be decided by experiment, and can then be conclusively shown by demonstration.

(4) The rehabilitation of our once large turpentine industry depends on second-growth long-leaf pine. This tree has been practically exterminated over large areas, and little effort is being made to bring it back, even in the districts best suited to its growth. Experiments on the ground would show that much so-called waste land could profitably produce long-leaf pine.

(5) "The Banks" and similar areas along our coast were originally covered with forests. Now they are mostly bare sandy wastes. The best methods of reforesting them and making them permanently productive, and at the same time stopping the ceaseless drifting of the sand, can only be shown by doing actual work in reforestation on the ground.

These and many other just as important problems in forest management and forest protection have to be solved to the satisfaction of the people of North Carolina, and *this can best be done by the State on State-owned forest land.*

FURTHER BENEFITS OF STATE FORESTS.

While the most important use of State forests is their educational value through demonstration and experimentation, they have several other uses, any of which in itself is generally considered sufficient excuse for their creation, and, added to the primary object, double their value to the State.

(a) *Protection Forests.* A forest covering a city watershed or lying on the headwaters of a stream or on a steep mountain slope serves as a protection against muddy or polluted water or against floods and extreme low water. Such forests should be publicly owned and controlled by the Nation, State, or municipality as protection forests. Asheville, Marion, and other of our towns own such forests, and the Federal Government is purchasing the Appalachian National Forests with this object primarily in view. All the spruce and balsam forests in North Carolina should be publicly owned, if only for this one reason.

(b) *Park Forests.* There are areas in all States which are noted for their scenery, extensive views, grand waterfalls, beautiful trees, rugged cliffs or gorges. The forest forms such an integral part of the attractiveness of such places that their value would be destroyed by its removal. Such natural monuments seem to belong by right to the whole people, and they should be preserved intact. Even though now in private ownership, they should be acquired and preserved by the State for the pleasure, health, and recreation of its citizens and for generations yet to come, all of whom have an actual interest in their perpetuation.

MOUNT MITCHELL STATE PARK.

It was primarily for the two above reasons, as set forth in its preamble, that the General Assembly passed the bill to purchase the top of Mount Mitchell as a State park. This project has been strongly advocated by the North Carolina Forestry Association and has been consistently urged by the State Geological and Economic Survey. (See Press Bulletins Nos. 100, 119, 135, and 138.) The measure was ably championed by Governor Craig and was indorsed by the Asheville Board of Trade and many other similar bodies. The bill was introduced into the General Assembly by Senator Zebulon Weaver of Buncombe, who, two years earlier, had proposed a similar measure. It received the strong support of a number of influential men in both houses of the Legislature, and was passed in the House by a majority of 67 to 32.

THE MOUNT MITCHELL PARK PURCHASE LAW.

The following is a copy of the law authorizing the purchase of the summit of Mount Mitchell:

AN ACT TO APPOINT A COMMISSION TO ACQUIRE A PORTION OF MOUNT MITCHELL, INCLUDING THE SUMMIT, AND TO PROVIDE FOR THE CREATION OF A PUBLIC PARK FOR THE USE OF THE PEOPLE OF THE STATE OF NORTH CAROLINA.*

Whereas the summit of Mount Mitchell in Yancey County is the greatest altitude east of the Rocky Mountains; and whereas the headwaters of many of the important streams of the State are at or near the said summit, and the forest is being cleared, which tends to damage and injure the streams flowing through the said State from the mountains to the Atlantic Ocean; and whereas it is deemed desirable that this beautiful and elevated spot shall be acquired and permanently dedicated as a State park for the use of the people of the entire State seeking health and recreation; and whereas, unless the said land is acquired by the State at this time, the cost of acquiring it at a later date will be greatly increased and the water-courses may be damaged and the beauty of the scenery destroyed by removing the growth therefrom, and irreparable damage accrue: Now, therefore,

The General Assembly of North Carolina do enact:

SECTION 1. That a commission is hereby created, to consist of five practical business men who shall be appointed by the Governor, and which shall carry out the provisions of this act and shall be known as the "Mitchell Peak Park Commission."

SEC. 2. That said commission shall be and is hereby created a body politic and corporate under the name and style of the "Mitchell Peak Park Commission."

SEC. 3. That the said commission shall have the power to fix the time and place of its meeting. Said commissioners shall hold office until the property hereinafter described shall have been purchased and a deed made to the State of North Carolina and until they shall have made a report of the same to the General Assembly and shall have been discharged. In the event of the death or resignation of any member of said commission, his successor shall be appointed by the Governor. The said commissioners shall receive no compensation but their traveling expenses, including hotel bills, while actively engaged in the work of said commission, and these expenses shall be paid out of the funds hereinafter provided for: *Provided*, that the said commission shall under no circumstances expend or contract to expend a greater amount than that named in this act for the purchase of said land.

SEC. 4. The said commission shall convene as soon as practicable and elect a chairman. The said chairman shall from time to time draw a warrant or warrants upon the treasurer of the State, which, after being approved and countersigned by the Governor and two other members of the commission be-

*Chapter 76, Public Laws 1915.

sides the chairman, shall be paid by the said treasurer to the owner of said lands purchased for the said purpose out of any funds not otherwise appropriated.

SEC. 5. The total amount to be expended under this act shall not exceed \$20,000, and the said sum of \$20,000 is hereby designated as a maximum amount to be expended in the acquisition of the said properties, and the said commission is especially charged with the duty of acquiring as much of the lands as is possible for the purpose intended, not exceeding the maximum amount hereinbefore designated.

SEC. 6. Out of the funds so appropriated the said Mitchell Peak Park Commission shall have power, as soon as practicable, to acquire either by purchase or condemnation so much of Mount Mitchell, including the peak thereof, as they shall deem necessary as a suitable site for the purpose intended, and in the event of the purchase of said land or lands privately from the owner or owners thereof, the said commission shall take a deed to the State of North Carolina therefor.

SEC. 7. Whenever from any cause the said commission cannot agree with the owner or owners of the land which they shall select for the purpose of the park as aforesaid, as to the price to be paid for the same or for any part thereof, said land or lands may be taken at a valuation to be made by three competent and disinterested freeholders of the county of Yancey, one of whom, after due notice to the landowner of such proceedings, shall be chosen by the said commission, one selected by the landowner, and these two shall select a third; and in case the landowner refuses to select, then said commission shall select two and these two shall select a third, and said freeholders after being duly sworn by a justice of the peace of the county of Yancey, shall at once go on said land and proceed to condemn said land or lands and ascertain the sum which shall be paid the owner or owners of said properties and report the same to the said commission, under their hands and seals, which report, on being confirmed by the said commission and spread upon their minutes, shall have the effect of a judgment against the said Mitchell Peak Park Commission, and upon paying said sum to the landowner, or in the event of an appeal, upon paying said sum to the chairman of said commission to await the result of such appeal, shall pass title to the State of North Carolina of the land so taken: *Provided*, that if any person whose land is taken for the said purpose or the said commission be dissatisfied with the valuation thus made, then and in that case either party may appeal to the next term of the Superior Court of Yancey County within ten days from the filing of such report: *Provided further*, that such appeal shall not hinder the commission from taking possession of said property.

SEC. 8. The Governor shall have power, upon complaint or upon his own motion, to remove any of said commissioners for negligence of duty or for any conduct unbecoming said commissioner and inconsistent with his duties under this act. The position of commissioner under this act shall not be construed to be an office within the meaning of section 7, Article XIV of the Constitution of North Carolina. The said Mitchell Peak Park Commission shall make report to the Governor, setting forth all purchases, condemnations, and expenditures of every kind under this act.

SEC. 9. This act shall be in force from and after its ratification.

Ratified this the 3d day of March, A. D. 1915.

Fire Protection Needed.

It will be seen that this bill provides only for the purchase of the land. Its weakness seems to be that no provision is made for the protection of the land from fire both during and subsequent to its acquisition. Since logging operations commenced two years ago, the forest areas which it is planned to buy have been constantly threatened with destruction, and several times fire has come upon the southern slope of the mountain. Fires at any time are liable to destroy hundreds of acres of these spruce forests, and, once destroyed, the beauties of the park would be gone. There is immediate need for some adequate system of fire protection for the Mount Mitchell State Park. Fortunately, special arrangements are now under consideration, and it is hoped that before fall effective protection can be given at least the part of this mountain which is to be purchased by the State. It would be most appropriate that the very first State protection furnished by North Carolina should be given to historic Mount Mitchell.

The Commission.

The Mitchell Peak Park Commission provided for by this law was appointed by the Governor on March 31. It consists of the following gentlemen, all of them from regions vitally concerned in the purchase of the park, and all but one from Yancey, the county in which Mount Mitchell is situated:

- Mr. T. E. Blackstock, Asheville, N. C.
- Mr. G. P. Deyton, Green Mountain, N. C.
- Mr. E. F. Watson, Burnsville, N. C.
- Mr. M. C. Honeycutt, Burnsville, N. C.
- Mr. Wilson Hensley, Bald Creek, N. C.

This commission met in Burnsville Saturday, April 10th, and organized by electing Mr. T. E. Blackstock chairman and Mr. M. C. Honeycutt secretary. A second meeting was planned to take place in May on the top of Mount Mitchell, with the object of securing local information in regard to the different properties which are being considered for purchase under the law.

APPALACHIAN NATIONAL FORESTS.

The Federal Government cannot purchase or acquire control of land in any State without the permission of that State. It was therefore necessary, when the people were asking that National forests or parks be established in western North Carolina, that the State grant the Government the right to make such purchases. The following law was

passed by the General Assembly of 1901, at the beginning of the agitation for the Appalachian Park and just ten years before the Federal law taking advantage of this permission was finally enacted. (See Press Bulletin 147, Forestry Laws of North Carolina, Appendix.)

LAW TO ALLOW FEDERAL ACQUIREMENT.

5430. *Forest reserve, western Carolina.* *The United States is authorized to acquire by purchase, or by condemnation with adequate compensation, except as hereinafter provided, such lands in western North Carolina as in the opinion of the Federal Government may be needed for the establishment of a National Forest Reserve in that region. This consent is given upon condition that the State of North Carolina shall retain a concurrent jurisdiction with the United States in and over such lands so far that civil process in all cases, and such criminal process as may issue under the authority of the State of North Carolina against any person charged with the commission of any crime without or within said jurisdiction, may be executed thereon in like manner as if this consent had not been given. Power is hereby conferred upon the Congress of the United States to pass such laws as it may deem necessary to the acquisition as hereinbefore provided, for incorporation in such National forest reserve such forest-covered lands lying in western North Carolina as in the opinion of the Federal Government may be needed for this purpose, but as much as 200 acres of any tract of land occupied as a home by *bona fide* residents in this State on the 18th day of January, 1901, shall be exempt from the provisions of this section. Power is hereby conferred upon Congress to pass such laws and to make or provide for the making of such rules and regulations, of both civil and criminal nature, and to provide punishment therefor, as in its judgment may be necessary for the management, control, and protection of such lands as may be from time to time acquired by the United States under the provisions of this section.

Acquirement by Purchase Only.

In a few localities in western North Carolina considerable opposition to the National Forest Reserve policy was at one time developed, based largely on a misunderstanding of the conditions on which the land was to be procured. The above State law allows the United States to acquire land "by purchase, or by condemnation with adequate compensation." From this permission the idea gained ground that the Government would condemn land and take it whether the owner wished to sell it or not. This is permitted under the State law, provided "adequate compensation" is made. But the Federal law under which Appalachian forest lands are acquired stipulated "that the Secretary of Agriculture is hereby authorized to *purchase*," and no other method of securing these lands is mentioned in the whole law. There has been no thought

*Chapter 118, section 5430, Revisal 1905.

of employing condemnation proceedings such as are allowed by the State law and as are actually to be put in practice by the Mitchell Peak Park Commission,‡ if it is found necessary to do so.

It is true, that in order to secure a clear title to land which is owned by a number of different claimants who have not only expressed a willingness to sell, but have agreed upon a price, the Government has in certain cases brought condemnation proceedings in court. These are nothing but friendly suits to determine the real ownership of the lands and the proper share of the price each claimant is entitled to. It is a proceeding all business men are familiar with, and can be objected to by no one.

It will be noticed that in all dealings with the Federal Government the rights and privileges of the State are jealously guarded. Not only does the State Legislature clearly define the powers which it delegates to the United States, but Congress clearly stipulates in the law allowing the purchase of land that no land shall be bought in any State which has not previously given its consent thereto.‡

PROTECTION OF GAME ON NATIONAL FORESTS.

It is with the same scrupulous care to maintain the most cordial relations with the State of North Carolina and avoid any possible cause of friction that permission was asked by the Federal Government to make and enforce regulations for the protection of animal life on the Appalachian National Forests. It might seem that such power was conferred upon Congress by the law allowing the United States to buy lands (page 43), but this was not considered specific enough. In accordance, therefore, with its policy, the Government of the United States asked permission to make such rules and regulations as were thought needful "in respect to game animals, game and nongame birds and fish" on Federal lands in the western part of North Carolina.

LAW TO ALLOW FEDERAL PROTECTION OF WILD LIFE.

The permission requested by the Federal Government was granted by the General Assembly of 1915 in the following law:

‡See page 41.

AN ACT TO GIVE THE CONSENT OF THE STATE OF NORTH CAROLINA TO THE MAKING BY THE CONGRESS OF THE UNITED STATES, OR UNDER ITS AUTHORITY, OF ALL SUCH RULES AND REGULATIONS AS IN THE OPINION OF THE FEDERAL GOVERNMENT MAY BE NEEDFUL IN RESPECT TO GAME ANIMALS, GAME AND NONGAME BIRDS, AND FISH ON LANDS, AND IN OR ON THE WATERS THEREON, ACQUIRED OR TO BE ACQUIRED BY THE FEDERAL GOVERNMENT IN THE WESTERN PART OF NORTH CAROLINA FOR THE CONSERVATION OF THE NAVIGABILITY OF NAVIGABLE RIVERS.*

Whereas the Government of the United States, with the consent of the General Assembly of the State of North Carolina, has acquired and will acquire areas of forested land in the western part of said State for the purpose of conserving the navigability of navigable streams, and said lands and waters thereon are and will be stocked, naturally and artificially, with game animals, game and nongame birds, and fish; and whereas, in order adequately to enjoy and protect the occupancy and use of said areas, it is important that the United States be fully authorized to make all needful rules and regulations in respect to such animals, birds, and fish: Therefore,

The General Assembly of North Carolina do enact:

SECTION 1. That the consent of the General Assembly of North Carolina be and hereby is given to the making by the Congress of the United States, or under its authority, of all such rules and regulations as the Federal Government shall determine to be needful in respect to game animals, game and nongame birds, and fish, on such lands in the western part of North Carolina as shall have been or may hereafter be purchased by the United States under the terms of the act of Congress of March 1, 1911, entitled "An act to enable any State to cooperate with any other State or States, or with the United States, for the protection of the watersheds of navigable streams, and to appoint a commission for the acquisition of lands for the purposes of conserving the navigability of navigable rivers" (36 United States Statutes at Large, page 961), and acts of Congress supplementary thereto and amendatory thereof, and in or on the waters thereon.

Ratified this the 9th day of March, A. D. 1915.

The people of North Carolina are coming to realize very acutely that our wild life needs protection quite as much as any other of our natural resources. The destruction of the food fishes of our streams by unrestrained and often unlawful fishing and by polluting the waters with sawdust or mill waste has reached alarming proportions. And when we come to think of it, what right has a man to deprive a neighborhood of one of the most delicious and healthful of foods in order that he may have 5 cents more per thousand feet of lumber on his sawing or a fraction of a cent more profit on his investment in some large manufacturing plant? The manufacturers of lumber, of leather, of paper, all do their

*Chapter 205, Public Laws 1915.

part towards the development of the community and the State, but we are beginning to realize that in prosecuting their business they have no right to trespass upon the rights of their neighbors.

Game birds in North Carolina have generally been looked upon in the light of the special property of the sportsman, and heretofore game laws have been passed chiefly for his benefit. We are now, however, coming to realize that the farmer, the owner of the land, has much more interest in the game which lives upon his land than has the man whose sole interest is killing it. To mention one instance of this, our common partridge or quail is worth to the farmer for destroying noxious insects a great deal more than it is to the sportsman or the hotel keeper. In the future our game laws must consider, first, the value of the living birds and animals to the landowner and the general public before it considers their value from the old standpoint of being something to kill.

ARBOR DAY.

The regular observance of Arbor Day in North Carolina has been strongly advocated by the State Geological and Economic Survey for a number of years. The first press bulletin on this subject ever issued by the Survey had the above title, and not only advocated the general observance of this day throughout the State, but suggested the adaptation of a program to the special conditions existing in North Carolina. As well as emphasizing the planting of trees, it was recommended that the attention of the children be called to the value of the forests of the State to the life of the average citizen. In the words of the author of the press bulletin above referred to, which was issued April 7, 1908, "It is to be desired that this day shall be more generally observed and that our young people shall be brought to a realization of the value of our forests and the beauty and need of trees for shade and decorative purposes. . . . How soon many of our school yards could be made places of beauty if on each Arbor Day the school would plant a certain number of trees or shrubs and then care for them during the year.

"While the same reasons for the observance of Arbor Day in the scantily forested western States cannot all hold in a well wooded State like North Carolina, yet the celebration here of such a day has its significance. Arbor Day in North Carolina could be set aside for the school children to learn of the great natural gift which we have in the forests, and the relation of the forest to the well-being and wealth of our people."

ARBOR DAY LAW.

An Arbor Day law such as is found on the statute books of practically half the States of the Union was introduced into the General Assembly

of 1913. It, however, failed of passage, owing to the rush of bills at the end of the session. A similar bill was introduced into the Legislature of 1915, and, backed by the good people of Charlotte (who had previously held a most successful Arbor Day celebration in that city), by the North Carolina Forestry Association, the State Geological and Economic Survey, and others interested in Forestry, it became a law without any serious opposition.

AN ACT TO APPOINT AN ARBOR DAY FOR NORTH CAROLINA.*

The General Assembly of North Carolina do enact:

SECTION 1. That the Friday following the first day of November in each year shall be known as Arbor Day, to be appropriately observed by the public schools of the State.

SEC. 2. That the Governor is herewith authorized to make proclamation setting forth the provisions of this act and recommending that Arbor Day be appropriately observed by the school children of the State, in order that they may be brought up to appreciate the true value of trees and forests to their State.

SEC. 3. That it shall be the duty of the State Superintendent of Public Instruction to take the matter of the observance of Arbor Day by the public schools of the State under his general supervision, to issue each year a program for its observance, to cover such part of the day as he may prescribe, and to transmit suitable instructions to the county school authorities under his charge for an appropriate observance of Arbor Day.

SEC. 4. That this act shall be in force from and after its ratification.

Ratified this the 25th day of February, A. D. 1915.

At first thought, it would seem that Arbor Day should be celebrated in the spring. The planting of trees and shrubs and the general call of the out-of-doors appeals to children much more strongly in the spring than in the fall. Many kinds of trees do better planted just before the sap starts in the spring than if planted in the autumn. It is for these and other reasons that most States keep Arbor Day in the spring, endeavoring to select a date upon which planting would be most likely to be successful. In many of the Southern States, however, the public schools are not in session in the spring; so that it is impossible to have the day generally observed by the schools at that time of the year. It is for this reason that several States observe Arbor Day in the fall. Two or three have two Arbor Days a year, one in the spring and one in the autumn. Kentucky, which originally appointed a spring day, has found it necessary to change to November.

For this same reason it was thought advisable, after consultation with the North Carolina school authorities, to fix a day when practically all schools in the State are in session. It is hoped that this will insure

*Chapter 51, Public Laws 1915.

the observance of Arbor Day throughout North Carolina. The selection of Friday as Arbor Day was made by the public school authorities in order that the exercises would break into the regular school curriculum as little as possible.

Manner of Observance.

It is the custom in most States where Arbor Day is observed for the Governor to issue a proclamation calling the attention of the people to the advantages of observing the day with tree planting, decorating school grounds and home grounds, and studying the relation of trees and forests to the life of the people. Governor Craig has expressed his approval of this practice by indorsing this same provision in the North Carolina law. The law expressly authorizes the Governor to make the proclamation, but it does not require it. Whether, therefore, the proclamation is made or not, the validity of the observance will be the same, but the active participation of the Chief Executive in this way would add interest and enthusiasm to the occasion.

The State Superintendent of Public Instruction, who assisted in the preparation of the bill and has, since its passage, expressed his entire agreement with its provisions, will, as provided by the law, issue a program and instruct the school authorities to observe the day in the proper manner. Already several suggestions for Arbor Day celebrations have been published by the various State departments, and these may be referred to for assistance. Two years ago the Department of Education, assisted by the State Geological and Economic Survey, prepared an Arbor Day program and made other suggestions for the observance of the day. (See Civic Days: Good Roads, Arbor Day, pages 35-46, Bulletin XXII, N. C. Department of Education, 1913.) Last year the same department issued a program entitled "Community Service Week in North Carolina"; a few suggestions for improving school grounds by planting trees, which can be done on Arbor Day, will be found on pages 16 and 85 of that publication. Other references to Arbor Day observance in North Carolina can be found in Economic Paper No. 22, "Forest Fires and Their Prevention," and Press Bulletin No. 49, "Arbor Day in the North Carolina Schools." Some of the North Carolina towns have also published Arbor Day programs, notably Durham in 1896 and Charlotte in 1913. Many of the States issue annually handsomely illustrated Arbor Day bulletins or hand-books. In these are reprinted poems and other selections which can be recited by the school children.

PUBLICATIONS
OF THE
NORTH CAROLINA GEOLOGICAL AND ECONOMIC SURVEY.

BULLETINS.

1. Iron Ores of North Carolina, by Henry B. C. Nitze, 1893. 8°, 239 pp., 20 pl., and map. *Out of print.*
2. Building and Ornamental Stones in North Carolina, by T. L. Watson and F. B. Laney in collaboration with George P. Merrill, 1906. 8°, 283 pp., 32 pl., 2 figs. *Postage 25 cents. Cloth-bound copy 30 cents extra.*
3. Gold Deposits in North Carolina, by Henry B. C. Nitze and George B. Hanna, 1896. 8°, 196 pp., 14 pl., and map. *Out of print.*
4. Road Material and Road Construction in North Carolina, by J. A. Holmes and William Cain, 1893. 8°, 88 pp. *Out of print.*
5. The Forests, Forest Lands and Forest Products of Eastern North Carolina, by W. W. Ashe, 1894. 8°, 128 pp., 5 pl. *Postage 5 cents.*
6. The Timber Trees of North Carolina, by Gifford Pinchot and W. W. Ashe, 1897. 8°, 227 pp., 22 pl. *Out of print.*
7. Forest Fires: Their Destructive Work, Causes and Prevention, by W. W. Ashe, 1895. 8°, 66 pp., 1 pl. *Postage 5 cents.*
8. Water-powers in North Carolina, by George F. Swain, Joseph A. Holmes, and E. W. Myers, 1899. 8°, 362 pp., 16 pl. *Postage 16 cents.*
9. Monazite and Monazite Deposits in North Carolina, by Henry B. C. Nitze, 1895. 8°, 47 pp., 5 pl. *Out of print.*
10. Gold Mining in North Carolina and other Appalachian States, by Henry B. C. Nitze and A. J. Wilkins, 1897. 8°, 164 pp., 10 pl. *Out of print.*
11. Corundum and the Basic Magnesian Rocks of Western North Carolina, by J. Volney Lewis, 1895. 8°, 107 pp., 6 pl. *Out of print.*
12. History of the Gems Found in North Carolina, by George Frederick Kunz, 1907. 8°, 60 pp., 15 pl. *Postage 8 cents. Cloth-bound copy 30 cents extra.*
13. Clay Deposits and Clay Industries in North Carolina, by Heinrich Ries, 1897. 8°, 157 pp., 12 pl. *Postage 10 cents.*
14. The Cultivation of the Diamond-back Terrapin, by R. E. Coker, 1906. 8°, 67 pp., 23 pl., 2 figs. *Out of print.*
15. Experiments in Oyster Culture in Pamlico Sound, North Carolina, by Robert E. Coker, 1907. 8°, 74 pp., 17 pl., 11 figs. *Postage 6 cents.*
16. Shade Trees for North Carolina, by W. W. Ashe, 1908. 8°, 74 pp., 10 pl., 16 figs. *Postage 6 cents.*
17. Terracing of Farm Lands, by W. W. Ashe, 1908. 8°, 38 pp., 6 pl., 2 figs. *Postage 4 cents.*
18. Bibliography of North Carolina Geology, Mineralogy, and Geography, with a list of Maps, by Francis Baker Laney and Katherine Hill Wood, 1909. 8°, 428 pp. *Postage 25 cents. Cloth-bound copy 30 cents extra.*
19. The Tin Deposits of the Carolinas, by Joseph Hyde Pratt and Douglas B. Sterrett, 1905. 8°, 64 pp., 8 figs. *Postage 4 cents.*
20. Water-powers of North Carolina: An Appendix to Bulletin 8, 1910. 8°, 383 pp. *Postage 25 cents.*
21. The Gold Hill Mining District of North Carolina, by Francis Baker Laney, 1910. 8°, 137 pp., 23 pl., 5 figs. *Postage 15 cents.*
22. A Report on the Old Mining District, Davidson County, N. C., by J. E. Pogue, Jr., 1911. 8°, 144 pp., 22 pl., 5 figs. *Postage 15 cents.*

23. Forest Conditions in Western North Carolina, by J. S. Holmes, 1911. 8°, 116 pp., 8 pl. *Postage 15 cents.*

24. Loblolly or North Carolina Pine, by W. W. Ashe, 1915. 8°, 176 pp., 27 pl., 5 figs. *Postage 15 cents.*

25. Monazite, Zircon, and Other Minerals Used in the Production of Chemical Compositions Employed in the Manufacture of Lighting Apparatus, by Joseph Hyde Pratt. *In press.*

ECONOMIC PAPERS.

1. The Maple-sugar Industry in Western North Carolina, by W. W. Ashe, 1897. 8°, 34 pp. *Postage 2 cents.*

2. Recent Road Legislation in North Carolina, by J. A. Holmes. *Out of print.*

3. Tale and Pyrophyllite Deposits in North Carolina, by Joseph Hyde Pratt, 1900. 8°, 29 pp., 2 maps. *Postage 2 cents.*

4. The Mining Industry in North Carolina During 1900, by Joseph Hyde Pratt, 1901. 8°, 36 pp., and map. *Postage 2 cents.*

Takes up in some detail Occurrences of Gold, Silver, Lead and Zinc, Copper, Iron, Manganese, Corundum, Granite, Mica, Tale, Pyrophyllite, Graphite, Kaolin, Gem Minerals, Monazite, Tungsten, Building Stones, and Coal in North Carolina.

5. Road Laws of North Carolina, by J. A. Holmes. *Out of print.*

6. The Mining Industry in North Carolina During 1901, by Joseph Hyde Pratt, 1902. 8°, 102 pp. *Postage ¼ cents.*

Gives a List of Minerals found in North Carolina; describes the Treatment of Sulphuret Gold Ores, giving Localities; takes up the Occurrence of Copper in the Virgilina, Gold Hill, and Ore Knob districts; gives Occurrence and Uses of Corundum; a List of Garnets, describing Localities; the Occurrence, Associated Minerals, Uses and Localities of Mica; the Occurrence of North Carolina Feldspar, with Analyses; an extended description of North Carolina Gems and Gem Minerals; Occurrences of Monazite, Barytes, Ocher; describes and gives Occurrences of Graphite and Coal; describes and gives Occurrences of Building Stones, including Limestone; describes and gives Uses for the various forms of Clay; and under the head of "Other Economic Minerals" describes and gives Occurrences of Chromite, Asbestos and Zircon.

7. Mining Industry in North Carolina During 1902, by Joseph Hyde Pratt, 1903. 8°, 27 pp. *Out of print.*

8. The Mining Industry in North Carolina During 1903, by Joseph Hyde Pratt, 1904. 8°, 74 pp. *Postage ¼ cents.*

Gives descriptions of Mines worked for Gold in 1903; descriptions of Properties worked for Copper during 1903, together with assay of ore from Twin-Edwards Mine; Analyses of Limonite ore from Wilson Mine; the Occurrence of Tin; in some detail the Occurrences of Abrasives; Occurrences of Monazite and Zircon; Occurrences and Varieties of Graphite, giving Methods of Cleaning; Occurrences of Marble and other forms of Limestone; Analyses of Kaolin from Barber Creek, Jackson County, North Carolina.

9. The Mining Industry in North Carolina During 1904, by Joseph Hyde Pratt, 1905. 8°, 95 pp. *Postage ¼ cents.*

Gives Mines Producing Gold and Silver during 1903 and 1904 and Sources of the Gold Produced during 1904; describes the mineral Chromite, giving Analyses of Selected Samples of Chromite from Mines in Yancey County; describes Commercial Varieties of Mica, giving the manner in which it occurs in North Carolina, Percentage of Mica in the Dikes, Methods of Mining, Associated Minerals, Localities, Uses; describes the mineral Barytes, giving Method of Cleaning and Preparing Barytes for Market; describes the use of Monazite as used in connection with the Preparation of the Bunsen Burner, and goes into the use of Zircon in connection with the Nernst Lamp, giving a List of the Principal Yttrium Minerals; describes the minerals containing Corundum Gems, Hiddenite and Other Gem Minerals, and gives New Occurrences of these Gems; describes the mineral Graphite and gives new Uses for same.

10. Oyster Culture in North Carolina, by Robert E. Coker, 1905. 8°, 39 pp. *Out of print.*

11. The Mining Industry in North Carolina During 1905, by Joseph Hyde Pratt, 1906. 8°, 95 pp. *Postage ¼ cents.*

Describes the mineral Cobalt and the principal minerals that contain Cobalt; Corundum Localities; Monazite and Zircon in considerable detail, giving Analyses of

Thorianite; describes Tantalum Minerals and gives description of the Tantalum Lamp; gives brief description of Peat Deposits; the manufacture of Sand-lime Brick; Operations of Concentrating Plant in Black Sand Investigations; gives Laws Relating to Mines, Coal Mines, Mining, Mineral Interest in Land, Phosphate Rock, Marl Beds.

12. Investigations Relative to the Shad Fisheries of North Carolina, by John N. Cobb, 1906. 8°, 74 pp., 8 maps. *Postage 6 cents.*

13. Report of Committee on Fisheries in North Carolina. Compiled by Joseph Hyde Pratt, 1906. 8°, 78 pp. *Out of print.*

14. The Mining Industry in North Carolina During 1906, by Joseph Hyde Pratt, 1907. 8°, 144 pp., 20 pl., and 5 figs. *Postage 10 cents.*

Under the head of "Recent Changes in Gold Mining in North Carolina," gives methods of mining, describing Log Washers, Square Sets, Cyanide Plants, etc., and detailed descriptions of Gold Deposits and Mines are given; Copper Deposits of Swain County are described; Mica Deposits of Western North Carolina are described, giving Distribution and General Character, General Geology, Occurrence, Associated Minerals, Mining and Treatment of Mica, Origin, together with a description of many of the mines; Monazite is taken up in considerable detail as to Location and Occurrence, Geology, including classes of Rocks, Age, Associations, Weathering, method of Mining and Cleaning, description of Monazite in Original Matrix.

15. The Mining Industry in North Carolina During 1907, by Joseph Hyde Pratt, 1908. 8°, 176 pp., 13 pl., and 4 figs. *Postage 15 cents.*

Takes up in detail the Copper of the Gold Hill Copper District; a description of the Uses of Monazite and its Associated Minerals; descriptions of Ruby, Emerald, Beryl, Hiddenite, and Amethyst Localities; a detailed description with Analyses of the Principal Mineral Springs of North Carolina; a description of the Peat Formations in North Carolina, together with a detailed account of the Uses of Peat and the Results of an Experiment Conducted by the United States Geological Survey on Peat from Elizabeth City, North Carolina.

16. Report of Convention called by Governor R. B. Glenn to Investigate the Fishing Industries in North Carolina, compiled by Joseph Hyde Pratt, State Geologist, 1908. 8°, 45 pp. *Out of print.*

17. Proceedings of Drainage Convention held at New Bern, North Carolina, September 9, 1908. Compiled by Joseph Hyde Pratt, 1908. 8°, 94 pp. *Out of print.*

18. Proceedings of Second Annual Drainage Convention held at New Bern, North Carolina, November 11 and 12, 1909, compiled by Joseph Hyde Pratt, and containing North Carolina Drainage Law, 1909. 8°, 50 pp. *Out of print.*

19. Forest Fires in North Carolina During 1909, by J. S. Holmes, Forester, 1910. 8°, 52 pp., 9 pl. *Out of print.*

20. Wood-using Industries of North Carolina, by Roger E. Simmons, under the direction of J. S. Holmes and H. S. Sackett, 1910. 8°, 74 pp., 6 pl. *Postage 7 cents.*

21. Proceedings of the Third Annual Drainage Convention, held under Auspices of the North Carolina Drainage Association; and the North Carolina Drainage Law (codified). Compiled by Joseph Hyde Pratt, 1911. 8°, 67 pp., 3 pl. *Out of print.*

22. Forest Fires in North Carolina During 1910, by J. S. Holmes, Forester, 1911. 8°, 48 pp. *Out of print.*

23. Mining Industry in North Carolina During 1908, '09, and '10, by Joseph Hyde Pratt and Miss H. M. Berry, 1911. 8°, 134 pp., 1 pl., 27 figs. *Postage 10 cents.*

Gives report on Virginina Copper District of North Carolina and Virginia, by F. B. Laney; Detailed report on Mica Deposits of North Carolina, by Douglas B. Sterrett; Detailed report on Monazite, by Douglas B. Sterrett; Reports on various Gem Minerals, by Douglas B. Sterrett; Information and Analyses concerning certain Mineral Springs; Extract from Chance Report of the Dan River and Deep River Coal Fields; Some notes on the Peat Industry, by Prof. Charles A. Davis; Extract from report of Arthur Keith on the Nantahala Marble; Description of the manufacture of Sand-lime Brick.

24. Fishing Industry of North Carolina, by Joseph Hyde Pratt, 1911. 8°, 44 pp. *Out of print.*

25. Proceedings of Second Annual Convention of the North Carolina Forestry Association, held at Raleigh, North Carolina, February 21, 1912. Forest Fires in North Carolina During 1911. Suggested Forestry Legislation. Compiled by J. S. Holmes, Forester, 1912. 8°, 71 pp. *Postage 5 cents.*

26. Proceedings of Fourth Annual Drainage Convention, held at Elizabeth City, North Carolina, November 15 and 16, 1911, compiled by Joseph Hyde Pratt, State Geologist, 1912. 8°, 45 pp. *Postage 3 cents.*

27. Highway Work in North Carolina, containing a Statistical Report of Road Work during 1911, by Joseph Hyde Pratt, State Geologist, and Miss H. M. Berry, Secretary, 1912. 8°, 145 pp., 11 figs. *Postage 10 cents.*

28. Culverts and Small Bridges for Country Roads in North Carolina, by C. R. Thomas and T. F. Hickerson, 1912. 8°, 56 pp., 14 figs., 20 pl. *Postage 10 cents.*

29. Report of the Fisheries Convention held at New Bern, N. C., December 13, 1911, compiled by Joseph Hyde Pratt, State Geologist, together with a Compendium of the Stenographic Notes of the Meetings Held on the two trips taken by the Legislative Fish Committee Appointed by the General Assembly of 1909, and the Legislation Recommended by this Committee, 1912. 8°, 302 pp. *Postage 15 cents.*

30. Proceedings of the Annual Convention of the North Carolina Good Roads Association held at Charlotte, N. C., August 1 and 2, 1912, in Coöperation with the North Carolina Geological and Economic Survey. Compiled by Joseph Hyde Pratt, State Geologist, and Miss H. M. Berry, Secretary, 1912. 8°, 109 pp. *Postage 10 cents.*

31. Proceedings of Fifth Annual Drainage Convention held at Raleigh, N. C., November 26 and 27, 1912. Compiled by Joseph Hyde Pratt, State Geologist. 8°, 56 pp., 6 pl. *Postage 5 cents.*

32. Public Roads Are Public Necessities, by Joseph Hyde Pratt, State Geologist, 1913. 8°, 62 pp. *Postage 5 cents.*

33. Forest Fires in North Carolina During 1912 and National and Association Coöperative Fire Control, by J. S. Holmes, Forester, 1913. 8°, 63 pp. *Postage 5 cents.*

34. Mining Industry in North Carolina During 1911-12, by Joseph Hyde Pratt, State Geologist, 1914. 8°, 314 pp., 23 pl., 12 figs. *Postage 15 cents.*

Gives detailed report on Gold Mining in various counties, with special report on Metallurgical Processes used at the Iola Mine, by Claud Hafer; description of a Cyanide Mill, by Percy Barbour; the new Milling Process for treating North Carolina Siliceous Gold Ores at the Montgomery Mine, including a description of the Uwarrie Mining Company's Plant; notes on the Carter Mine, Montgomery County, by Claud Hafer; also a description of the Howie Mine and its mill; a detailed report on the Coggins (Appalachian) Gold Mine, by Joseph Hyde Pratt; a List of Gems and Gem Minerals occurring in United States; special descriptions of Localities where the Amethyst, Beryl, Emerald, and Quartz Gems occur, as taken from United States Geological Survey Report, by Douglas B. Sterrett; a report on the Dan River Coal Field, by R. W. Stone, as reprinted from Bulletin 471-B of the United States Geological Survey; a special report on Graphite, by Edson S. Bastin, and reprinted from Mineral Resources of United States for 1912; a special report on Asbestos, describing both the Amphibole and Chrysotile varieties; a report on the Mount Airy Granite Quarry; special report on Sand and Gravel, giving Uses, Definitions of Various Sands, etc.; the portion of a Bulletin on Feldspar and Kaolin of the United States Bureau of Mines which relates to North Carolina, and which takes up in detail Occurrences, Methods of Mining, and Descriptions of Localities of Feldspar and Kaolin Mines in North Carolina, prepared by Mr. A. S. Watts. In this Economic Paper are also given the names and addresses of Producers of the various minerals during the years covered by the report.

35. Good Roads Days, November 5th and 6th, 1913, compiled by Joseph Hyde Pratt, State Geologist, and Miss H. M. Berry, Secretary. 8°, 102 pp., 11 pl. *Postage 10 cents.*

36. Proceedings of the North Carolina Good Roads Association, held at Morehead City, N. C., July 31 and August 1, 1913. In Coöperation with the North Carolina Geological and Economic Survey. Statistical Report of High-

way Work in North Carolina During 1912. Compiled by Joseph Hyde Pratt, State Geologist, and Miss H. M. Berry, Secretary. 8°, 127 pp., 7 figs. *Postage 10 cents.*

37. Forest Fires in North Carolina During 1913 and a Summary of State Forest Fire Prevention in the United States, by J. S. Holmes, Forester, 1914. 8°, 82 pp. *Postage 8 cents.*

38. Forms covering the Organization of Drainage Districts under the North Carolina Drainage Law, Chapter 442, Public Laws of 1909, and Amendments, And Forms for Minutes of Boards of Drainage Commissioners covering the Organization of the Board up to and Including the Issuing of the Drainage Bonds. Compiled by George R. Boyd, Drainage Engineer. 133 pp. *Postage 10 cents.*

39. Proceedings of the Good Roads Institute held at the University of North Carolina, March 17-19, 1914. Held under the auspices of the Departments of Civil and Highway Engineering of the University of North Carolina and The North Carolina Geological and Economic Survey. 8°, 117 pp., 15 figs., 4 pl. *Postage 10 cents.*

40. Forest Fires in North Carolina During 1914, and Forestry Laws of North Carolina, by J. S. Holmes, State Forester, 1915. 8°, 55 pp. *Postage 5 cents.*

41. Proceedings of the Seventh Annual Drainage Convention held at Wilson, N. C., November 18 and 19, 1914. Compiled by Joseph Hyde Pratt. *In press.*

42. Proceedings of the Road Institute held at the University of North Carolina February 23-27, 1915. Compiled by Joseph Hyde Pratt. *In press.*

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