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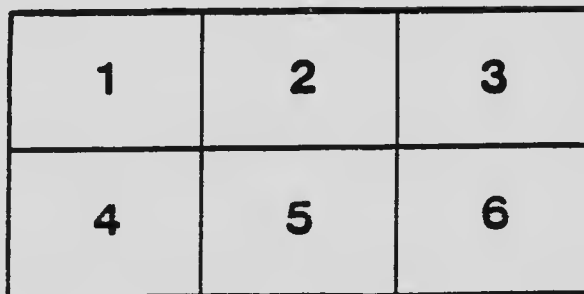
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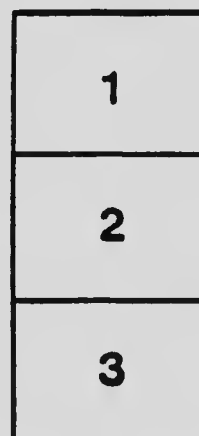
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FORESTRY BRANCH—BULLETIN No. 39

R. H. CAMPBELL, Director of Forestry

FOREST PRODUCTS OF CANADA

1912

POLES AND CROSS-TIES

COMPILED BY

R. G. LEWIS, B. Sc. F.

ASSISTED BY W. GUY H. BOYCE

OTTAWA
GOVERNMENT PRINTING BUREAU
1913

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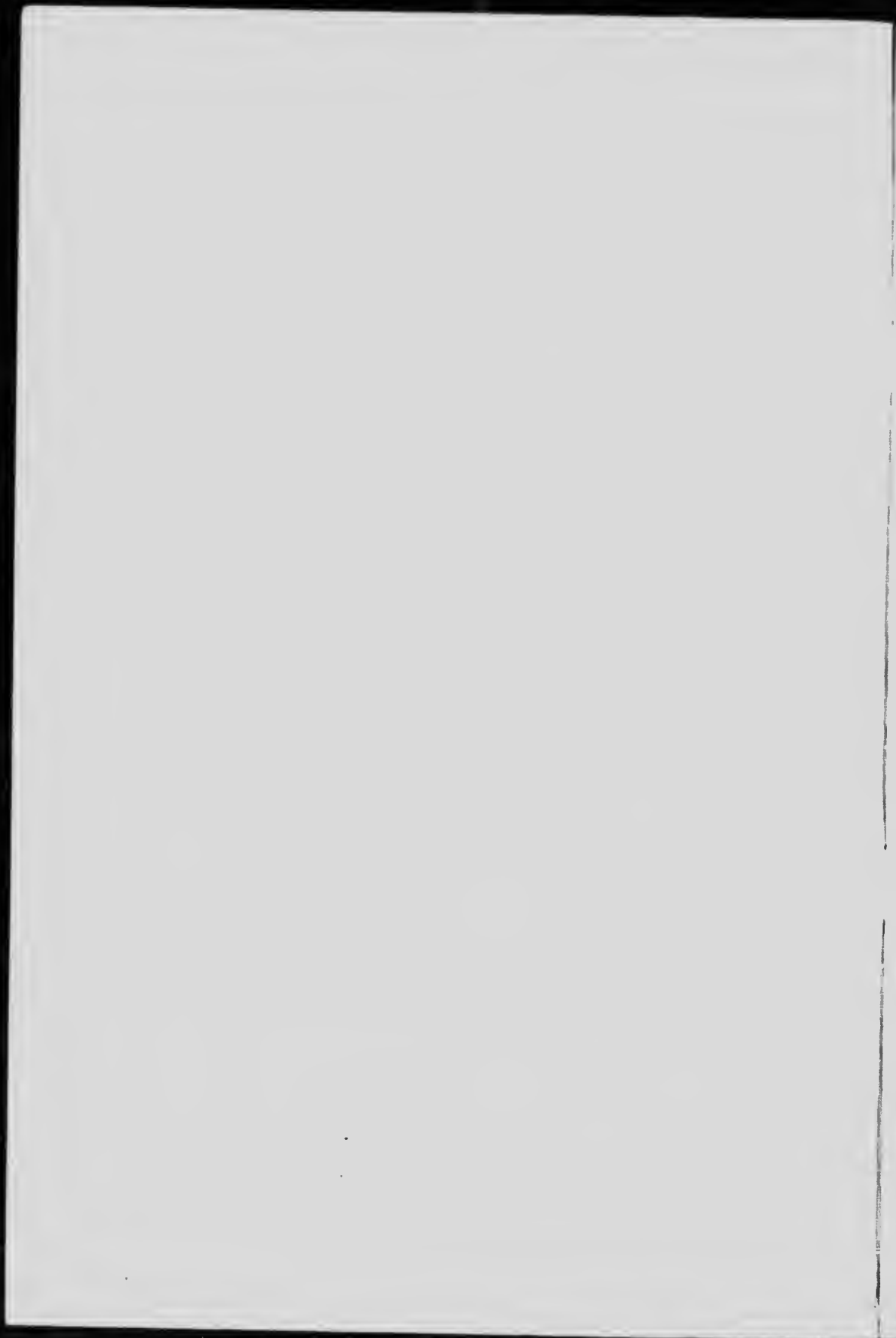
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LETTER OF TRANSMITTAL.

FORESTRY BRANCH, DEPARTMENT OF THE INTERIOR.
OTTAWA, May 25, 1913.

SIR,—I beg to transmit herewith reports on the 'Cross-ties Purchased' and on the 'Poles Purchased' in the Dominion during the calendar year 1912, and to recommend their publication as Bulletin No. 39 of this Branch.

The first of these contains an account of the Cross-ties purchased during the year by the different railway companies of Canada, steam and electric, both jointly and separately. A diagram, comparative for 1911 and 1912, showing the number of ties used, according to kinds of wood, has been added.

The second report, viz., that on 'Poles Purchased,' contains an account of the poles purchased during the year above referred to, both in the aggregate and also separately, by (1) the steam railways, telephone and telegraph companies, and (2) by the electric railways, power and light companies. It also groups poles used according to their length. A diagram similar to that for ties has also been added.

Your obedient servant,

R. H. CAMPBELL,

Director of Forestry.

W. W. CORRY, Esq., C. M. G.,
Deputy Minister of the Interior,
Ottawa.

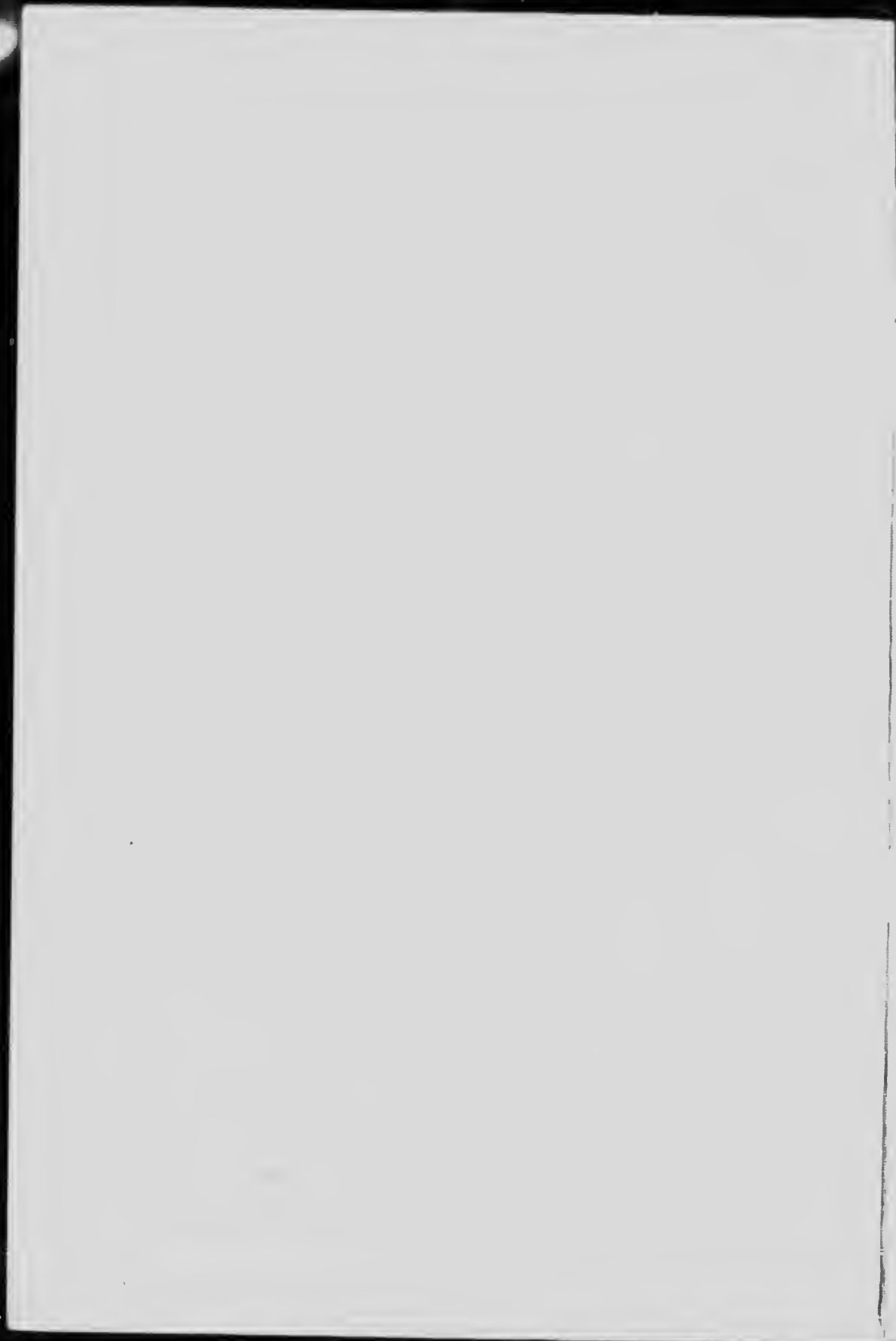


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POLES PURCHASED IN 1912.

The statistics in this bulletin are based on reports received from 207 telephone companies, 131 electric light and power concerns, 29 electric railways, 18 steam railways (operating telegraph and telephone lines) and 4 telegraph companies. These 389 companies reporting purchases in 1912 represent at least 95 per cent of the wooden-pole users in Canada, and the figures in this bulletin include at least 95 per cent of the poles purchased in 1912.

Pole-users are divided into two groups, with steam railways, telephone and telegraph companies forming one group, and electric railway, power and light companies the other.

Table 1 shows the number, total value, average value and per cent distribution of poles purchased in Canada in 1911 and 1912.

TABLE 1.
POLES PURCHASED, 1911 AND 1912, BY KINDS OF WOOD AND CHIEF USES:
Number, Total Value, Average Value and Per Cent Distribution.

Kind of Wood.	1911.				1912.			
	Number	Value.	Average Value	Per Cent	Number	Value.	Average Value	Per Cent
TOTAL OF ALL USES.								
Total	585,703	1,056,277	1 80	100 0	698,556	1,113,524	1 83	100 0
Cedar.....	463,231	746,854	1 61	79 1	378,369	613,580	1 62	62 2
Western Cedar	72,354	216,444	2 99	12 4	144,222	408,472	2 83	23 7
Balsam Fir.....					38,000	30,400	0 80	6 2
Tamarack.....	28,226	10,410	1 43	4 8	36,158	46,822	1 29	5 9
Spruce.....	8,764	8,983	1 02	1 5	9,127	10,334	1 13	1 5
Jack Pine.....	3,318	2,986	0 90	0 6	1,790	2,710	1 51	0 3
Douglas Fir.....	7,906	29,994	3 79	1 3	612	994	1 62	0 1
Chestnut.....	150	788	5 25	*	228	117	0 61	*
Hemlock.....	555	936	1 69	0 1	50	65	1 30	*
Red Pine.....	156	2,051	13 17	*				
White Pine.....	68	728	10 71	*				
Yellow Pine.....	39	280	9 33	*				
Unspecified.....	942	5,820	6 18	0 2				
STEAM RAILWAYS, TELEPHONES AND TELEGRAPHS.								
Total	521,572	764,398	1 47	89 1	549,560	830,793	1 51	99 3
Cedar.....	422,588	595,880	1 41	81 0	311,210	462,964	1 36	62 1
Western Cedar	57,597	112,234	1 95	11 0	122,925	278,816	2 27	23 4
Balsam Fir.....					38,000	30,400	0 80	6 9
Tamarack.....	28,213	49,394	1 43	5 4	36,158	46,822	1 29	6 6
Spruce.....	8,577	8,730	1 02	1 6	8,567	7,869	0 92	1 6
Jack Pine.....	3,318	2,986	0 90	0 3	1,790	2,710	1 51	0 3
Douglas Fir.....					612	995	1 63	0 1
Chestnut.....					228	147	0 64	*
Hemlock.....	555	936	1 69	0 1	40	40	1 00	*
Red Pine.....	156	2,054	13 17	*				
White Pine.....	68	728	10 71	*				
Unspecified.....	509	156	0 91	0 1				

*Less than one tenth of one per cent.

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TABLE 1—Continued.
ELECTRIC RAILWAYS, POWER AND LIGHT

Kind of Wood.	1911.				1912.			
	Number.	Value.	Av. Value	Per Cent.	Number.	Value.	Av. Value	Per Cent.
Total	64,131	291,879	4 55	10.9	58,996	282,731	4.79	9.7
Cedar	40,646	150,974	3.71	63.4	37,129	150,615	4.06	62.9
Western Cedar	14,757	104,210	7.06	23.0	21,297	129,626	6.09	36.1
Spruce	187	253	1.35	0.3	560	2,465	4.40	0.9
Hemlock					10	25	2.50	*
Douglas Fir	7,906	29,994	3.79	12.3				
Chestnut	150	788	5.25	0.2				
Yellow Pine	30	280	9.33	.				
Tamarack	13	16	1.23	.				
Unspecified	442	5,364	12.14	0.7				

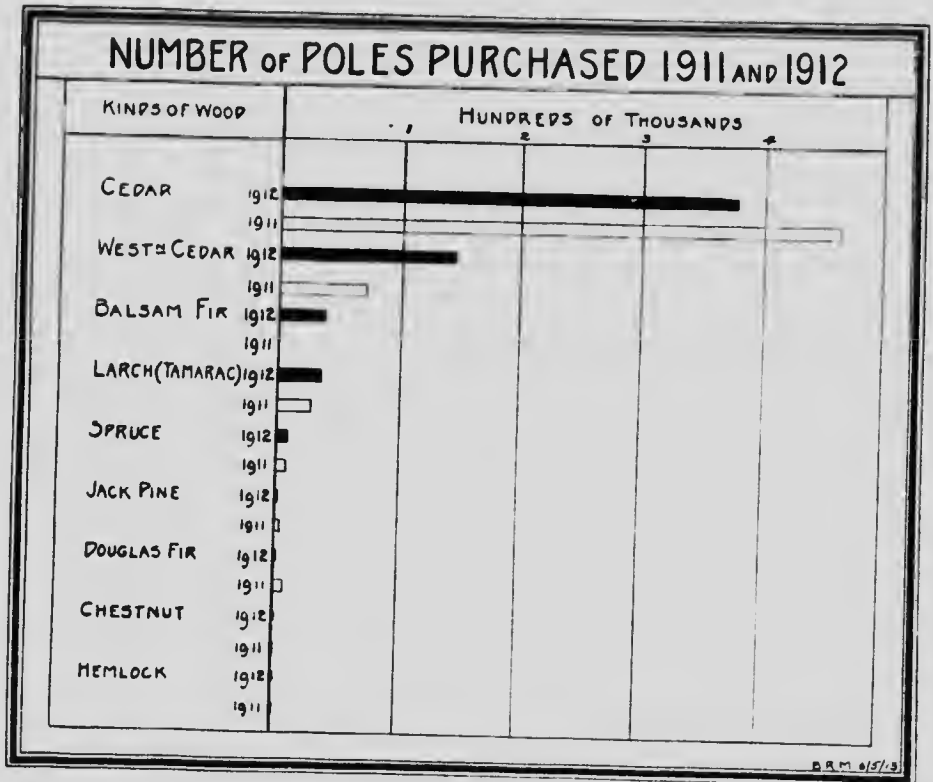
*Less than one tenth of one per cent.

There were 608,556 wooden poles reported as having been purchased in Canada in 1912. This number is an actual increase of 22,853 poles, or 3.9 per cent increase over the figures for 1911. While this increase is slight, it follows a decided decrease from 1910 to 1911. The average pole has a life of at least ten years, and the demand for poles is, therefore, more or less intermittent, depending on the building of new pole-lines.

Altogether nine kinds of wood were reported for poles in 1912, with Eastern cedar heading the list as in past years. Cedar has been, and probably will be for some time, the most popular wood for telegraph, telephone, and other pole-lines, although the purchases in 1912 show a decrease. Wood for this purpose need not be especially strong or hard, as there is little or no mechanical strain to be endured. Durability in contact with the soil, lightness and a slender tapering form are most essential, and cedar seems to fit those requirements better than any other native wood used in an untreated state.

The use of the British Columbia species of cedar (*Thuja plicata*) has increased in the last few years with the decrease in the supply of poles of the Eastern species in the greater length-classes. While these poles are not so strong or so durable as those of Eastern cedar, they can be obtained in greater lengths, and the source of supply is more easily accessible. The two species of cedar together formed over 85 per cent of the total.

Balsam fir was reported for the first time in 1912. This wood is being used more and more each year for all purposes, especially in the Maritime Provinces where the supply of pine is beginning to fall below the demand. As far as form and lightness are concerned, this species should make excellent pole material if its lack of durability were made up for by some preservative treatment. Increases are to be noted in the use of Western cedar, tamarack, spruce, and chestnut, with balsam fir added to the list; and decreases in the use of Eastern cedar, jack pine, Douglas fir and hemlock. No poles were reported in 1912 of red, white or yellow pine.



The average prices given in the above tables are based on the cost at the point of purchase, and may or may not include transportation charges. Only in the case of those woods which are used in large quantities can the value given be taken to represent the relative value of the wood. The average value of poles in 1912 was \$1.83, an increase of only 3 cents over 1911. A slight increase was recorded in the case of Eastern cedar, and other increases to be noted are in the value of poles of spruce and jack pine. All other kinds of wood decreased in value and the balsam fir reported in 1912 was valued at an average price below the general average for 1911.

Steam railways and telephone and telegraph companies reported the purchase of 549,560 poles in 1912. This number is an increase of 5.4 per cent over the total for 1911 and is noticeable in the cases of Western cedar, tamarack and the newly added material, balsam fir. All other woods show a decrease in number, although Douglas fir and chestnut were added to the list of woods purchased by steam railways. The average value of \$1.51 per pole is an increase over that of 1911. The average values of poles purchased by this class of pole-line companies is always less than with the electric railway, power and light concerns, as the steam railway and telephone companies are usually closer to the source of supply and purchase their poles in greater quantities. They also use more poles of the shorter length-classes. These companies used all the poles purchased of balsam fir, tamarack, jack pine, Douglas fir and chestnut. They purchased 90.3 per cent of all the poles used.

The electric railway, power and light companies purchased a total of 58,996 poles, 9.7 per cent of all the poles purchased in 1912. This number is a decrease of 5,135 or of over eight per cent from the total in 1911. These

companies used only four kinds of wood, namely, cedar (Eastern and Western), spruce and hemlock. Hemlock was not reported in 1911 by these companies and poles of Douglas fir, chestnut, yellow pine and tamarack reported in that year were dropped from the list in 1912. The electric companies as a rule purchase the best class of poles of the greatest length and seldom obtain their supply locally. These facts are probably responsible for the high values in the above table. The average value per pole of \$4.79 is an increase of 24 cents over 1911.

Table 2 gives the details of the poles purchased by all classes of pole-line companies, separated according to length classes.

TABLE 2.

POLES PURCHASED, 1912, BY LENGTH-CLASSES AND KINDS OF WOOD: Number, Total Value, Average Value and Per Cent Distribution.

Kind of Wood.	TOTAL—ALL LENGTH CLASSES.				20-25 FEET (66.1 PER CENT).			
	Number.	Value.	Av. Value	Per Cent.	Number	Value	Av. Value	Per Cent.
Total	608,556	1,113,524	1.83	100.0	402,407	436,583	1.08	100.0
Cedar.....	378,369	613,580	1.62	62.2	263,440	255,508	0.97	65.5
Western Cedar.....	144,222	408,472	2.85	23.7	60,785	102,638	1.69	15.1
Balsam Fir.....	38,000	30,400	0.80	6.2	38,000	30,400	0.80	9.4
Tamarack.....	36,158	46,822	1.29	5.9	32,160	41,257	1.28	8.0
Spruce.....	9,127	10,334	1.13	1.5	7,148	5,607	0.78	1.8
Jack Pine.....	1,790	2,710	1.51	0.3	.....	.....	.....	.....
Douglas Fir.....	612	994	1.62	0.1	612	994	1.62	0.2
Chestnut.....	228	147	0.64	*	222	129	0.58	*
Hemlock.....	50	65	1.30	*	40	40	1.00	*
Total.....	128,228	310,663	2.42	100.0	47,559	190,634	4.01	100.0
Cedar.....	70,087	165,892	2.37	54.7	27,893	100,143	3.59	58.6
Western Cedar.....	50,594	132,168	2.61	39.5	19,439	90,082	4.63	40.9
Balsam Fir.....	3,771	5,147	1.36	2.9	227	409	1.80	0.5
Tamarack.....	1,976	4,721	2.39	1.5	.....	.....	.....	.....
Spruce.....	1,790	2,710	1.51	1.4	.....	.....	.....	.....
Jack Pine.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas Fir.....	.....	.....	.....	.....	.....	.....	.....	.....
Chestnut.....	.....	.....	.....	.....	.....	.....	.....	.....
Hemlock.....	10	25	2.50	*	.....	.....	.....	.....
Total.....	20,937	112,648	5.38	100.0	9,425	62,996	6.68	100.0
Cedar.....	12,325	58,089	4.71	58.9	4,624	33,947	7.34	49.1
Western Cedar.....	8,612	54,559	6.34	41.1	4,792	29,025	6.06	50.8
Balsam Fir.....	.....	.....	.....	.....	.....	.....	.....	.....
Tamarack.....	.....	.....	.....	.....	.....	.....	.....	.....
Spruce.....	.....	.....	.....	.....	.....	.....	.....	.....
Jack Pine.....	.....	.....	.....	.....	3	6	2.00	*
Douglas Fir.....	.....	.....	.....	.....	.....	.....	.....	.....
Chestnut.....	.....	.....	.....	.....	.....	.....	.....	.....
Hemlock.....	.....	.....	.....	.....	6	18	3.00	*

* Less than one tenth of one per cent.

Of the total 608,556 poles, 66.1 per cent were from 20 to 25 feet in length and were valued at \$1.15. Over twenty per cent were in the 26-to-30-foot class, and were valued at an average of \$2.42. In the 31-to-35-foot class, 7.8 per cent of the poles were placed, and these were valued at \$4.01. The 36-to-40-foot poles formed 3.4 per cent of the total, at \$5.38, and the poles of 40 feet and over, at a value of \$6.68, made up the remaining 1.5 per cent.

Cedar poles formed the greater part of each length-class and made up practically all the poles in the greater length-classes (36 feet and over). Tamarack and spruce poles were also used in the greater length-classes and formed a large per cent of the poles between 26 and 35 feet. The jackpine poles were all in the 26-to-30-foot class and practically all the poles of Douglas fir, chestnut, and hemlock were less than 25 feet in length.

The spruce and chestnut poles in the greatest length-class (40 feet and over) were purchased for special purposes, and their low prices do not indicate their relative value.

Many of the pole-line companies use preservative treatments of different kinds to prevent decay and insect injury. These include impregnation of the butts of the poles with creosote, zinc chloride and other chemicals. In some cases the bark is left on that part of the pole which comes into contact with the soil, and this tends to increase the life with some kinds of wood. Painting the butts of the poles with hot tar or creosote will increase their life by several years. Many companies have found that the increased life which is secured by preservative treatment brings about a considerable saving in the annual cost of the upkeep of a pole-line. By thorough treatment with preservatives many non-durable woods, such as balsam fir, are being used satisfactorily where their use in an untreated state would not have been possible.

CROSS-TIES PURCHASED, 1912.

The statistics in this bulletin were based on reports received from 51 steam railways and 36 electric railways operating in Canada in 1912.

The total number of ties (21,308,571) was valued at \$9,373,869. Part of these were imported, but the bulk of the ties used on Canadian railways are cut in Canada. The imports of ties in 1912 were valued approximately at \$1,697,431, which would indicate that less than one fifth of the ties purchased in 1912 were imported.

Table 3 gives the number of ties purchased in 1911 and 1912, together with the total value, average value and per cent distribution.

TABLE 3.
CROSS-TIES PURCHASED, 1911 AND 1912, BY KINDS OF WOOD: Number, Value, Average Value per Tie and Per Cent Distribution.

Kind of Wood.	1911.				1912.			
	Number.	Value.	Av. Value	Per Cent.	Number	Value.	Av. Value	Per Cent.
		\$	\$ cts.			\$	\$ cts.	
Total.....	14,389,224	5,540,769	0 39	100-0	21,308,571	9,373,869	0 44	100-0
Jack Pine.....	5,457,586	2,230,321	0 41	37-9	7,783,034	3,417,238	0 44	36-5
Cedar.....	1,432,395	577,427	0 40	10-0	3,332,105	1,486,456	0 45	15-6
Douglas Fir.....	1,947,662	740,548	0 38	13-5	2,183,554	661,891	0 30	10-2
Hemlock.....	1,674,047	590,878	0 35	11-6	1,947,474	743,535	0 38	9-1
Tamarack.....	1,389,897	438,280	0 32	9-7	1,803,696	806,049	0 45	8-5
Western Larch.....	1,194,779	514,013	0 43	8-3	1,196,184	514,359	0 43	5-6
Onk.....	149,747	121,215	0 81	1-0	933,486	624,174	0 67	4-4
Eastern Spruce.....	901,629	232,969	0 26	6-3	835,121	330,854	0 40	3-9
Hard Pine.....	444	491	1 11	*	658,096	434,840	0 66	3-1
Chestnut.....	65,849	37,016	0 56	0-5	266,082	157,225	0 59	1-2
Beech.....	6,460	1,352	0 21	*	103,583	70,220	0 68	0-5
Western Cedar.....	59,072	25,057	0 42	0-4	82,357	29,109	0 35	0-4
Maple.....	13,891	2,908	0 21	0-1	51,465	39,681	0 77	0-2
White Pine.....	5,882	1,688	0 29	*	44,408	15,348	0 35	0-2
Birch.....	13,891	2,908	0 21	0-1	37,943	22,605	0 60	0-2
Red Pine.....	73,712	23,308	0 32	0-5	26,646	12,673	0 48	0-1
Balsam Fir.....					12,469	1,621	0 13	0-1
Western Spruce.....					8,000	4,640	0 58	*
Elm.....	225	95	0 43	*	2,868	1,351	0 47	*
Poplar.....	1,001	270	0 27	*				
Black Ash.....	58	25	0 43	*				

* Less than one tenth of one per cent.

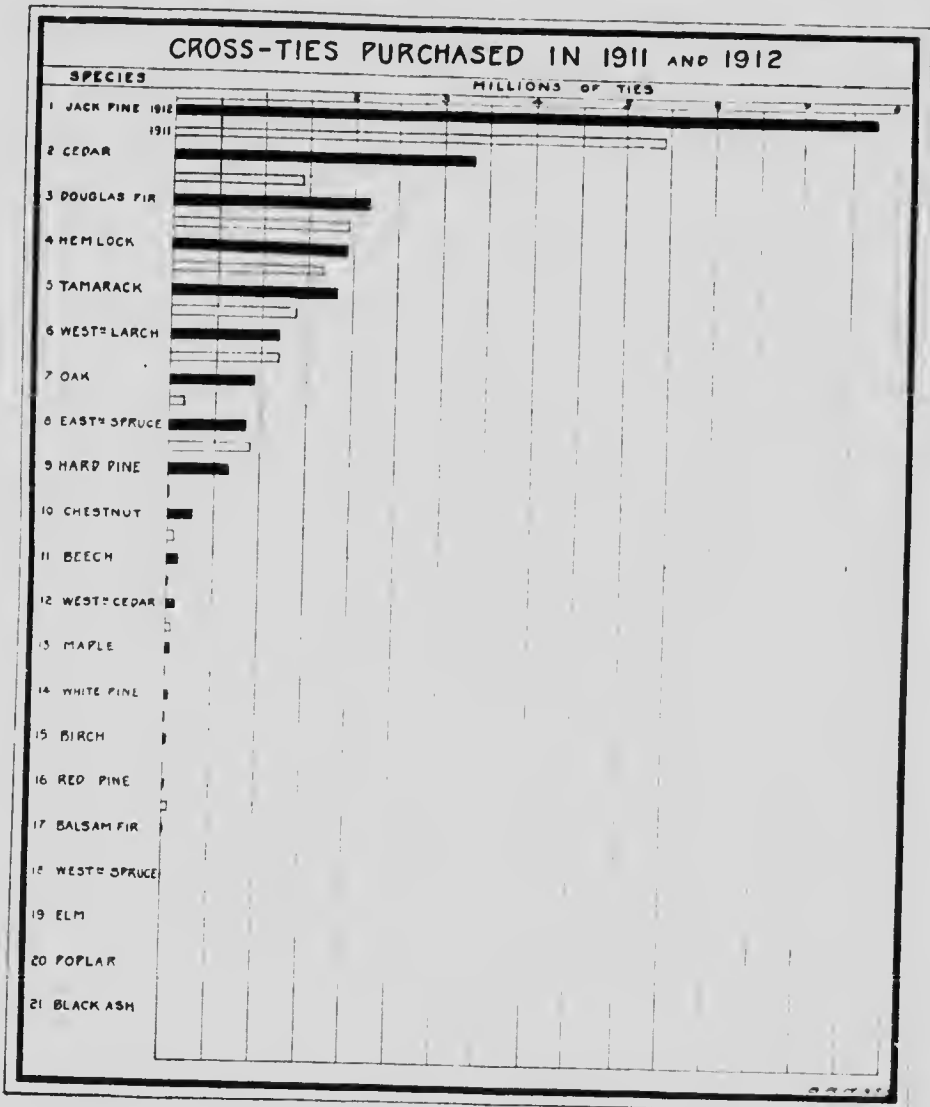
There was purchased in Canada in 1912 a total of 21,308,571 cross-ties; this was an increase in actual numbers of 6,919,347, or a 48.1 per cent increase over 1911. This increase took place on almost all the railways in Canada and was especially noticeable on transcontinental lines.

Nineteen different kinds of wood were used, with jack pine still leading. The use of each material increased from 1911 with the exception of Eastern spruce and red pine. Balsam fir and Western spruce were added to the list of woods used in 1911, and poplar and black ash were dropped.

The use of the cedar tie has varied greatly from year to year. In 1908, 1909 and 1910 cedar ties headed the list, although the numbers purchased showed decreases each year. In 1911 cedar ties formed only 10 per cent of the total and fell back to fourth place on the list. In 1912 the use of this

Material increased by some 1,898,710 ties, and this wood moved up to second place on the list, forming 15.6 per cent of the total.

Douglas fir has steadily increased in use since 1909, when data concerning its use were first obtained. Oak and the other five hardwoods—chestnut, beech, maple, birch and elm—have also increased remarkably. There seems to be a tendency on the part of the management of older-established steam railways to reduce the use of soft, light material for cross-ties, especially where fast trains and heavy rolling stock are used. Some of the Eastern roads have ceased to purchase cedar, pine, hemlock and tamarack ties and use only the hardwoods. The use of imported hard pine has increased with the hardwoods, and that wood was used in making 3.1 per cent of the ties purchased in 1912. Western larch formed 5.6 per cent of the total number, over a million ties of this wood having been purchased.



The average value of ties, at the point of purchase, increased from 39 to 44 cents in 1912. Increases are noted in the case of jack pine, cedar, hemlock, tamarack, Eastern spruce, chestnut, beech, maple, white pine, birch, red pine, and elm. The increases in the values of beech, maple and birch were probably due to the fact that ties of these three materials were treated chemically in considerable numbers to prevent decay, and their cost materially increased on this account. The decreases were in the values of Douglas fir, oak, hard pine and Western cedar. Western larch ties were purchased at the same price as in 1911.

The values in all cases, being based on the cost at the point of purchase, can never be considered to represent exactly the relative values of the different kinds of wood for cross-ties. So many variable factors enter into this cost that only in those cases where ties of a certain kind of wood are used in large numbers can the values given in the above table be said to indicate the intrinsic value of the material.

Table 4 gives the details of the ties purchased by steam railways in Canada in 1911 and 1912.

TABLE 4.

CROSS-TIES PURCHASED, 1911 AND 1912, BY STEAM RAILWAYS BY KINDS OF WOOD: Number, Total Value, Average Value and Per Cent Distribution.

Kind of Wood,	1911.				1912.			
	Number.	Value.	Av. Value	Per Cent.	Number	Value.	Av. Value	Per Cent.
		\$	¢	cts.		\$	¢	cts.
Total	13,799,982	5,368,330	0 39	100 0	20,825,209	9,131,675	0 44	100 0
Jack Pine	5,433,086	2,219,521	0 41	39 4	7,757,418	3,402,417	0 44	37 3
Cedar	1,266,510	508,776	0 40	9 2	3,172,629	1,398,774	0 44	15 2
Douglas Fir	1,624,392	675,787	0 41	11 8	2,026,624	593,859	0 29	9 7
Hemlock	1,658,504	585,181	0 35	12 0	1,894,711	720,109	0 38	9 1
Tamarack	1,366,346	433,962	0 32	9 9	1,772,151	756,853	0 44	8 5
Western Larch	1,194,779	514,013	0 43	8 7	1,196,184	514,359	0 43	5 7
Oak	144,763	118,172	0 82	1 0	930,561	621,783	0 67	4 5
Eastern Spruce	896,814	291,752	0 26	6 5	818,485	325,202	0 40	3 9
Hard Pine	444	491	1 11	*	653,896	431,900	0 66	3 1
Chestnut	64,549	36,416	0 56	0 5	266,082	157,225	0 59	1 3
Beech	6,460	1,352	0 21	*	103,583	70,220	0 68	0 5
Western Cedar	59,072	25,957	0 12	0 4	57,357	16,234	0 28	0 3
Maple	13,891	2,908	0 21	0 1	41,227	14,965	0 34	0 2
White Pine	3,488	716	0 21	*	37,943	22,605	0 60	0 2
Birch	13,891	2,908	0 21	0 1	26,646	12,673	0 48	0 1
Red Pine	51,712	12,928	0 25	0 4	12,469	1,421	0 13	0 1
Balsam Fir					2,778	1,195	0 43	*
Elm	222	95	0 43	*				
Poplar	1,001	270	0 27	*				
Black Ash	58	25	0 43	*				

*Less than one-tenth of one per cent.

Steam railways in 1912 reported the purchase of 20,825,209 ties, this number forming 97.7 per cent of the total for all Canada. The relative importance of each kind of wood and the average values in each case were approximately the same as those given in Table 1, owing to the large proportion of the total used by these companies. The total is an increase of 7,025,227 ties or an increase of 50.9 per cent over 1911.

Steam railways paid an average price of 44 cents for their ties as compared to 50 cents paid by the electric lines. The steam railways paid less for every kind of wood used by both classes, with the exception of Eastern spruce. These companies are usually closer to the source of supply, buy in greater quantities, and have better facilities for transporting their tie material than the electric roads. The steam railways used all the ties purchased in Canada in 1912 of the following kinds of wood:—Western larch, chestnut, beech, maple, birch, red pine and balsam fir.

It is interesting to note the increased use of hardwoods by steam railway companies. In 1911, woods such as oak, chestnut, beech, maple, birch, elm and black ash together formed only 1.8 per cent of the ties purchased. In 1912 this percentage increased to 6.7 per cent through increased purchases of 1,148,578 hardwood ties.

Table 5 gives the details of the purchases of tie material by the electric railways of Canada in 1911 and 1912.

TABLE 5.

CROSS-TIES PURCHASED, 1911 AND 1912, BY ELECTRIC RAILWAYS BY KINDS OF WOOD: Number, Total Value, Average Value and Per Cent Distribution.

Kind of Wood.	1911.				1912.			
	Number.	Value.	Av. Value	Per Cent	Number.	Value	Av. Value	Per Cent.
Total	586,242	172,439	0 29	100 0	483,362	242,195	0 50	100 0
Cedar	166,885	68,651	0 41	28 3	159,475	87,681	0 55	33 0
Douglas Fir	623,270	66,761	0 11	54 9	156,930	68,032	0 43	32 5
Hemlock	15,543	5,697	0 37	2 6	52,763	23,426	0 44	10 9
Tamarack	23,551	4,318	0 18	1 0	31,545	19,196	0 61	6 5
Jack Pine	21,500	10,800	0 51	4 2	25,616	14,821	0 58	5 3
Western Cedar					25,000	12,875	0 51	5 2
Eastern Spruce	4,815	1,217	0 25	0 8	16,636	5,652	0 34	3 4
Western Spruce					8,000	4,610	0 58	1 7
Hard Pine					4,200	2,910	0 70	0 9
Oak	4,984	3,013	0 61	0 8	2,925	2,391	0 82	0 6
White Pine	2,394	972	0 41	0 4	181	381	2 12	*
Elm					90	157	1 74	*
Red Pine	22,000	10,380	0 47	3 7				
Chestnut	1,300	600	0 46	0 2				

*Less than one tenth of one per cent.

Electric railways in Canada reported having purchased 483,362 cross-ties in 1912. This is a decrease of 18 per cent from 1911, and, where the purchases of these railways in 1911 amounted to over four per cent of the total, they formed less than three per cent in 1912. As stated previously, the values of ties of every kind of wood used by both classes of roads were greater in the case of steam railways, with the single exception of Eastern spruce.

The greater part of the material used by these companies was of the softer, lighter woods. Coniferous woods formed together 99.4 per cent of the total. The only hardwoods used were oak and elm and these together formed only

0.6 per cent of the total. Imported hard pine, however, is used to a slight extent, and this material is in reality, much harder than many of the native so-called hardwoods.

Decreases in the number of ties purchased by electric railways are noticeable in the case of cedar, Douglas fir, oak and white pine, and these woods together form the bulk of the material used. Increases are seen in the use of hemlock, tamarack, jack pine and Eastern spruce.

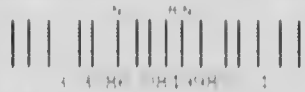
Ties of Western cedar, Western spruce, hard pine and elm were reported for the first time in 1912. The use of red pine and chestnut was not reported by electric roads in 1911. These companies used all the Western spruce ties reported in 1912.

PRESERVATIVE TREATMENT.

Many Canadian railway companies are now beginning to realize the value of preserving at least a part of their tie material from decay and insect injury. The practice of chemical treatment of railway ties has been carried on by railways in the United States for some years with apparently satisfactory results.

The practice in Canada is just beginning, but is increasing rapidly with the increasing cost of tie material and the constantly decreasing supply. In 1910 practically no treated ties were used by Canadian railways. In 1911 some 206,209 ties received chemical treatment before being placed in the roadbed. This number, while forming only 1.4 per cent of the total number of ties used, was, nevertheless, an indication of the increase in this particular form of conservation. In 1912 a total of 1,818,189 ties were chemically treated. This number forms 8.5 per cent of the total number of ties purchased. Steam railways used 1,798,189 of these treated ties and electric roads used 20,000.

The treated ties were mostly hardwoods, as it has been found more economical to treat the heavier, stronger woods than those which are liable to fail from mechanical wear before they have time to decay. The greatest actual saving by preservative treatment is found in the use of the so-called 'inferior woods,' provided that these are properly protected from mechanical wear. Until the price of the durable woods becomes excessive the railway companies will not resort to expensive treatment of inferior woods on account of this cost of protecting them from mechanical wear.



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