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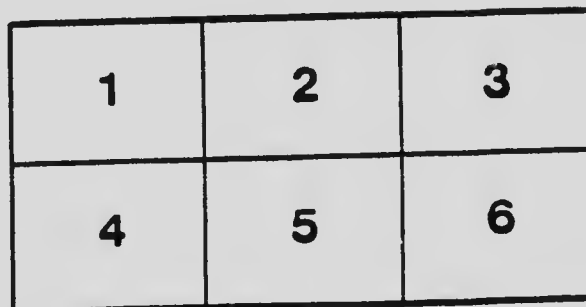
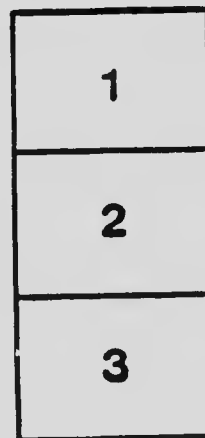
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DEPARTMENT OF THE INTERIOR, CANADA

Hon. ROBERT ROGERS, Minister; W. W. COXY, C.M.G., Deputy Minister.

FORESTRY BRANCH— BULLETIN No. 31.

R. H. CAMPBELL, Director of Forestry.

# FOREST PRODUCTS OF CANADA

1911

## TIGHT AND SLACK COOPERAGE

COMPILED BY

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

ASSISTED BY W. GUY H. BOYCE

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OTTAWA  
GOVERNMENT PRINTING BUREAU  
1912

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LETTER OF TRANSMITTAL.

FORESTRY BRANCH, DEPARTMENT OF THE INTERIOR.

OTTAWA, July 1, 1912.

Sir,—I beg to transmit herewith a report on 'Wood Used for Cooperage' throughout the Dominion for the calendar year 1911, and to recommend its publication as Bulletin No. 31 of this Branch.

The report contains a general summary of the quantity and value of the wood used for both slack and tight cooperage during the year and the quantity used for each of the two kinds of cooperage according to species. The quantities and values of the slack cooperage stock used is also given separately for the different provinces, and a separate table shows the value of one item of the industry, viz., the manufacture of nail kegs.

I have the honour to be, sir,

Your obedient servant,

R. H. CAMPBELL,

*Director of Forestry.*

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





## TIGHT AND SLACK COOPERAGE, 1911.

A total of 234 firms reported the manufacture of cooperage work during 1911. These firms were distributed among five provinces, as follows: Nova Scotia, 134; Ontario, 82; Quebec, 8; New Brunswick, 7; British Columbia, 3. While reports were received from only sixteen firms in Nova Scotia for 1910, the increase of 118 firms for 1911 does not necessarily indicate a proportionate increase in manufacture. In Nova Scotia, the industry is carried on by a few large factories and a large number of small portable cooperages. The portable mills move from place to place, locating near the source of supply and sometimes close down temporarily when the demand is small. Farmers, orchardists and some fishermen manufacture barrels by hand for their own use and their surplus in this direction depends upon the size of the potato and apple crops and the sea catch. It is evident that statistics from this source are difficult to obtain and very irregular from year to year.

### EXPORTS AND IMPORTS.

The export of empty barrels and manufactured cooperage from Canada varies with the amount left on the different manufacturers' hands after their season's product has been shipped, and changes from year to year. According to figures furnished by the Department of Customs, exports of staves, heading and barrels in 1910 amounted to \$115,000, while for the year ending March 31, 1912, the amount was \$135,000, an increase of seventeen per cent. The figures for exports and imports were as follows:—

<i>Imports—</i>	
108,579 empty barrels, worth, . . . . .	\$114,510
7,250 oak staves, worth, . . . . .	245,482
Total, . . . . .	\$329,992
<i>Exports—</i>	
46,561 empty barrels, worth, . . . . .	\$49,663
Staves and heading, worth, . . . . .	85,800
Total, . . . . .	\$135,463
Excess of imports over exports, . . . . .	\$194,529

### SLACK COOPERAGE.

Slack cooperage includes barrels for the shipping of dry products, such as lice, potatoes, apples, dry fish, flour, cereals and all products which do not require a water-tight container. As most Canadian products are of this nature, and as Canadian woods are best suited for slack cooperage, this industry is much more important than tight cooperage in Canada. The quantities of wood used for the manufacture of new kegs are not included in the general tables for Canada or the tables for the different provinces.

TABLE 1.  
SLACK COOPERAGE STOCK, 1911, BY SPECIES.—Total Quantity, Total Value and Average Value of Staves, Heading and Hoops Manufactured in Canada

SPECIES.	STAVES.			HEADING.			HOOPS.				
	Quantity.	Value.		Quantity.	Value.		Quantity.	Value.			
		Total.	Av.		Total.	Av.		Total.	Av.		
	M.	Pcs.	\$	¢	M.	Pcs.	\$	¢	M.	Pcs.	\$
Total	102,787	710,717	6.91	8,808	482,370	54.77	35,779	272,615	7.62		
Elm	51,727	393,065	7.60	1,153	59,104	51.26	27,136	216,796	7.99		
Spruce	30,999	175,315	5.66	2,280	120,915	53.04	4,425	29,917	6.76		
Poplar	6,955	53,600	7.71	310	18,970	61.19	162	1,222	7.54		
Balsam Fir	3,471	19,003	5.47	97	5,092	52.49	50	247	4.94		
Beech	1,975	14,019	7.10	586	33,338	56.89	325	1,907	5.87		
Birch	1,848	12,984	6.54	221	14,836	67.13	.....	.....	.....		
Ash	1,225	8,937	7.30	45	2,748	61.06	.....	.....	.....		
Basswood	1,071	7,653	7.15	20	1,000	50.00	3,340	20,024	6.00		
Cottonwood	1,017	6,258	6.15	2,905	164,803	56.73	155	1,230	7.94		
Pine	1,000	11,000	11.00	.....	.....	.....	32	352	11.00		
Gum	720	4,757	6.53	.....	.....	.....	.....	.....	.....		
Hemlock	200	1,576	7.85	131	7,324	55.91	.....	.....	.....		
Cedar	50	250	5.00	.....	.....	.....	.....	.....	.....		
Douglas Fir	25	500	20.00	.....	.....	.....	.....	.....	.....		
Unspecified	495	2,700	5.45	2	360	180.00	154	920	5.97		
				1,058	53,880	50.95	.....	.....	.....		

During 1911 Canadian cooperages reported the manufacture of over one hundred and two million slack-barrel staves, a decrease of over two million from 1910, and a decrease in the average price per thousand from \$7.03 to \$6.91.

Of the fifteen kinds of wood reported, elm was still the most important, and elm staves formed over 50 per cent of the total. Elm and spruce together made up over 80 per cent, as they have done in the past three years, but spruce is becoming more important each year. There were over eleven million more spruce staves reported for 1911 and over nine million fewer elm staves. Elm is becoming scarce, although, for cooperage, its price has not increased, and in time it will probably be used exclusively for hoops. Spruce is still fairly cheap and abundant. The other woods on the list change in quantity and shift in place from year to year. This is probably due, not so much to a general increase in the popularity of any particular wood, but rather to the movements of small portable mills which use whatever material is available.

There was an increase in the average price per thousand of staves in all the different woods reported, with the exception of elm, spruce, hemlock, basswood and cedar. Spruce remained at practically the same average price as it was in 1910. Most of the factories confine their production to one particular class of stock, although many make heading from material left over from stave manufacture.

Basswood is the favourite material for heading when it can be obtained, and formed a third of the total amount of heading manufactured in 1911, at an average price of \$56.73 per thousand sets. Elm, spruce and basswood together formed 72 per cent of the total. All the kinds of wood reported for heading increased consider-

ably in price with the exception of elm, which remained practically the same as in 1910.

Hoops were made from eight kinds of wood. No hemlock hoops were reported for 1911. Elm, on account of its toughness and elasticity and comparative cheapness, is evidently the best material for hoops, and formed over 75 per cent of the total. Spruce came next with only 12 per cent, and birch third with 9 per cent. Birch was used for one million hoops in 1910 and increased to three million in 1911. Other woods are not used in any quantity.

The decrease in the total number of hoops made (from 38,244 in 1910, to 35,779 in 1911) is due partly to the substitution of wire hoops which are used in conjunction with patent wooden hoops. The use of wooden hoops on the bilge of a slack barrel is imperative, as they prevent the collapse of the barrel when stored on its side.

All materials but spruce, poplar and basswood, show a decrease in price, birch falling from \$9.05 to \$6. In time, birch will probably replace elm as a hoop material, as its toughness, elasticity and comparative abundance fit it for this purpose, while elm is becoming scarce.

TABLE 2.

SLACK COOPERAGE STOCK, 1911, BY PROVINCES—Total Quantity, Total Value and Average Value.

PROVINCE.	STAVES.			HEADING.			HOOPS.								
	Value.			Value.			Value.								
	Quantity.			Quantity.			Quantity.								
	Total.	Av.		Total.	Av.		Total.	Av.							
	M.	Pes.	\$	\$	c.	M.	Sets.	\$	\$	c.	M.	Pes.	\$	\$	c.
Total.....	102,787	710,717	6 91	8,808	482,370	54 77	35,779	272,615	7 62						
Ontario.....	66,409	590,609	7 54	6,146	340,362	55 38	27,377	220,457	8 05						
Nova Scotia.....	30,025	175,328	5 84	2,152	117,378	54 55	6,840	42,752	6 25						
New Brunswick.....	5,168	21,930	4 24	438	16,370	37 37	1,433	8,191	5 72						
British Columbia.....	1,000	11,000	11 00	62	7,560	121 94									
Quebec.....	185	1,830	10 00	10	700	70 00	129	1,215	9 42						

In stave manufacture, Ontario leads with over 66,000,000, or 64 per cent of the total number of staves made in Canada, at an average price of \$7.51 per thousand sets. Nova Scotia, in spite of the large number of firms reporting, made only 29 per cent of the staves at \$5.84, New Brunswick made 5 per cent at \$4.24, many of these being nail-keg staves. British Columbia and Quebec made less than 1 per cent each.

In heading, the relative importance of the provinces, as to quantity, was practically the same, viz., Ontario, 70 per cent; Nova Scotia, 24 per cent; New Brunswick, 5 per cent; British Columbia and Quebec less than 1 per cent each. New Brunswick made the cheapest heading at \$37.37 per thousand sets, and British Columbia the most expensive at \$121.94.

In hoops, Ontario supplied 76 per cent at \$7.61; New Brunswick made the cheapest hoops at \$5.72, and Quebec the most expensive at \$9.42. No hoops were reported from British Columbia.

Tables 3, 4, 5, 6 and 7 show the relative importance of different woods in five different provinces, namely, Ontario, Nova Scotia, New Brunswick, British Columbia and Quebec.

TABLE 3.  
SLACK COOPERAGE STOCK, 1911, BY SPECIES—Province of Ontario.

SPECIES.	STAVES.			HEADING.			HOOPS.		
	Quantity.	Value.		Quantity.	Value.		Quantity.	Value.	
		Total.	Av.		Total.	Av.		Total.	Av.
	M Pes.	\$	\$ c.	M Sets.	\$	\$ c.	M Pes.	\$	\$ c.
Total.....	66,409	500,609	7 54	6,146	340,362	55 38	27,377	220,457	8 05
Elm.....	51,417	390,590	7 60	1,131	57,864	51 16	.....	.....	.....
Poplar.....	6,281	50,012	7 96	292	17,947	61 46	26,380	211,455	8 02
Maple.....	1,925	13,639	7 09	576	32,838	57 00	.....	.....	.....
Spruce.....	1,599	11,018	6 89	32	1,920	60 00	.....	.....	.....
Beech.....	1,354	9,109	6 73	214	14,426	67 41	965	8,650	8 96
Ash.....	1,071	7,653	7 15	20	1,000	50 00	.....	.....	.....
Basswood.....	1,017	6,258	6 15	2,895	164,103	56 69	.....	.....	.....
Birch.....	890	5,826	6 54	76	4,564	60 05	32	352	11 00
Pine.....	590	3,500	7 00	.....	.....	.....	.....	.....	.....
Gum.....	200	1,570	7 85	.....	.....	.....	.....	.....	.....
Balsam Fir.....	80	500	7 00	.....	.....	.....	.....	.....	.....
Cedar.....	25	500	20 00	.....	.....	.....	.....	.....	.....
Unspecified.....	50	380	7 60	910	45,700	50 22	.....	.....	.....

In Ontario, elm and poplar formed 86 per cent of the staves manufactured, while spruce and balsam fir formed only 2 per cent. Cedar staves were the most expensive at \$20, and basswood the cheapest at \$6.15.

Basswood heading formed 47 per cent of Ontario's production at \$56.69 per thousand, basswood and elm being the only woods used in large quantities. Elm hoops formed 96 per cent of the total at an average price of \$8.01 per thousand. Only elm, spruce and basswood were reported for hoop manufacture.

TABLE 4.  
SLACK COOPERAGE STOCK, 1911, BY SPECIES—Province of Nova Scotia.

SPECIES.	STAVES.			HEADING.			HOOPS.		
	Quan- tity.	Value.		Quan- tity.	Value.		Quan- tity.	Value.	
		Total.	Aver- age.		Total.	Aver- age.		Total.	Aver- age.
	M Pcs.	\$	\$ cts.	M Sets.	\$	\$ cts.	M Pcs.	\$	\$ cts.
Total .....	30,025	175,328	5 84	2,152	117,378	54 55	6,840	42,752	6 25
Spruce .....	24,232	142,367	5 88	1,765	96,045	54 42	3,460	21,267	6 15
Balsam Fir .....	3,391	18,443	5 44	82	4,472	54 54	50	247	4 94
Poplar .....	674	3,594	5 33	18	1,023	56 83	162	1,222	7 54
Beech .....	494	2,975	6 02	7	410	58 57			
Birch .....	335	3,117	9 30	45	2,748	61 07	2,537	15,783	6 17
Pine .....	229	1,257	5 49	53	2,790	50 18			
Elm .....	125	625	5 00	22	1,240	56 36	127	1,376	10 83
Maple .....	50	380	7 60	10	500	50 00	325	1,907	5 87
Hemlock .....	50	250	5 00						
Ash .....							5	30	6 00
Unspecified .....	445	2,320	5 21	148	8,180	53 27	154	920	5 97

In Nova Scotia, as compared to Ontario, spruce and balsam fir formed 92 per cent of the staves, while elm and poplar, which are the leading species in Ontario, formed only 3 per cent. Birch staves were the most expensive at \$9.30 per thousand; elm and hemlock were the cheapest at \$5.

Spruce heading at \$54.41 a thousand sets formed 82 per cent of the heading made in Nova Scotia. No other wood was used in any quantity.

Spruce and birch hoops formed together nearly 90 per cent. Birch hoops were valued at \$6.17 a thousand.

TABLE 5.  
SLACK COOPERAGE STOCK, 1911, BY SPECIES—Province of New Brunswick.

SPECIES.	STAVES.			HEADING.			HOOPS.		
	Quantity.	Value.		Quantity.	Value.		Quantity.	Value.	
		Total.	Av.		Total.	Av.		Total.	Av.
	M Pcs.	\$	\$ c.	M Pcs.	\$	\$ c.	M Pcs.	\$	\$ c.
Total .....	5,168	21,930	4 24	438	16,370	37 37	1,433	8,191	5 72
Spruce .....	5,168	21,930	4 24	423	15,750	37 23			
Balsam Fir .....				15	620	41 33			
Birch .....							783	4,241	5 42
Elm .....							500	2,750	5 50
Ash .....							150	1,200	8 00

Only spruce staves were made in New Brunswick in 1911. Spruce and balsam fir were used exclusively for heading, and birch and elm formed about 90 per cent of the hoops reported.

TABLE 6.  
SLACK COOPERAGE STOCK, 1911, BY SPECIES—Province of British Columbia.

SPECIES.	STAVES.			HEADING.			HOOPS.		
	Quantity.	Value.		Quantity.	Value.		Quantity.	Value.	
		Total.	Ave.		Total.	Ave.		Total.	Ave.
	M Pes.	\$	\$ c.	M Sets.	\$	\$ c.	M Pes.	\$	\$ c.
Total.....	1,000	11,000	11 00	62	7,560	121 94			
Cottonwood.....	1,000	11,000	11 00						
Spruce.....				60	7,200	120 00			
Douglas Fir.....				2	360	180 00			

British Columbia imports most of her cooperage, either in the form of manufactured stock or assembled barrels, and the few figures contained in the above table indicate merely the small extent of the industry. The prices cannot be compared with those of other provinces as the amounts are so small.

TABLE 7.  
SLACK COOPERAGE STOCK, 1911, BY SPECIES—Province of Quebec.

SPECIES.	STAVES.			HEADING.			HOOPS.		
	Quantity.	Value.		Quantity.	Value.		Quantity.	Value.	
		Total.	Average.		Total.	Average.		Total.	Average.
	M Pes.	\$	\$ cts.	M Sets.	\$	\$ cts.	M Pes.	\$	\$ cts.
Total.....	185	1,850	10 00	10	700	70 00	129	1,215	9 42
Elm.....	185	1,850	10 00				129	1,215	9 42
Basswood.....				10	700	70 00			

The prices given above for Quebec are all above the average for the whole of Canada and serve to show how little the industry has developed in the province.

TABLE 8.  
NAIL KEGS.

SPECIES.	STAVES.				HEADING.				HOOPS.			
	Quantity.		Value.		Quantity.		Value.		Quantity.		Value.	
	M.	Per.	\$	\$ c.	M.	Sets.	\$	\$ c.	M.	Per.	\$	\$ c.
Total	13,883		39,777	2 87	577		16,317	28 28	989		4,935	4 99
Spruce	7,663		19,589	2 56	250		6,218	24 87				
Poplar	1,484		4,911	3 31	45		1,350	30 00				
Beech	1,286		4,036	3 14	40		1,200	30 23				
Balsam Fir	948		3,087	3 26	50		1,580	33 60				
Elm	790		2,422	3 46	20		700	35 00	989		4,935	4 99
Maple	673		2,181	3 24	40		1,200	30 00				
Ash	586		1,840	3 14	80		2,400	30 00				
Birch	541		1,705	3 15	1		30	30 00				
Basswood	2		6	3 00	51		1,530	30 00				

For the manufacture of nail-keg staves, nine kinds of wood were used, spruce leading with 55 per cent. Spruce, poplar and beech together formed 75 per cent of the total. Poplar was the most expensive, and basswood the cheapest wood reported.

For heading, spruce was most commonly used and made 43 per cent of the total. All the woods used for staves were also used for heading. Elm was the only wood used for nail-keg hoops, and nearly a million hoops were made of this material in 1911 at an average price of \$4.99.

To obtain an estimate of the amount of raw material consumed in Canada by the slack-cooperage industry the following "experience figures" were used:—

1,000 feet of logs produce 3,500 staves.

1 double cord of heading bolts (8 ft. x 4 ft. x 40 in.) produces 180 sets of heading.

1000 feet of logs produce 4,200 hoops.

This would indicate that 29,367,714 feet of logs were used for staves in 1911, 24,466,666 feet for heading and 8,518,810 feet for hoops, making a total of 62,353,190 feet, board measure, of logs.

This rough estimate does not represent accurately the amount of raw material consumed in the industry. In making staves, for instance, short pieces are left over and are utilized by many of the factories in making heading. Some cooperages utilize smaller waste in other ways or sell it to other wood-using establishments. A successful effort has been made in the United States to utilize mill-waste for cooperage. It has been proved in many instances that a combination saw-mill and cooperage will effect a closer utilization of wood and result in a considerable saving to the manufacturer. To what extent this practice would apply to Canadian conditions is still to be proved.

#### SOURCES OF LOSS AND WASTE.

1. Allowing logs to dry and check in the woods results in a loss of about 4 per cent on the average, due to warping, checking and staining.

<sup>1</sup>The Forestry Branch invites criticism of these figures for the purpose of obtaining a fair average for the whole of Canada.



2. Cutting logs into bolts two or more inches longer than the length of the staves requires. Estimated loss, 7 per cent.
  3. Improper bolting and conversion of bolts into staves.
  4. Seasoning the finished product.
- It is estimated that forty to fifty per cent of the raw material is lost during the process of manufacture. The three general remedies for loss and waste are:—  
 Increased care in the process of manufacture.  
 Introduction of more specialized machinery.  
 Closer utilization of waste material.

**TIGHT COOPERAGE.**

Tight cooperage includes the manufacture of water-tight barrels only. These are mostly used for containing liquids, such as whiskey, beer, wine, syrup, cider, vinegar and oil, but are also used for pork and fish packed in salt or brine. Great difficulty has been experienced in gathering accurate information of this industry, as separated from slack cooperage. Many manufacturers make both classes of cooperage and do not separate the stock in their reports. Others buy manufactured stock or import staves and heading from the United States and merely assemble the barrels themselves.

The object of this bulletin is to show the quantity of raw material manufactured into cooperage stock and not the number of barrels assembled from imported stock. A misunderstanding of the terms 'tight' and 'slack' cooperage has also led to considerable confusion.

The supply of native white oak in Canada is now practically exhausted, and as white oak alone can be used to contain alcoholic liquids it is readily understood why this branch of the cooperage industry is decreasing in importance in Canada.

The manufacture of fish barrels in Nova Scotia from spruce, balsam fir and pine is a growing industry and is now carried on by a number of small plants in or near the fishing ports.

Table 9 shows the number of tight staves made in Canada in 1911 according to the kinds of wood and the classes of stock.

**TABLE 9.**  
**TIGHT-BARREL STAVES, 1911, BY CLASSES AND SPECIES OF WOOD.**

SPECIES.	Total.	Sawed.	Bucked and Split.	Hewed.
	M Pes.	N Pes.	M Pes.	M Pes.
Total.....	4,934	4,445	7	482
Oak.....	2,768	2,227	3	478
Spruce.....	966	965	1	.....
Elm.....	447	447	.....	.....
Ash.....	384	384	.....	.....
Balsam Fir.....	192	188	.....	.....
Basswood.....	150	150	3	1
Pine.....	24	24	.....	.....
Unspecified.....	3	.....	.....	3

A total of 4,934,090 tight-barrel staves was reported for 1911. Of these over 90 per cent were sawn, 9 per cent hewn, and less than 1 per cent bucked and split. Seven different kinds of wood were reported, oak heading with 53 per cent of the total. This oak was practically all imported from the United States in the log. Oak barrels are used for all the different classes of cooperage when they can be obtained. They are used exclusively for alcoholic beverages.

Spruce staves formed about 20 per cent of the total. Spruce barrels are used for containing syrup, vinegar, cider and fish.

Elm staves formed about 9 per cent of the total and were made into barrels for syrup and glucose.

Ash, with about 8 per cent of the total, was made into pork-barrel staves.

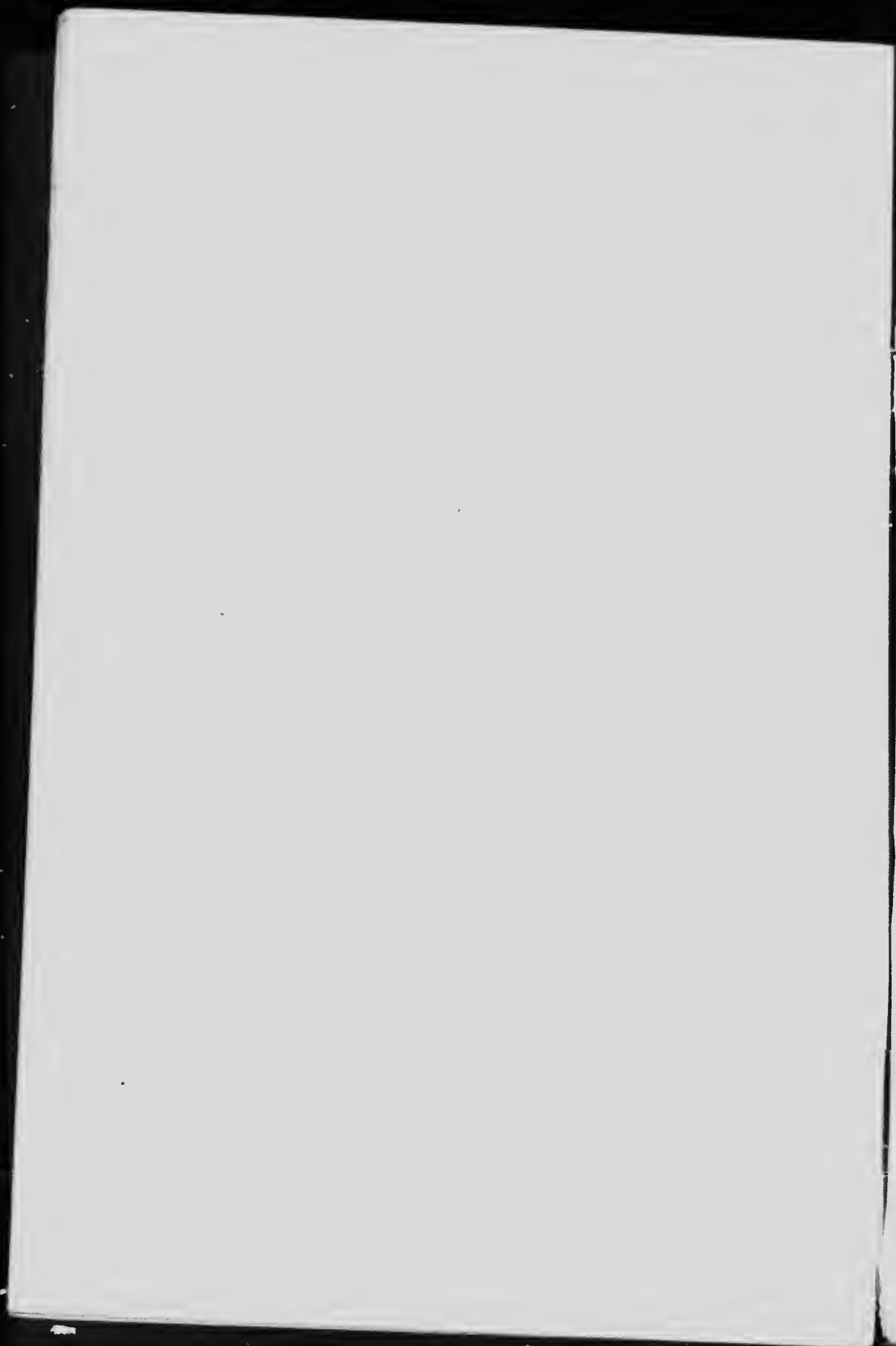
Balsam fir and pine were made into a poorer grade of fish barrels, and basswood was used with elm for syrup and glucose.

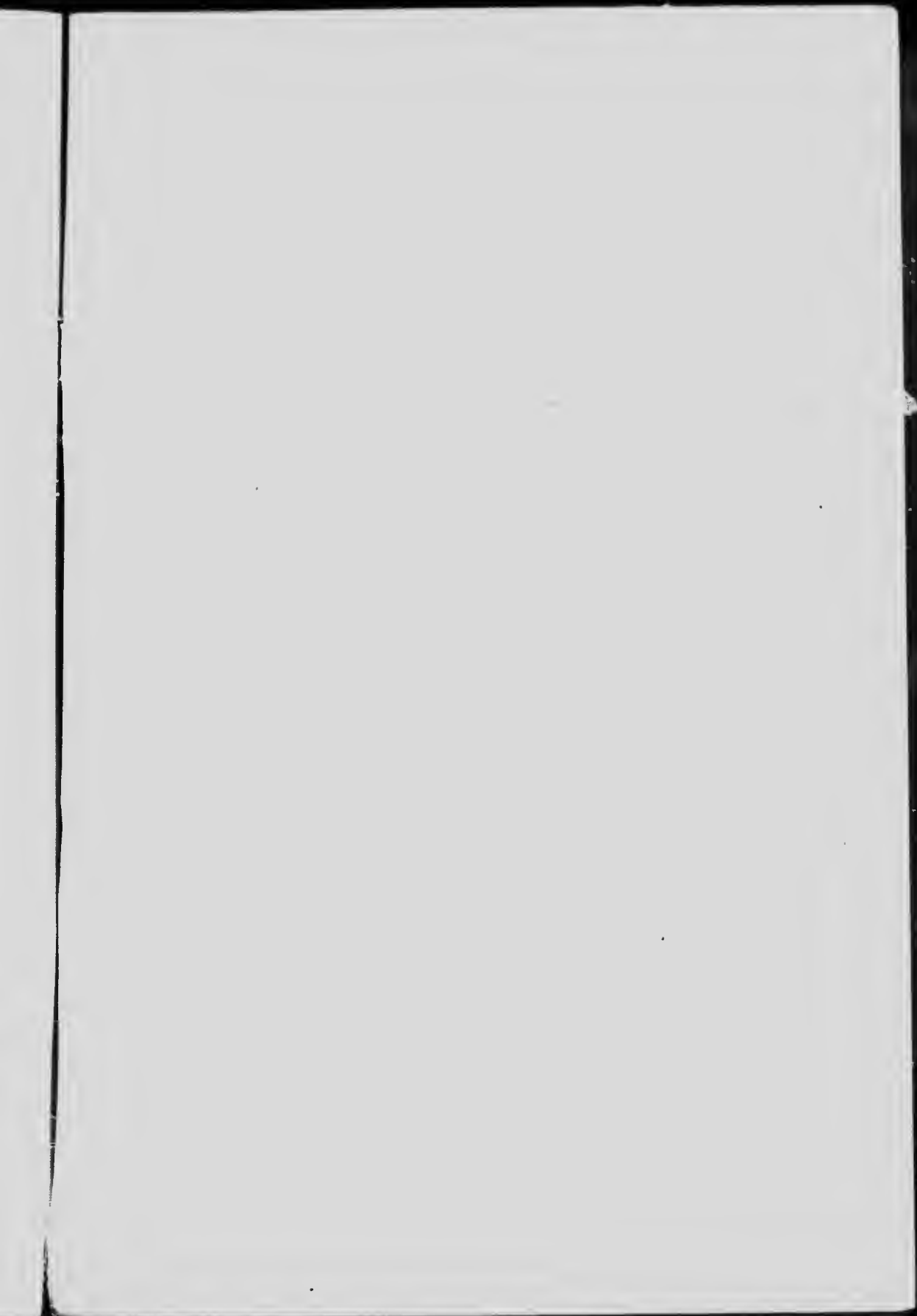
Table 10 shows the quantity of tight heading made in Canada in 1911 by kinds of wood and classes.

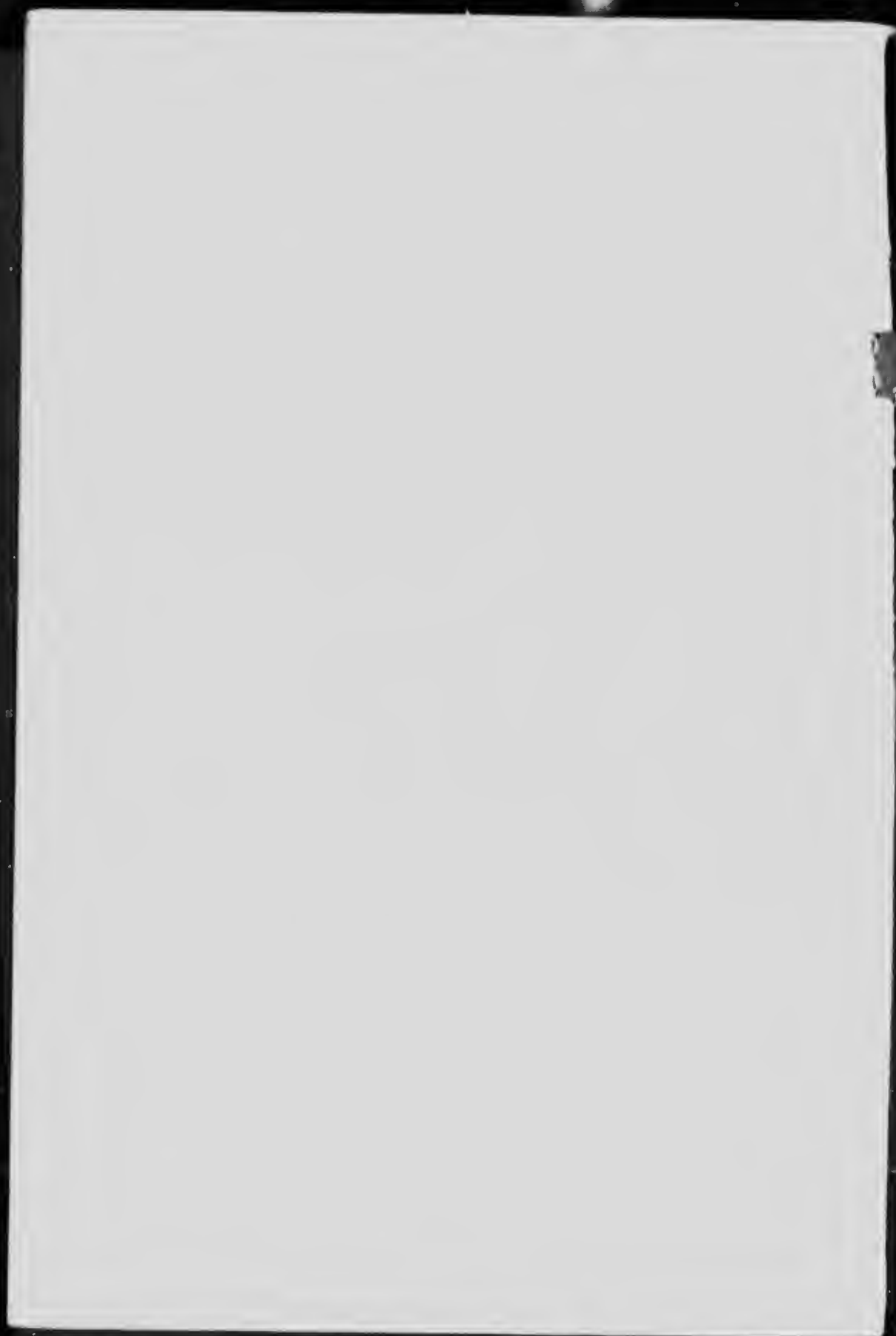
TABLE 10.  
TIGHT-BARREL HEADING, 1911, BY CLASSES AND SPECIES OF WOOD.

SPECIES.	TOTAL.	SAWED.	BEER.
	M Sets.	M Sets.	M Sets.
Total.....	828	689	139
Oak.....	510	371	139
Basswood.....	147	147	.....
Ash.....	73	73	.....
Spruce.....	61	61	.....
Balsam Fir.....	17	17	.....
Pine.....	11	11	.....
Birch.....	6	6	.....
Hemlock.....	3	3	.....

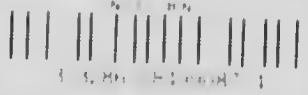
Of the 828,000 sets of tight heading manufactured in 1911, 83 per cent were sawn heading and 17 per cent beer heading. All the beer heading was of oak and the sawn heading was made up of 54 per cent oak, 21 per cent basswood, 11 per cent ash, 9 per cent spruce, 2 per cent balsam fir, and 2 per cent pine. Birch and hemlock were used in small quantities for inferior stock.











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\* The supply of these Bulletins is exhausted. Copies of all the others may be obtained on application to the Director of Forestry, Ottawa.

