Not for publication

A STATISTICAL REVIEW OF FOREST RESOURCES IN THE PRAIRIES REGION

by

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DEPARTMENT OF FISHERIES AND FORESTRY

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The Prairies Region has more than one-half of Canada's poplar volume, this species being by far the most plentiful hardwood in the region (as well as in Canada). In Canadian totals, this region has proportionally more than twice the hardwood volume than it has of softwood.

As for any single member of the region, Alberta has more combined softwood and hardwood by volume than any of the others. In fact, this province has more than twice the softwood and hardwood volume of Saskatchewan, its closest rival.

In the Prairies Region, the provincial governments own approximately 66% of the productive forests; the federal government owns about 30%; and private landlords account for the remaining 4% (Table 1-4). Nationally, the region holds about 98% of federal forest resources, the reason being that the Yukon and Northwest Territories are not provinces and still remain under federal jurisdiction.

Primary forest production for participants of the region has fluctuated annually from 1958 to 1967 but no increasing or decreasing trends are evident (Table 1-5). However, the Prairies Region's share of national production has decreased somewhat from 7.2% in 1958 to 5.7% in 1967.

If forests in the Prairies Region were managed on a 100-year rotation[1], the annual allowable cut for this region would be roughly 1.8[2] billion cubic feet. Actual cut in 1967 amounted to 216 million cubic feet, only 1/8 of the allowable cut. However, a large portion of merchantable

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[1] Rotation is the period of years required to establish and grow timber crops to a specified condition of maturity.

[2] Using the Von Mantel formula (Annual yield = $\frac{\text{Growing stock}}{\text{Half the number of years in rotation}}$) as well as a deduction of 20% for loss from fire, windfall, insects, and diseases.

timber lies in what is considered as inaccessible forested areas of the Prairies Region. These areas are in the north, far enough away from major settlements as to make the development of forest-based industries uneconomical (at least for the present). Another factor hindering northern development of wood resources is the predominance of small trees, which increases harvesting costs.

Although market conditions, transportation, and manufacturing costs predetermine the growth of the wood industry, available resources are a prerequisite. Industry will not develop unless there is a continuous supply of wood fibre at reasonable cost. Expansion of forest industries in the Prairies Region is not limited by wood resources as the latter is capable of supporting at least eight times the present production.

TABLE 1-1. Merchantable timber by volume and acreage

Location	Volume of merchantable timber '000,000 cu. ft.	Acres of merchantable productive[1] forest '000 acres	Cubic feet per acre
Alberta	54,960	20,719	2,653
Saskatchewan	20,171	18,425	1,095
N.W.T.	14,029	18,304	766
Manitoba	12,846	15,060	853
Yukon	9,156	19,904	460
Prairies Region	111,162	92,412	1,203
Canada	748,981	317,057	2,362
Prairies Region as a % of Canada	14.8	29.1	50.9

[1] Merchantable productive forest land - land presently producing timber crops that are merchantable or will develop into merchantable stands.

Source: Dominion Bureau of Statistics, Canadian Forestry Statistics, 1967. Cat. No. 25-202, annual.

TABLE 1-2. Merchantable productive forest area by cover type

Location	'000 acres			
	Softwood	Mixedwood	Hardwood	Unclassified[1]
Alberta	9,269	8,087	3,363	28,877
Saskatchewan	6,676	5,767	5,891	1,998
N.W.T.	12,544	5,120	640	--
Manitoba	9,388	3,494	2,178	1,927
Yukon	9,984	7,552	2,368	--
Prairies Region	47,861	30,020	14,440	32,802
Canada	200,396	84,495	32,166	56,291
Region as a % of Canada	23.9	35.5	44.9	58.3

[1] Unclassified - areas of recent burn, cut-over, or windfall, not yet re-stocked.

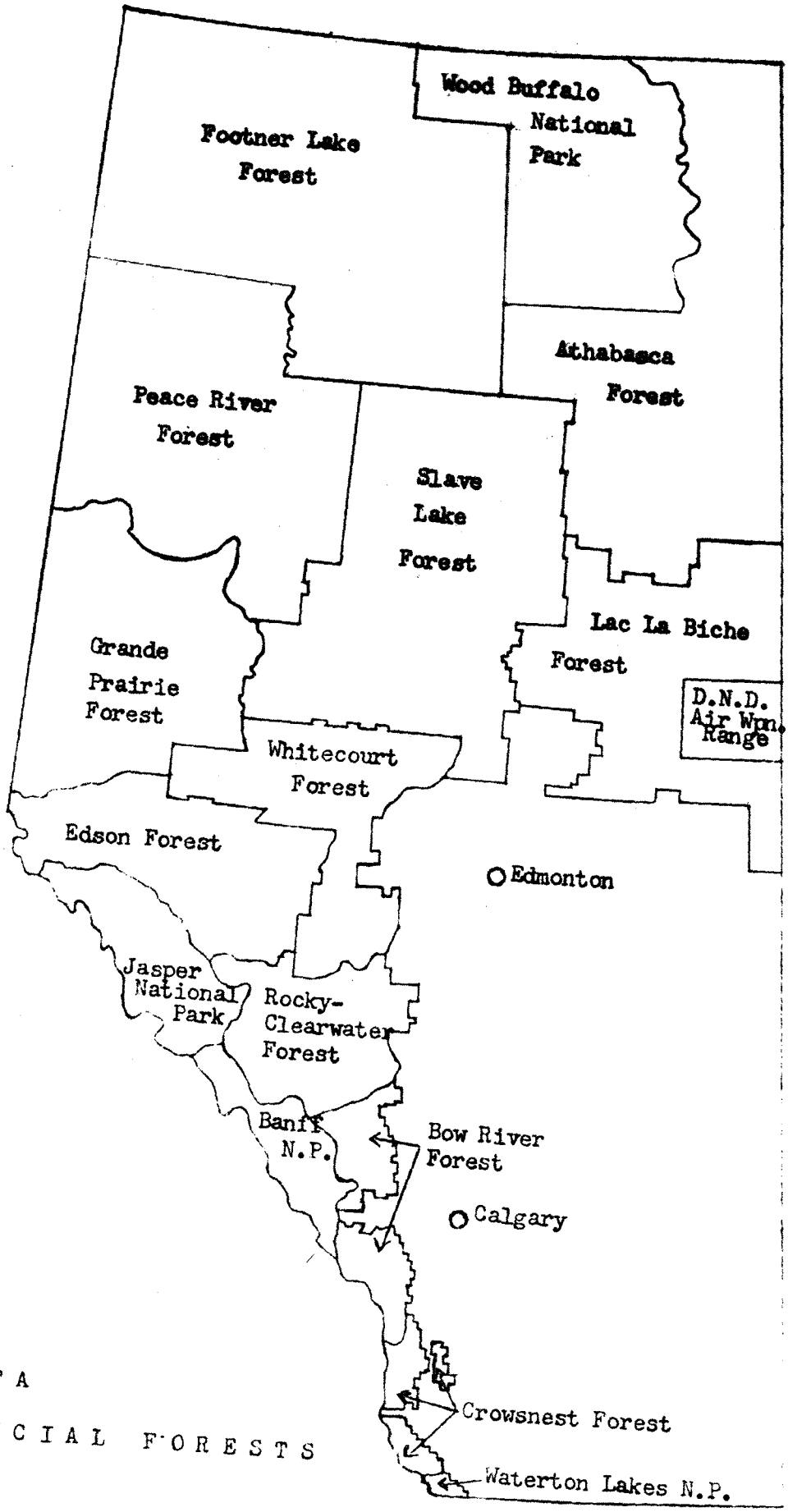
Source: Dominion Bureau of Statistics, Canadian Forestry Statistics, 1967. Cat. No. 25-202, annual.

TABLE 1-5. Estimates of primary forest production[1]

Year	'000 cu. ft.					Region as a % of Canada
	Alberta	Sask.	Manitoba	Yukon and N.W.T.	Canada	
1958	107,612	41,561	50,377	5,930	2,854,670	7.2
1959	135,003	44,621	51,766	2,843	3,186,387	7.4
1960	148,485	49,860	45,255	5,697	3,431,465	7.3
1961	118,390	44,036	37,602	1,815	3,303,289	6.1
1962	131,706	47,844	53,160	4,106	3,431,802	6.9
1963	133,472	42,091	41,556	3,965	3,523,010	6.3
1964	124,475	39,390	39,402	3,265	3,626,985	5.7
1965	126,584	45,403	42,491	2,654	3,660,669	5.9
1966	130,268	46,387	43,407	3,676	3,849,019	5.8
1967	111,265	64,469	35,922	4,474	3,778,446	5.7
Average	115,600	46,564	44,094	3,843	3,466,574	6.4

[1]Estimated production on provincial, federal, and private land.

Source: Dominion Bureau of Statistics, Canadian Forestry Statistics, 1967. Cat. No. 25-202, annual.



MAP 2-2

A L B E R T A

P R O V I N C I A L F O R E S T S

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TABLE 2-1. Area classification - Alberta

Location	'000 acres			
	Productive forest[1]	Non-productive forest[2]	Water	Total
Footner Lake	13,639	6,193	633	20,465
Slave Lake	8,109	6,701	829	15,639
Athabasca	7,497	6,092	1,258	15,027
Peace River	6,866	6,102	215	13,183
Lac La Biche	3,818	5,776	620	10,214
Grande Prairie	5,578	3,320	121	9,019
Whitecourt	3,744	3,371	170	7,285
Edson	4,163	1,802	64	6,029
Clearwater-Rocky	2,785	1,293	65	4,143
Bow River	1,402	688	26	2,116
Crowsnest	635	233	3	871
Total (11 Forests)	53,416	41,571	4,004	103,991
Other areas[3]	16,190	43,055	146	59,391
Total province	74,606	84,626	4,150	163,382
%	46	52	2	100

[1] Productive forest lands are those that support either coniferous or deciduous tree growth capable of reaching merchantable size.

[2] Non-productive forest lands are those incapable of producing or not likely to produce timber of commercial value. In the Alberta inventory, this includes muskegs (both open and wooded), cultivated lands, hay and grass meadows, permanent brush areas, barren lands above tree line, areas where trees are stunted owing to elevation, and rock barrens.

[3] Other areas represent national parks, settled land, and land outside the forest management units.

Source: Alberta Forest Inventory, Alberta Department of Lands and Forests - master file.

TABLE 2-2. Productive forest area by provincial forest and cover type - Alberta

Forest	'000 acres			
	Softwood	Mixedwood	Hardwood	Total[1]
Footner Lake	1,339	2,576	2,832	6,747
Athabasca	2,386	2,040	1,038	5,464
Slave Lake	1,115	2,567	1,708	5,390
Peace River	821	1,579	1,735	4,135
Edson	3,099	621	301	4,021
Grande Prairie	1,419	931	1,328	3,678
Whitecourt	1,341	1,077	723	3,141
Lac La Biche	1,342	1,148	584	3,074
Clearwater-Rocky	2,078	253	311	2,642
Bow River	1,099	100	107	1,306
Crowsnest	482	22	68	572
Metis Colonies	22	124	329	475
Totals	16,543	13,038	11,064	40,645
%	41	32	27	100

[1]Does not include burned, cut-over or other non-stocked forest land.

Source: Alberta Forest Inventory, Alberta Department of Lands and Forests, 1961 Revised 1968, p. 26. Table No. 2.

TABLE 2-3. Gross timber volumes by provincial forest and cover type - Alberta

Forest	4" d.b.h. and over in '000,000 cu. ft.			
	Softwood	Hardwood	Totals	%
Slave Lake[1]	4,619	5,142	9,761	16
Footner Lake	3,995	3,716	7,711	13
Grande Prairie	4,415	3,199	7,614	13
Edson	6,287	1,158	7,445	12
Peace River[1]	2,895	3,360	6,255	11
Whitecourt	3,184	2,171	5,355	9
Athabasca	3,439	1,528	4,967	8
Lac La Biche[1]	2,243	2,251	4,494	8
Clearwater-Rocky	3,083	876	3,959	7
Bow River	1,276	130	1,406	2
Crowsnest	582	26	608	1
Totals	36,018	23,557	59,575	
%	60	40		100

[1]Inventory of Metis colonies included in these three forests.

Source: Alberta Forest Inventory, Alberta Department of Lands and Forests 1961, Revised 1969.

TABLE 2-4. Gross timber volumes by provincial forest, species, and size class - Alberta

Forest	White spruce		Black spruce	Balsam fir		Pine		Aspen poplar	
	4"-9" M cds.[1]	10"+ MM fbm[2]	4"-9" M cds.	4"-9" M cds.	10"+ MM fbm	4"-9" M cds.	10"+ MM fbm	4"-9" M cds.	10"+ MM fbm
Slave Lake	11,856	8,156	4,717	1,063	287	6,920	2,454	26,911	16,805
Footner Lake	13,098	7,088	3,397	450	77	2,795	808	25,337	8,264
Grande Prairie	7,955	6,299	2,939	537	167	14,991	3,833	16,525	9,495
Edson	8,462	3,241	1,446	2,163	633	25,335	5,828	8,220	2,057
Peace River	6,869	4,439	2,335	617	132	7,294	1,103	21,369	6,769
Whitecourt	7,180	4,425	2,488	880	286	11,726	3,757	13,039	7,719
Athabasca	4,510	2,648	2,440	395	90	10,642	1,889	9,399	3,858
Lac La Biche	4,620	2,863	3,965	472	91	4,555	878	13,361	6,226
Clearwater-Rocky	3,236	2,463	982	308	134	13,446	2,589	3,604	1,631
Bow River	1,429	1,313	99	216	111	5,855	1,255	974	252
Crowsnest	644	1,250	-	165	77	1,788	449	250	25
Totals	69,859	44,185	24,808	7,266	2,085	105,347	24,843	138,989	63,101

[1] cds. abbreviation for cords.

[2] fbm represents foot board measure or board feet and is a measure of sawtimber.

Source: Alberta Forest Inventory, Alberta Department of Lands and Forests - master file.

TABLE 2-5. Annual allowable cut, gross volumes by provincial forest and cover type - Alberta

Forest	Softwood			Hardwood	Total
	Sawlogs MM fbm	Pulpwood M cds.	Total MM cu.ft.	Total MM cu.ft.	all species MM cu.ft.
Slave Lake	179	666	91	159	250
Footner Lake	127	448	62	105	167
Grande Prairie	130	551	72	71	143
Edson	192	965	118	30	148
Peace River	100	352	49	83	132
Whitecourt	141	617	79	70	149
Athabasca	81	365	46	55	101
Lac La Biche	84	380	48	57	105
Clearwater-Rocky	102	457	58	18	76
Bow River	52	196	26	4	30
Crowsnest	33	69	12	1	13
Totals	1,221	5,066	661	653	1,314

Source: Alberta Forest Inventory, Alberta Department of Lands and Forests 1961. Revised 1968. p. 30. Table No. 6.

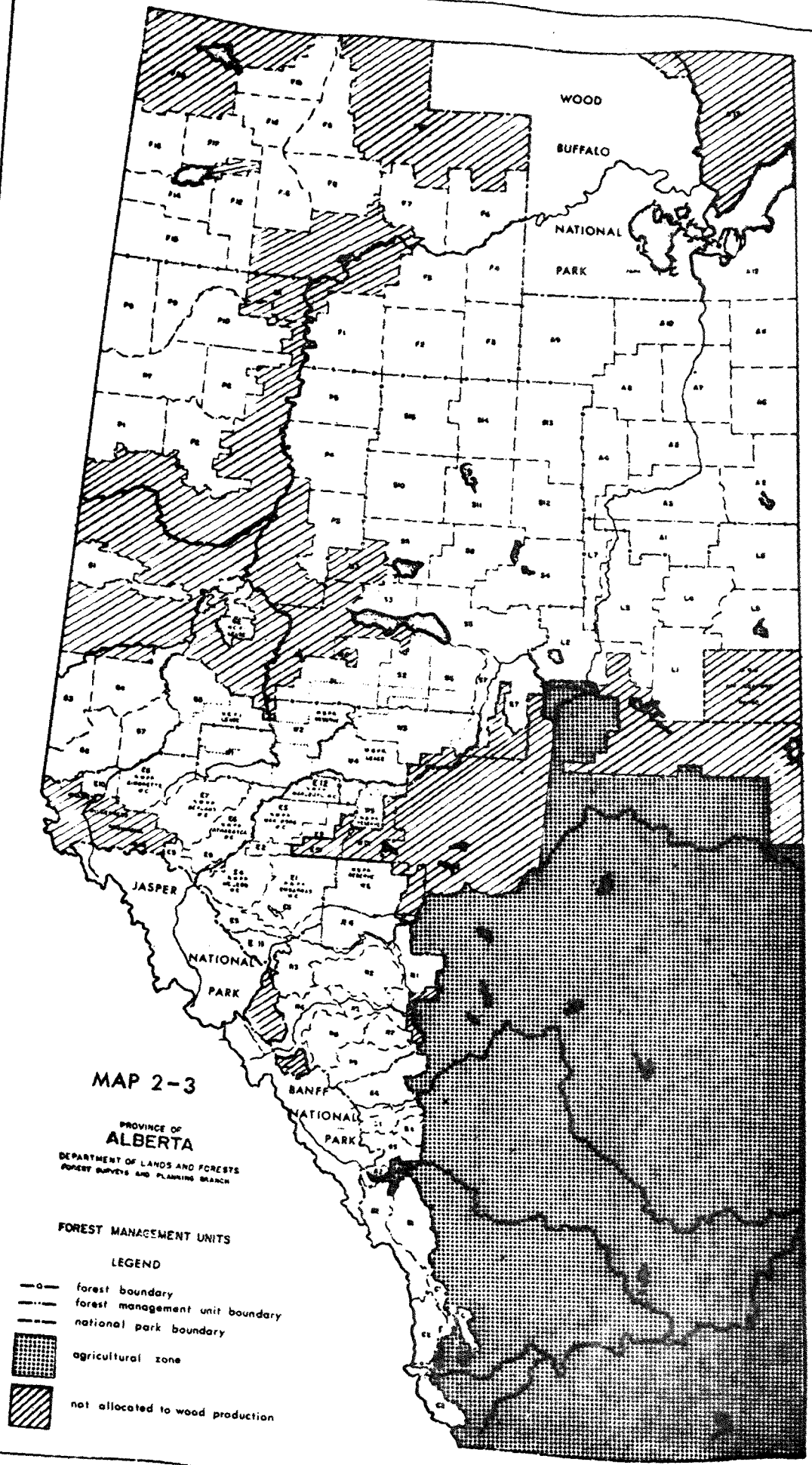
WOOD
BUFFALO
NATIONAL
PARK
JASPER
NATIONAL
PARK
BANFF
NATIONAL
PARK
MAP 2-3
PROVINCE OF
ALBERTA
DEPARTMENT OF LANDS AND FORESTS
FOREST SURVEYS AND PLANNING BRANCH
FOREST MANAGEMENT UNITS
LEGEND
forest boundary
forest management unit boundary
national park boundary
agricultural zone
not allocated to wood production

TABLE 2-7. Forest products trend for Alberta 1959-69

Year	'000 cu. ft.			
	Sawtimber production	Pulpwood production	Other products[1]	Total production
1959-60	72,700	21,930	10,239	104,869
1960-61	45,800	27,795	7,965	81,560
1961-62	54,400	23,035	7,880	85,315
1962-63	59,200	24,055	12,108	95,363
1963-64	71,800	25,500	14,803	112,103
1964-65	60,300	33,150	11,664	105,114
1965-66	58,300	32,215	11,113	101,628
1966-67	54,700	32,215	17,832	104,747
1967-68	51,300	20,740	19,136	91,176
1968-69	73,000	26,860	15,547	115,407
Average	60,150	26,750	12,829	99,728

[1]Other products include railway ties, plywood, round timber, mine ties, fuelwood, Christmas trees, and lath.

Source: 20th Annual Report, March 31, 1969. Alberta Department of Lands and Forests. p. 43.

TABLE 2-8. Forest fires in Alberta 1959-68

Year	No. of fires	Acreage burnt	Average fire size in acres	Total suppression costs in $'000	Suppression cost/acre in $
1959	469	87,959	188	1,184	13.46
1960	474	19,960	42	346	17.32
1961	811	193,545	239	2,366	12.22
1962	278	4,506	16	211	46.80
1963	554	17,609	32	610	34.61
1964	338	15,057	45	397	26.35
1965	252	54,334	216	575	10.57
1966	371	69,950	189	1,306	18.66
1967	796	23,215	29	2,383	102.63
1968	617	989,375	1,604	5,507	5.57
Average	496	147,551	297	1,488	10.08

Source: Annual Reports, Alberta Department of Lands and Forests.

TABLE 2-9. Timber loss by fire in Alberta 1959-68

Year	Forested acres burnt	'000 cu. ft.		
		Sawtimber	Other	Total
1959	51,154	3,872	21,654	25,526
1960	10,463	199	1,268	1,467
1961	157,257	29,637	106,429	136,066
1962	3,120	861	2,978	3,839
1963	14,554	2,224	8,633	10,857
1964	8,732	1,189	3,571	4,760
1965	49,769	3,584	24,069	27,653
1966	35,842	4,287	17,169	21,456
1967	13,438	1,311	8,609	9,920
1968	527,790	112,230	669,417	781,647
Average	87,212	15,939	86,380	102,319

Source: Annual Reports, Alberta Department of Lands and Forests.

SASKATCHEWAN

Saskatchewan's 161 million acres are classified as 17% productive forest, 71% non-productive forest[1], and 12% water. Provincial forests comprise most of the commercial stands of timber and represent 54% of the total province.

Of the productive forest area, about 85% is in the provincial forests. These productive forests include almost equal areas of softwood, mixedwood, and hardwood.

According to the Dominion Bureau of Statistics, Saskatchewan has 20 billion cubic feet of merchantable timber in all species, 3/4 of which is in provincial forests. By volume, important species within the provincial forests are: aspen poplar, black spruce, jack pine, and white spruce in that order.

Annual forest production on provincial crown lands from 1960 to 1969 averaged 30 million cubic feet, which is about 1/13 of the annual allowable cut. Specific figures released by the Forestry Branch in Prince Albert show that the annual allowable cut for softwood lumber is 140 million board feet and for softwood cordwood, it is 2.4 million cords. As to hardwoods, the annual allowable cut for lumber is 190 million board feet and for hardwood cordwood, it is 1.5 million cords.

Yearly, forest fires from 1959 to 1968 burned an average of 461,000 acres and destroyed some 20 million cubic feet of timber. Suppression costs averaged $1.67 an acre.

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[1] Although classed as non-productive for timber crops, a large percentage of this land is arable.

Plans for a $126.5-million forest industry complex in the Meadow Lake area of northwest Saskatchewan have been announced jointly by Parsons and Whittemore Inc. of New York and the Saskatchewan government.

Under an agreement with the provincial government, the New York company is firmly committed to an early construction start on a $6.5 million small-log chipper-saw mill. It has also agreed in principle to start building a $120 million pulp mill within two years.

Both projects will be 70%-owned by Parsons and Whittemore and 30% by the Saskatchewan government. This is the same arrangement under which these two parties built Saskatchewan's only pulp mill, the 650-ton-per-day Prince Alberta Pulp Co. mill, which became operational in 1968.

The chip-saw mill will be located at Meadow Lake and will have an annual capacity of 50 million fbm. The proposed 1,000-ton-per-day pulp mill will probably be built about 40 miles away in the Dore Lake area.

Provincial timber has been committed to the project only under the condition that cutting rights will be withdrawn if construction is not started within five years. The pulp mill will be operated as Athabasca Forest Industries.

The initial sawmill project will have 80 mill employees and 100 logging employees. Completion of the pulp mill will bring total employment to 1500.

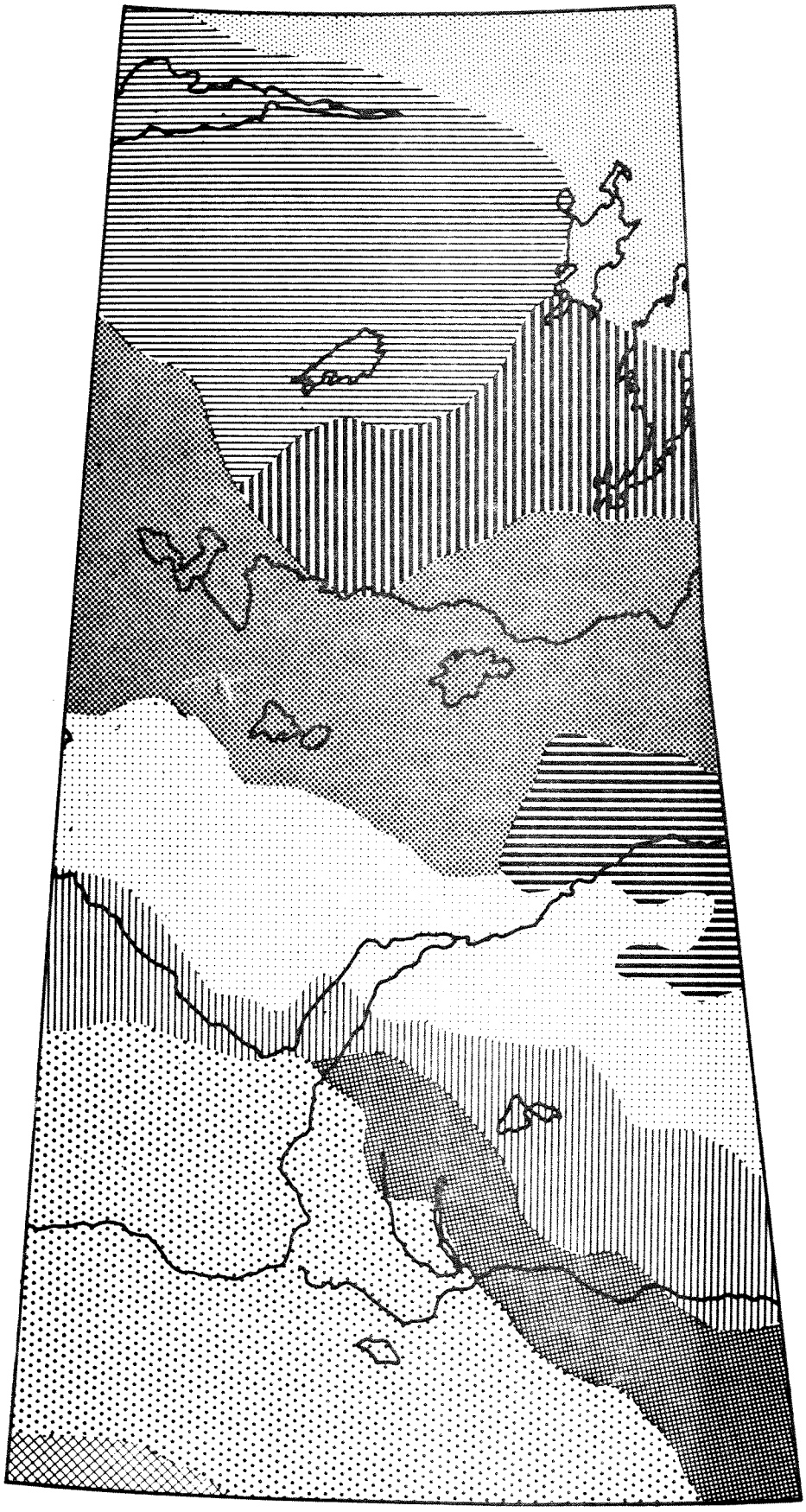
Capital grants of $1.8 million towards construction of the sawmill and $12 million towards construction of the pulp mill are expected from the federal government.

Simpson Timber Co. has begun a $3.5-million expansion of its stud mill in Hudson Bay, Saskatchewan and is to undertake feasibility studies that could lead to the establishment of a hardwood lumber or particleboard plant at the site.

The expansion will increase annual production at the stud mill, already the largest exclusively stud producer in Canada, from 56 million fbm to 88 million fbm. Work on the project began in early July 1970 and is scheduled for completion next March.

Simpson has been granted a new 20-year timber-harvesting permit by the Saskatchewan government. This will increase the former's annual woods production in Saskatchewan from a present 130,000 cords to 204,000 cords.

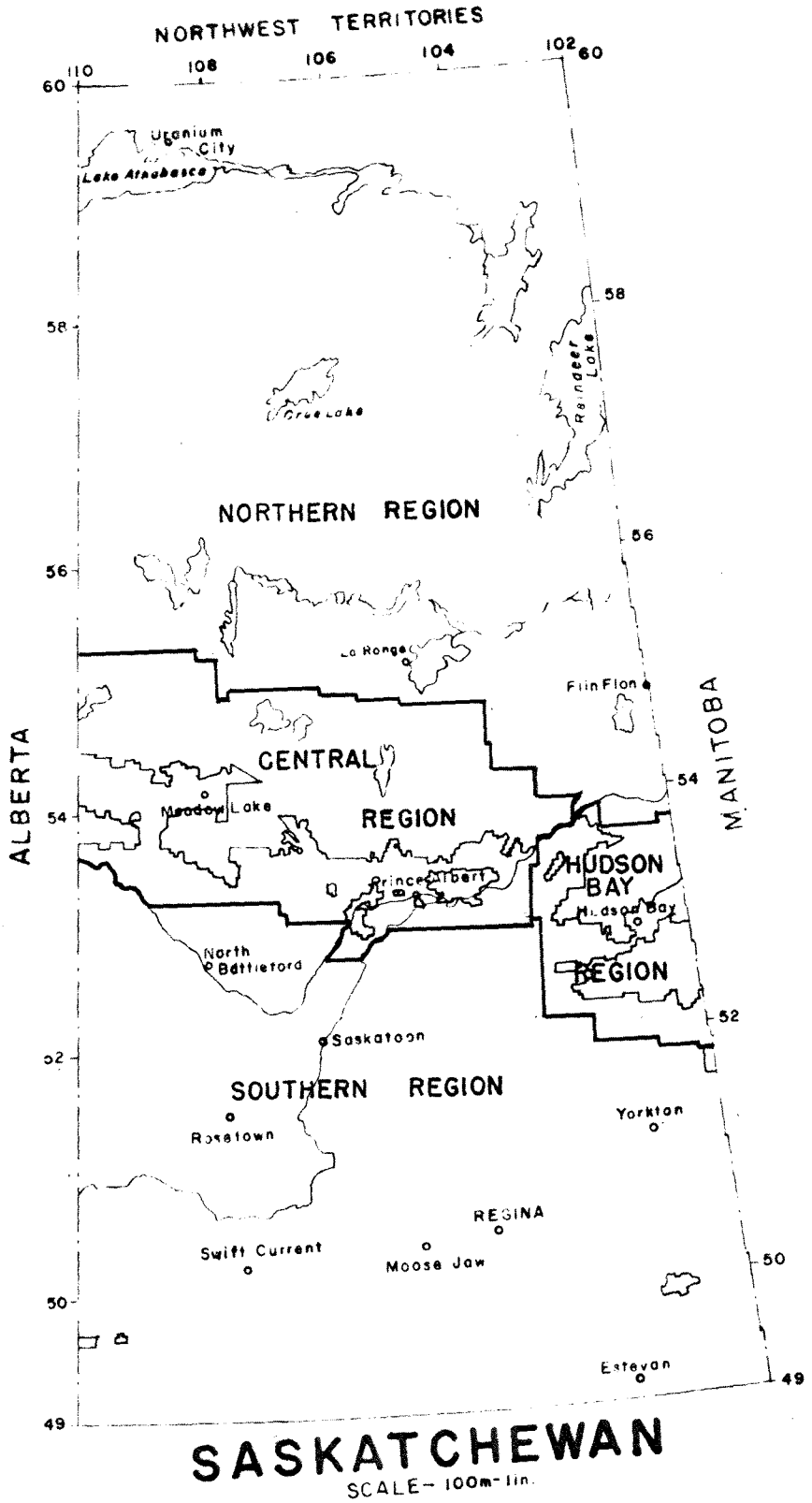
The Saskatchewan government has agreed to build logging access roads on Simpson Timber's licence areas. The agreement covering expansion also provides that stumpage payments by the company will be increased to help finance government reforestation of cutover areas. Simpson is also committed to employ Indians or Metis at at least 10% of the work force, which it has been doing for several years.



SASKATCHEWAN
MAP 3-1

NATURAL VEGETATION

- SHORT GRASS PRAIRIE
- MIXED GRASS PRAIRIE
- TALL GRASS PRAIRIE
- MIXED GRASS PRAIRIE , LIGHTLY WOODE
- ASPEN GROVE
- ASPEN - OAK GROVE
- SPRUCE - ASPEN FOREST
- SWAMP - BOG COMPLEX
- LOW INCIDENCE OF PERMAFROST SPRUCE - PINE - ASPEN FOREST
- MEDIUM INCIDENCE OF PERMAFROST OPEN JACK PINE - LICHEN FOREST
- MEDIUM INCIDENCE OF PERMAFROST BLACK SPRUCE FOREST
- HIGH INCIDENCE OF PERMAFROST OPEN BLACK SPRUCE - LICHEN FOREST
- CONTINUOUS PERMAFROST , TUNDRA



MAP 3-2

FOREST REGIONS

TABLE 3-1. Area classification - Saskatchewan

Classification	'000 acres			%
	Provincial forests	Other areas	Total	
Forest land:				
Productive	22,533	4,438	26,971	17
Forested	20,744	4,229	24,973	16
Non-forested	1,789	209	1,998	1
Non-productive	48,198	65,747	113,945	71
Water	15,649	4,523	20,172	12
Total area	86,380	74,708	161,088	-
%	54	46	-	100

Source: Department of Natural Resources, Forestry Branch, Prince Albert, Saskatchewan.

Dominion Bureau of Statistics, Canadian Forestry Statistics, 1967. Cat. No. 25-202, annual.

TABLE 3-2. Gross timber volumes in provincial forests by species and size class - Saskatchewan

Species	'000,000 cu. ft. 4"-9" d.b.h.	10" + d.b.h.	Total	% of all species
Softwood				
Black spruce	3,396	196	3,592	25
Jack pine	2,477	508	2,985	20
White spruce	1,020	956	1,976	14
Tamarach (Larch)	178	9	187	1
Balsam fir	124	45	169	1
Total softwood	7,195	1,714	8,909	61
Hardwood				
Aspen poplar	3,099	1,166	4,265	29
Balsam poplar	298	415	713	5
White birch	591	101	692	5
Maple	27	7	34	-
Elm	9	20	29	-
Ash	2	1	3	-
Total hardwood	4,026	1,710	5,736	39
Total all species	11,221	3,424	14,645	100

Source: Department of Natural Resources, Forestry Branch, Prince Albert, Saskatchewan.

TABLE 3-3. Estimated forest harvest on provincial crown lands in Saskatchewan 1959-69

Year	'000 cu. ft.		
	Sawtimber production	Pulpwood production	Total production[1]
1959-60	16,504	1,401	23,291
1960-61	16,953	2,248	24,011
1961-62	15,998	1,644	21,235
1962-63	14,863	1,167	22,060
1963-64	13,050	1,635	21,438
1964-65	12,323	2,033	21,930
1965-66	16,606	1,754	30,363
1966-67	19,108	1,925	34,500
1967-68	16,536	18,376	50,271
1968-69	18,169	22,855	49,122
Average	17,564	5,504	29,822

[1]Total production is made up of sawtimber, pulpwood, ties, piling and round lumber, posts, rails, fuelwood, boxwood, poles, shimwood, plywood-particleboard-fibreboard, and small trees. In addition to sawtimber and pulpwood, posts, plywood-particleboard-fibreboard, poles, and fuelwood were the more important forest products.

Source: Annual Reports, Saskatchewan Department of Natural Resources.

TABLE 3-4. Forest fires in Saskatchewan 1959-68

Year	No. of fires	Acreage burnt	Average fire size in acres	Total suppression costs in $	Suppression cost/acre in $
1959	169	150,909	893	87,750	.58
1960	236	466,230	1,976	268,064	.58
1961	507	2,025,740	3,996	1,558,860	.77
1962	289	19,190	66	295,000	15.37
1963	255	158,108	620	306,830	1.94
1964	460	1,186,314	2,579	1,211,503	1.02
1965	123	10,097	82	352,822	34.94
1966	216	37,807	175	485,141	12.83
1967	418	352,168	768	1,549,985	5.08
1968	349	204,599	586	1,611,703	7.87
Average	302	461,116	1,525	772,766	1.67

Source: Annual Reports, Saskatchewan Department of Natural Resources.

TABLE 3-5. Timber loss by fire in Saskatchewan 1959-68

Year	Sawtimber M fbm	Small material cords	Total '000 cu. ft.
1959	381	3,342	360
1960	16	345,688	29,386
1961	63,184	885,598	87,912
1962	40	909	85
1963	5,079	231,745	20,713
1964	15,212	142,630	15,166
1965	-	534	45
1966	79	10,960	947
1967	257	281,621	23,989
1968	21,783	248,744	25,499
Average	10,603	215,177	20,410

Source: Forest Fire Research Institute, Canadian Forestry Service, Department of Fisheries and Forestry, Ottawa.

MANITOBA

Manitoba, with a total area of 161 million acres, has 47% forest, 37% non-forest, and 16% water. Less than half of the 76 million acres of forest is productive (Table 4-2).

By cover type, 65% of Manitoba's merchantable forest area is classified as softwood, 23% mixedwood, and 12% hardwood. Almost all of the 1.8 million acres of hardwood are in accessible regions[1]. More specifically, this accessible hardwood is located in the Duck and Porcupine mountains, Riding Mountain National Park, and the Lowlands South Regions[2].

On provincial crown lands, it is estimated that more than 7 billion cubic feet of merchantable timber are accessible. With the inaccessible[3] region and the federal and private lands considered, Manitoba has a grand total of 12.5 billion cubic feet of merchantable timber (Table 4-4).

The important species in Manitoba by gross volume are black spruce, poplar, jack pine, and white spruce, in that order.

Annual harvest on provincial crown lands from 1960 to 1969 averaged 28 million cubic feet. On a 100-year rotation, annual allowable cut on provincial land is estimated at 200 million cubic feet[4]. If utilization of all species were possible, annual harvest could be expanded about sevenfold. Annual timber loss from forest fires averaged 84 million cubic feet from 1960 to 1968. This loss is about three times the average annual harvest.

A $100-million forest industry involving four companies is now taking shape at The Pas. In 1966, Switzerland's Moncoa A.G. agreed to

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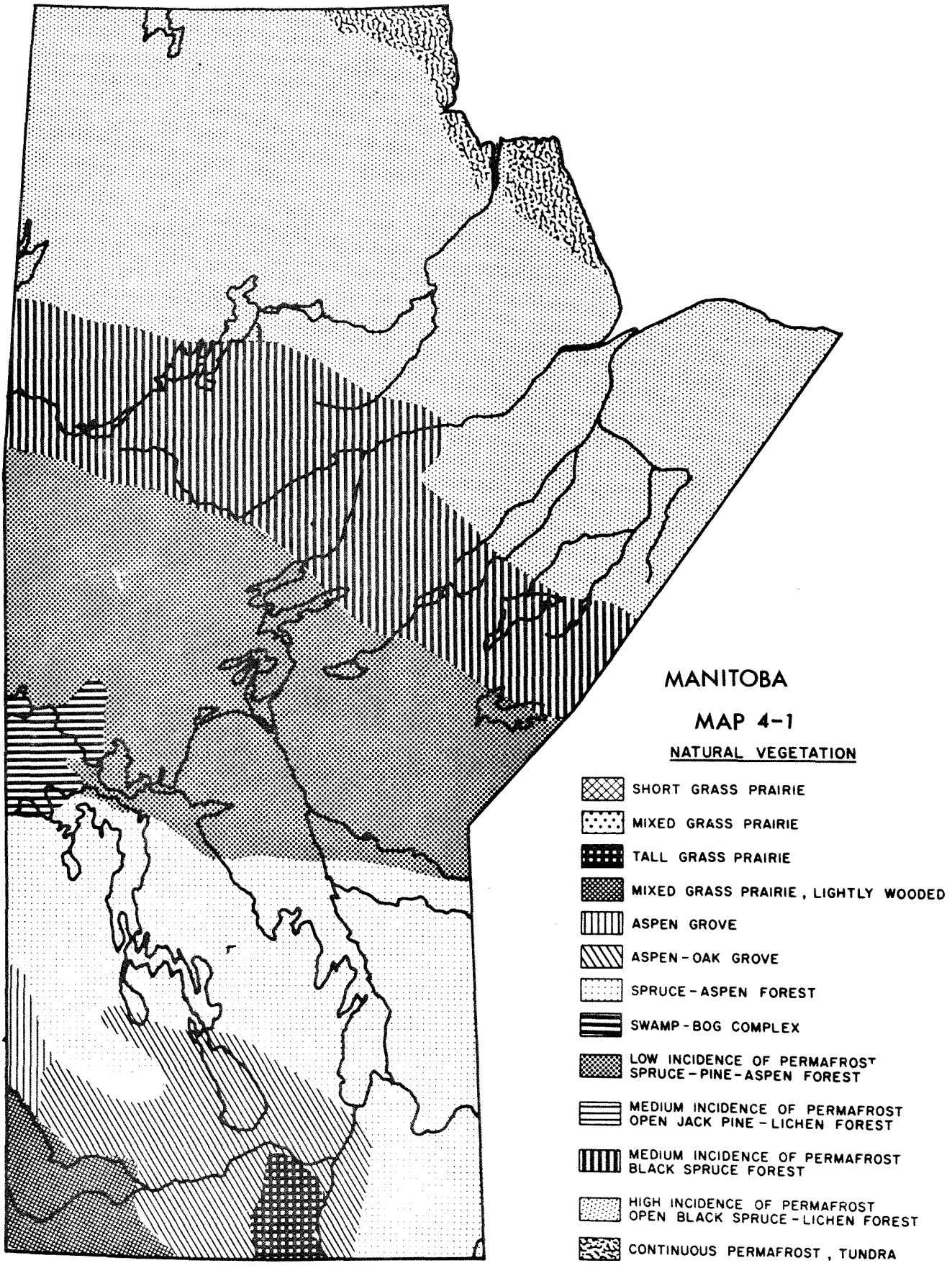
1 & 3 Based on the presence or absence of transportation routes such as railways, highways, and water routes.

2 All inventory data for Manitoba are based on the year 1956 because updating of inventory for the newly defined regions is still in progress.

4 Using Von Mantel's formula as well as a deduction of 20% for loss by fire, windfall, insects, and diseases.

build a $50 million pulp mill and a $1.5-million sawmill under the name of Churchill Forest Industries (Manitoba) Limited. Under the agreement, Churchill Forest Industries was given exclusive timber rights to 40,000 square miles, an area covering about 1/5 of the province's land mass. The mill is expected to go into full operation in August 1970, yielding $350,000 annually in stumpage fees.

By 1969, three other firms had joined Churchill Industries at The Pas. A West German corporation announced plans for its subsidiary, M.P. Industrial Mills Limited, to build a $30-million kraft-paper mill with a capacity of 420 tons a day. River Sawmill, a subsidiary of Idaho's Pack River Company, proposed a $12 million sawmill project. And Scottish-owned James Bertram and Son (Canada) Limited announced that it would build a $10-million machinery plant.


MANITOBA
MAP 4-1
NATURAL VEGETATION
SHORT GRASS PRAIRIE
MIXED GRASS PRAIRIE
TALL GRASS PRAIRIE
MIXED GRASS PRAIRIE, LIGHTLY WOODED
ASPEN GROVE
ASPEN-OAK GROVE
SPRUCE-ASPEN FOREST
SWAMP-BOG COMPLEX
LOW INCIDENCE OF PERMAFROST SPRUCE-PINE-ASPEN FOREST
MEDIUM INCIDENCE OF PERMAFROST OPEN JACK PINE-LICHEN FOREST
MEDIUM INCIDENCE OF PERMAFROST BLACK SPRUCE FOREST
HIGH INCIDENCE OF PERMAFROST OPEN BLACK SPRUCE-LICHEN FOREST
CONTINUOUS PERMAFROST, TUNDRA

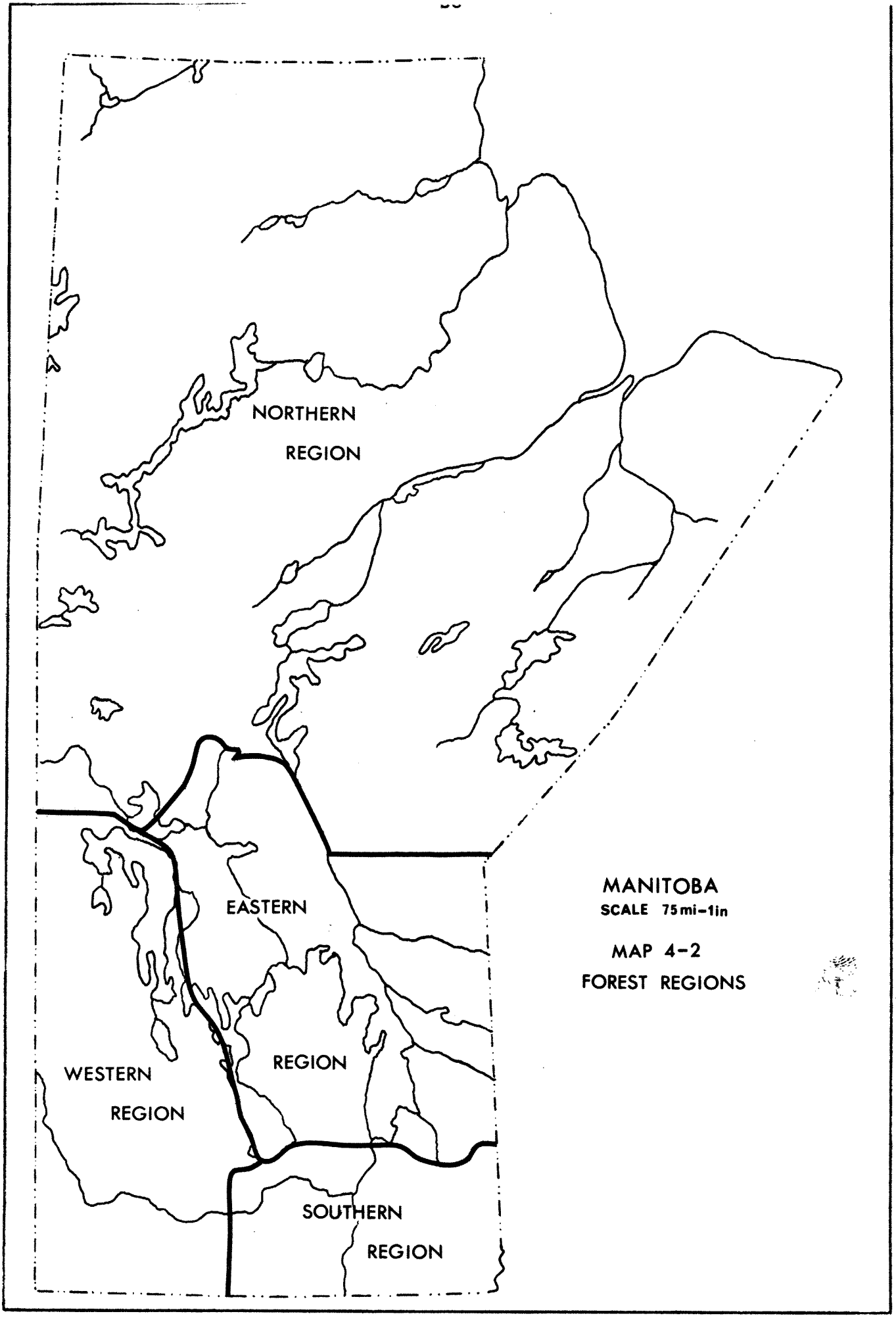

NORTHERN
REGION
EASTERN
REGION
WESTERN
REGION
SOUTHERN
REGION
MANITOBA
SCALE 75 mi-1in
MAP 4-2
FOREST REGIONS

TABLE 4-1. Area classification - Manitoba

Region	'000 acres				% of total province
	Forest	Non-forest	Water	Total	
Inaccessible[1]	47,143	31,058	11,438	89,639	55.8
Southwestern	160	21,375	8,807	30,342	18.9
Nelson River	7,880	1,827	1,256	10,963	6.7
Lowlands South	6,185	2,443	682	9,310	5.8
Lowlands North	3,598	1,872	1,414	6,884	4.3
Northern Mining	5,353	186	1,097	6,636	4.1
Winnipeg River	2,202	402	251	2,855	1.8
Mountain Forest	2,026	105	97	2,228	1.4
Southeastern	1,409	313	62	1,783	1.1
Total province	75,956	59,580	25,104	160,640	100

[1] Inaccessible forest - based on absence of transportation routes such as railways, highways, and water routes.

Source: Forest Resource Inventory 1956. Report No. 9, p. 21, Table 7; Report No. 10, p. 31, Table 2.

Manitoba Department of Mines and Natural Resources.

TABLE 4-2. Forest classification[1] - Manitoba

Region	'000 acres		Region's total forest as a % of provincial total
	Productive forest	Total forest area	
Inaccessible	13,710	47,143	62.1
Nelson River	4,358	7,880	10.4
Lowlands South	4,333	6,185	8.1
Northern Mining	4,463	5,353	7.0
Lowlands North	2,263	3,598	4.7
Winnipeg River	1,334	2,202	2.9
Mountain Forest	1,671	2,026	2.7
Southeastern	907	1,408	1.9
Southwestern	147	160	.2
Total province	33,186	75,955	100

[1] Includes cruised and uncruised areas by Region.

Source: Report No. 9, Inaccessible Forest Zone - uncruised, Table 7, p. 21.

Report No. 10, Forest Resources Inventory - Manitoba. Table 2, p. 31.

Manitoba Department of Mines and Natural Resources.

TABLE 4-3. Merchantable forest by region and cover type - cruised area - Manitoba

Forest region	'000 acres			
	Softwood	Mixedwood	Hardwood	Total
Provincial crown				
Nelson River	1,712	701	112	2,525
Lowlands South	1,028	561	303	1,892
Northern Mining	1,464	323	45	1,832
Winnipeg River	688	283	155	1,126
Mountain Forest (Duck & Porcupine)	344	367	373	1,084
Lowlands North	693	246	31	970
Southeastern	441	79	129	649
Southwestern	18	36	66	120
Total provincial crown accessible	6,388	2,596	1,214	10,198
Federal crown				
Riding Mountain National Park	32	87	333	452
Patented lands				
All forest regions	41	60	102	203
Total accessible	6,461	2,743	1,649	10,853
Total inaccessible	2,811	612	138	3,561
Grand total	9,272	3,355	1,787	14,414
Cover type in %	65	23	12	100

Source: Resource Inventory Report No. 10. 1956. Department of Mines and Natural Resources, Table 3. p. 32.

TABLE 4-4. Merchantable timber volumes by region and cover type - Manitoba

Forest region	'000,000 cu. ft.			
	Softwood	Mixedwood	Hardwood	Total
Provincial crown				
Nelson River	1,077	475	57	1,609
Mountain Forests (Duck & Porcupine)	410	477	382	1,269
Northern Mining	1,003	221	26	1,250
Winnipeg River	565	251	132	948
Lowlands South	472	346	112	930
Lowlands North	509	220	17	746
Southeastern	281	70	109	460
Southwestern	---	7	20	27
Total provincial crown accessible	4,317	2,067	855	7,239
Federal crown				
Riding Mountain National Park	34	103	422	559
Patented lands				
All forest regions	20	20	38	78
Total accessible	4,371	2,190	1,315	7,876
Total inaccessible	3,672	786	197	4,655
Grand total	8,043	2,976	1,512	12,531
Cover type in %	64	24	12	100

Source: Resource Inventory Report No. 10. 1956. Manitoba Department of Mines and Natural Resources, Table 4. p. 32.

TABLE 4-5. Gross softwood and hardwood volumes by region - 4"-9" d.b.h. - Manitoba

Forest region	'000,000 cu. ft.		
	Softwood	Hardwood	Total
Provincial crown			
Nelson River	1,176	211	1,387
Northern Mining	1,006	127	1,133
Mountain Forests (Duck & Porcupine)	482	407	889
Lowlands South	607	143	750
Winnipeg River	542	136	678
Lowlands North	513	94	607
Southeastern	304	69	373
Southwestern	2	18	20
Total provincial crown accessible	4,632	1,205	5,837
Federal crown			
Riding Mountain National Park	19	114	133
Patented lands			
All forest regions	31	27	58
Total accessible	4,682	1,346	6,028
Total inaccessible	3,206	489	3,695
Grand total	7,888	1,835	9,723
Cover types in %	81	19	100

Source: Resource Inventory Report No. 10. 1956. Manitoba Department of Mines and Natural Resources.

TABLE 4-6. Gross softwood and hardwood volumes by region - 10" + d.b.h. - Manitoba

Forest region	'000,000 cu. ft.		
	Softwood	Hardwood	Total
Provincial crown			
Mountain Forests (Duck & Porcupine)	196	185	381
Winnipeg River	175	95	270
Nelson River	181	41	222
Lowlands South	116	64	180
Lowlands North	123	16	139
Northern Mining	99	19	118
Southeastern	23	63	86
Southwestern	2	4	6
Total provincial crown accessible	915	487	1,402
Federal crown			
Riding Mountain National Park	70	356	426
Patented land			
All forest regions	6	13	19
Total accessible	991	856	1,847
Total inaccessible	866	95	961
Grand total	1,857	951	2,808
Cover types in %	66	34	100

Source: Resource Inventory, Report No. 10. 1956. Manitoba Department of Mines and Natural Resources, Table 5. p. 34.

TABLE 4-8. Estimated forest harvest on provincial crown lands in Manitoba 1959-69

Year	'000 cu. ft.		
	Lumber	Pulpwood	Total production
1959-60	8,968	18,198	30,281
1960-61	9,047	14,180	26,638
1961-62	7,066	10,795	20,832
1962-63	8,570	16,776	29,183
1963-64	7,706	16,593	27,115
1964-65	7,423	18,825	29,264
1965-66	6,831	18,924	28,050
1966-67	8,053	22,387	32,863
1967-68	7,107	14,297	23,981
1968-69	8,811	17,942	29,257
Average	7,958	16,892	27,746

[1] Total production includes figures on ties, poles, posts, boxwood, round timber, pilings, mine timber, and fuelwood as well as lumber and pulpwood. Next to lumber and pulpwood, fuelwood, posts, and railway ties were the more important products.

Source: Annual Reports, Manitoba Department of Mines and Natural Resources.

TABLE 4-9. Forest fires in Manitoba 1959-68

Year	No. of fires	Acreage burnt	Average fire size in acres	Total suppression costs in $	Suppression cost/acre in $
1959	155	27,064	175	42,856	1.58
1960	448	412,149	920	203,438	.49
1961	707	2,724,978	3,854	1,097,108	.40
1962	285	175,984	618	167,818	.95
1963	443	70,477	159	115,676	1.64
1964	581	836,278	1,439	302,152	.36
1965	225	16,752	75	56,138	3.35
1966	235	6,154	26	139,036	22.59
1967	638	322,096	505	513,511	1.59
1968	231	47,982	208	141,745	2.95
Average	395	468,158	1,201	252,916	.54

Source: Annual Reports, Manitoba Department of Mines and Natural Resources.
Forest Fire Losses in Canada - Canada Department of Forestry.

TABLE 4-10. Timber loss by fire in Manitoba[1] 1960-68

Year	Merchantable area burned acres	Sawtimber cu. ft.	Pulpwood cu. ft.	Total loss '000 cu. ft.
1960	138,916	444,200	68,527,000	68,971
1961	721,760	30,464,800	383,282,255	413,746
1962	81,125	500	63,179,480	63,180
1963	17,963	14,200	9,382,725	9,397
1964	302,125	40,050,000	131,316,245	171,366
1965	404	330	165,070	165
1966	765	2,022	320,620	323
1967	80,642	21,200	27,472,935	27,494
1968	5,973	420	3,027,955	3,028
Average	149,964	7,888,630	76,297,143	84,186

[1]These data include only fire losses on Manitoba crown lands and Indian Reserves. National parks, other Federal lands, private lands, and municipal areas are not included.

Source: Annual Reports, Manitoba Department of Mines and Natural Resources.

NORTHWEST TERRITORIES AND YUKON TERRITORY

The total area of these two territories is almost 1 billion acres, of which 27% is forest, 70% non-forest, and 3% water. Productive forest land is only 5% of the total area. Although the Northwest Territories is six times larger than The Yukon Territory, the latter has more productive forest land. However, the Northwest Territories has about one-and-a-half times the merchantable timber volume of The Yukon.

The only areas with reasonable access are those in the immediate vicinity of the major rivers. These same areas, namely, the Liard, Buffalo, Nisutlin, and Slave Rivers, contain a large portion of the better timber. (Map 5-2).

This timber is concentrated on the alluvial flats and does not usually extend beyond 1 mile from the river. Generally, the tree sizes are largest on the recent alluvium close to the river and diminish as the distance from shore increases.

White spruce and Balsam poplar are the main sawtimber species. However, borings taken from large pure stands of mature and over-mature balsam poplar indicate that there is a high incidence of decay. The affected trees have defoliated and broken tops.

The most suitable area for industrial development seems to be the Liard River Basin, especially the portion between the South Nahanni River and the 60th parallel, for it appears to contain the largest single tract of good timber in the Northwest Territories.

Any large-scale economic development of the forest resources in these four river-basins is adversely affected by the lack of accessibility

and transportation facilities. Areas between the 60th parallel and the market to the south have large sections of good forests, if not better than in any of the areas described. Lumber products can also be delivered cheaper from the south where large-scale production is already well established. New areas for harvesting operations will be opened in their turn as access fans out from areas already developed. In the meantime, the timber resources described here are better suited to small operation geared mainly for local use.

Annual timber production in the two territories averaged 3.4 million cubic feet from 1961 to 1969. The most important product has been white spruce sawlogs.

Fires over the same period destroyed an average of 30 million cubic feet of timber yearly.

As for future expansion of production, two forest regions in the Yukon and Northwest Territories are to be made available for commercial timber harvesting in 1970. Tenderers will bid for rights to cut timber in a 600,000-acre tract along the lower Liard River; on the Yukon-Northwest Territories border, which contains substantial volumes of white spruce; and in an area of 1.3 million acres between Whitehorse and Teslin, which contains white spruce and lodgepole pine.

In 1969, four companies were enfranchised to operate in the Yukon: Acorn Timber Limited in the Pelly and MacMillan Rivers region near Pelly Crossing in the Central Yukon; Timberline Development Services Limited on the Nisutlin River near Teslin; B.C. Forest Products Limited and Watson Lake Lumber Limited on the Liard River near Watson Lake in the southeastern Yukon.

Each agreement was based on an estimated annual production of 10 million board feet in 10 years. Each company must produce an average of 3 million board feet yearly during the first 5 years, and in subsequent years,

production must be not less than 3 million board feet yearly.

Stumpage has been set initially at $2.50/1000 board feet, with provision for adjustment after 5 years. Annual occupation-and-fire-protection fee is $15.80/square mile. Each agreement is for an initial period of 10 years, renewable for 10 more years.

MAP 5 – 1

FOREST DISTRICTS

★ HEADQUARTERS

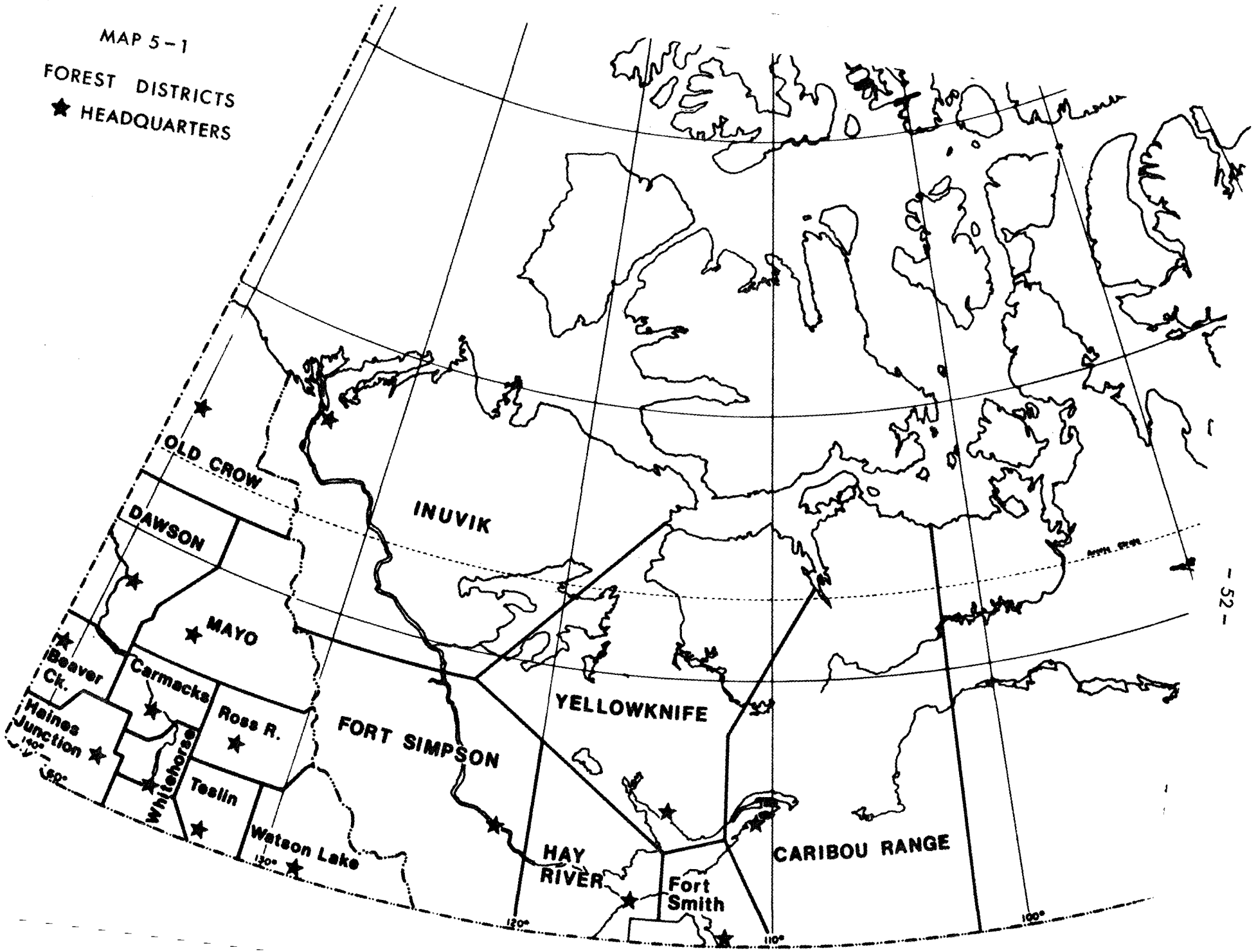


TABLE 5-1. Area classification - Northwest Territories and Yukon Territory

	'000 acres			
	Northwest Territories		Yukon Territory	
Classification	Area	% of Total	Area	% of Total
Forest land	124,544	15	51,968	39
Productive	21,504		26,944	
Softwood	14,464		14,464	
Mixedwood	6,080		8,832	
Hardwood	960		3,648	
Unclassified	-		-	
Non-productive	103,040		25,024	
Non-forest	677,656	81	79,454	60
Water	32,938	4	1,107	1
Total area	835,138	100	132,529	100

Source: Dominion Bureau of Statistics, Canadian Forestry Statistics, 1967. Cat. No. 25-202, annual.

TABLE 5-2. Merchantable timber by cover type, species, and size class - Northwest Territories and Yukon Territory

Location	Softwood		Hardwood		
	Spruce[1]		Poplar[2]		
	4"-9" d.b.h. M cds.	10" + d.b.h. MM cu.ft.	4"-9" d.b.h. M cds.	10" + d.b.h. MM cu.ft.	Total MM cu.ft.
Northwest Territories	112,000	600	41,000	424	14,029
Yukon Territory	76,000	926	18,700	180	9,156
Total	188,000	1,526	59,700	604	23,185

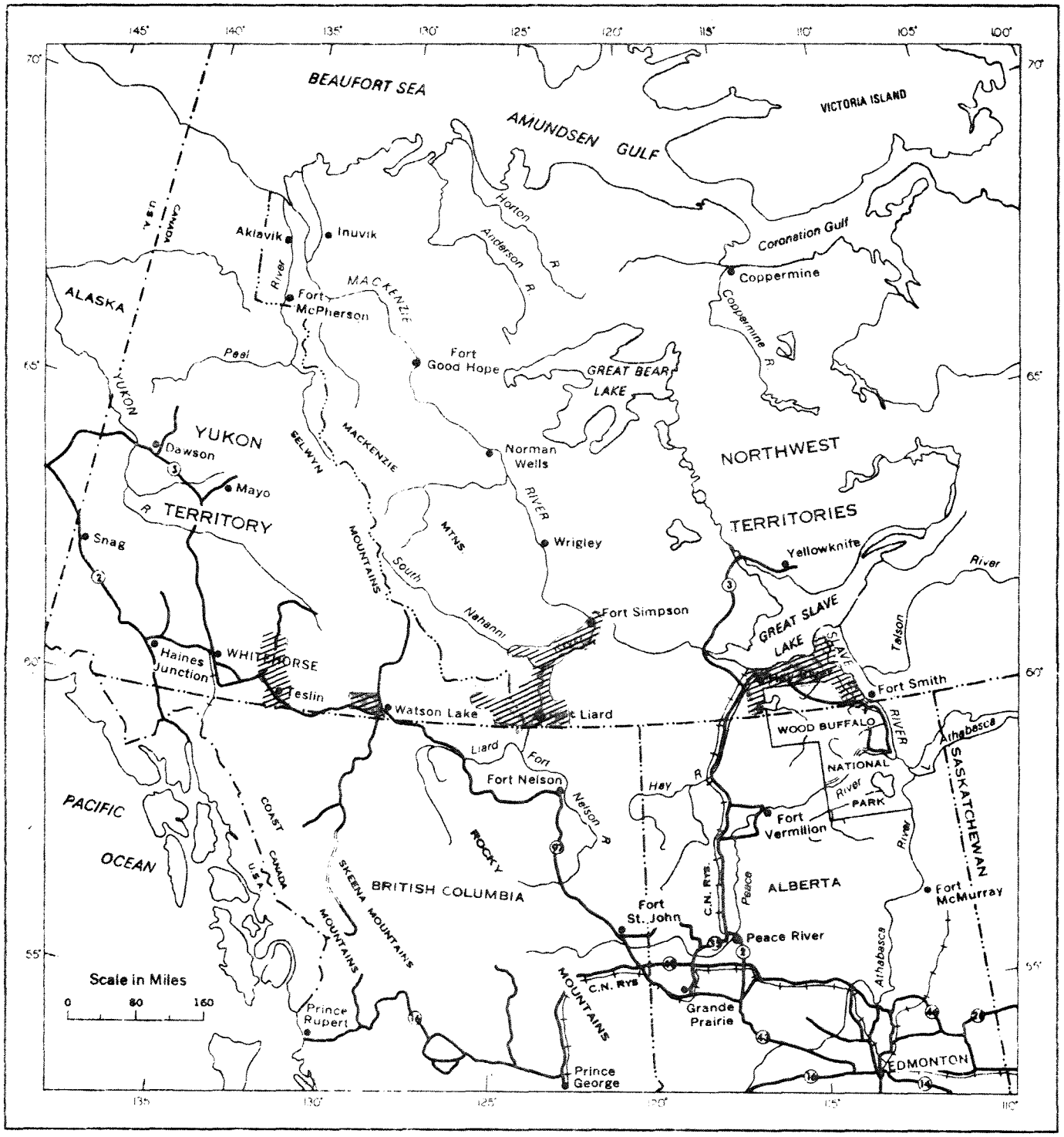
[1]Jack and Lodgepole pine and Balsam fir are included in "Spruce".

[2]White birch included in "Poplar" .

Source: Dominion Bureau of Statistics, Canadian Forestry Statistics, 1967. Cat. No. 25-202, annual.

MAP 5-2

KEY TIMBER TRACTS



MAP 5-2

KEY TIMBER TRACTS

NORTHWESTERN CANADA

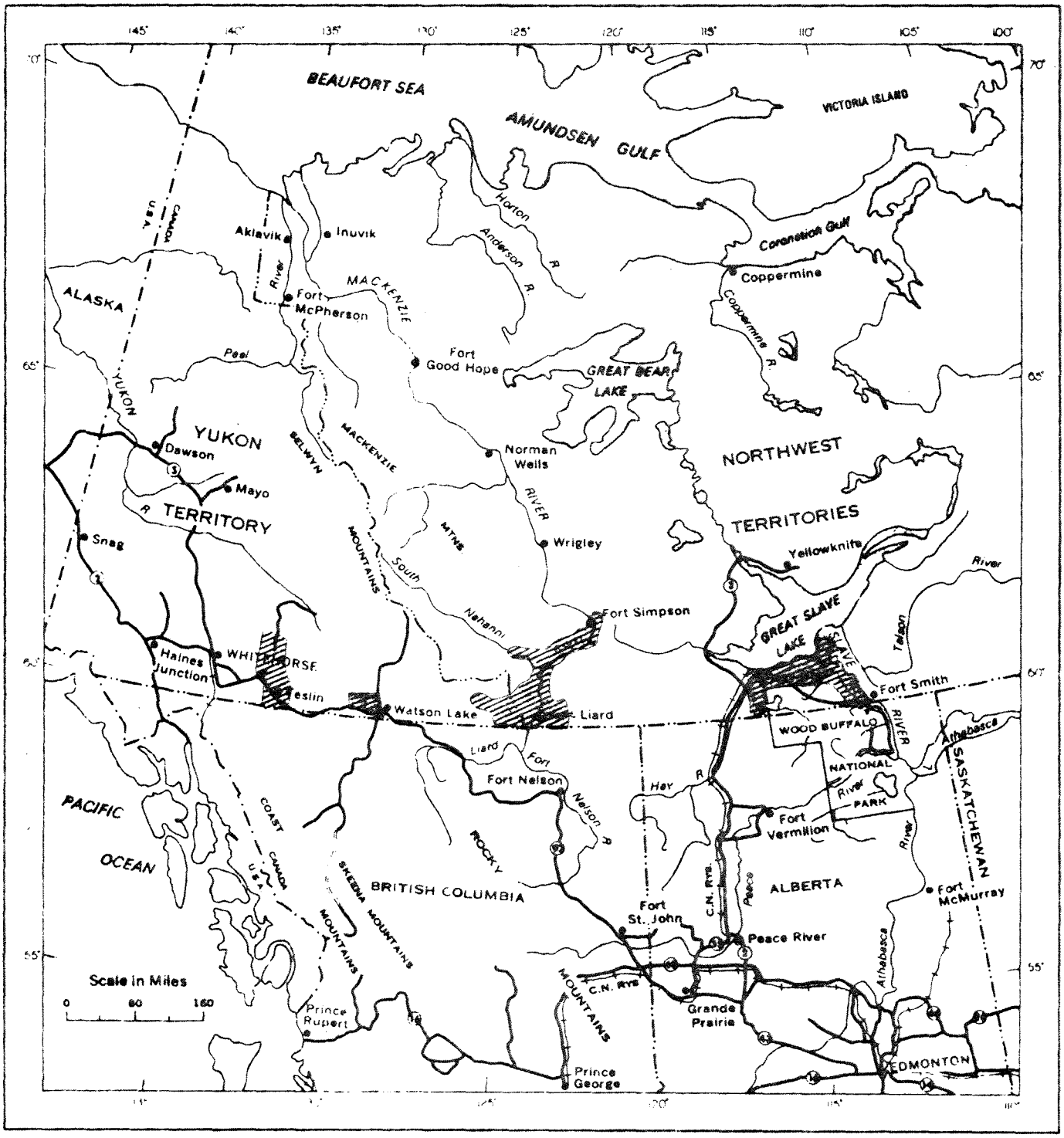


TABLE 5-3. Area classification of key timber tracts - Northwest Territories and Yukon Territory

Classification	'000 acres					% of total
	Liard River[1]	Buffalo River	Nisutlin River	Slave River	Total	
Forest land						
Productive forest	3,537	815	918	443	5,713	73
Softwood	1,078	430	894	65	2,467	32
Mixedwood	1,615	345	23	346	2,329	30
Hardwood	793	11	1	28	833	10
Total stocked	3,486	786	918	439	5,629	72
Total unstocked	51	29	-	4	84	1
Non-productive forest[2]	282	1,109	93	224	1,708	22
Water	139	90	56	89	374	5
Total area	3,958	2,014	1,067	756	7,795	100
Area in square miles	6,184	3,145	1,670	1,182	12,181	

[1] Includes Upper and Lower Liard.

[2] Includes all cleared land.

Source: Forest Management Institute, Canadian Forestry Service, Department of Fisheries and Forestry, Ottawa, Northern Survey Report Nos. 3,4, 5,6, & 7.

TABLE 5-4. Gross timber volumes by cover type, species, and size class for the key timber tracts - Northwest Territories and Yukon Territory

Location	Softwoods					
	White spruce		Black spruce		Jack pine and Lodgepole pine	
	4"-9" MM cu.ft.	10" + MM f.b.m.	4"-9" MM cu.ft.	10" + MM f.b.m.	4"-9" MM cu.ft.	10" + MM f.b.m.
Liard River	1,377	3,546	49	1	122	211
Buffalo River	346	4	50	-	231[3]	1[3]
Nisutlin River	120	139	30[2]	3[2]	118	13
Slave River[1]	-	168	-	-	-	-
Totals	1,843	3,857	129	4	471	225

Location	Hardwoods					
	Balsam poplar		Trembling aspen		White birch	
	4"-9" MM cu.ft.	10" + MM f.b.m.	4"-9" MM cu.ft.	10" + MM f.b.m.	4"-9" MM cu.ft.	10" + MM f.b.m.
Liard River	438	2,014	357	682	185	-
Buffalo River	21	-	232	2	10	-
Nisutlin River	14[2]	-	-	-	1	-
Slave River	22[4]	-	-	-	-	-
Totals	495	2,014	589	684	196	-

[1] Volume estimates were calculated only for merchantable sawtimber size stands 70' +.

[2] Included are 4.6 MM cu. ft. of 4"-9" alpine fir and 3 MM f.b.m. of 10" + alpine fir.

[3] Jack pine

[4] Totals were listed as poplar and represent both trembling aspen and balsam poplar.

Source: Forest Management Institute, Canadian Forestry Service, Department of Fisheries and Forestry, Ottawa, Northern Surveys, Reports Nos. 3, 4,5,6,& 7.

TABLE 5-5. Annual timber production for the Northwest Territories and The Yukon Territory by products 1960-69

Year	'000 cu. ft.					
	Logs	Fuelwood	Poles, piling	Mining timber	Other	Total
1960-61	1,018	613	752	-	1	2,384
1961-62	1,146	564	105	-	-	1,815
1962-63	2,031	851	172	1,042	10	4,106
1963-64	2,254	788	923	-	-	3,965
1964-65	1,583	870	271	491	49	3,264
1965-66	1,035	1,236	95	867	36	3,269
1966-67	1,708	1,337	22	563	27	3,657
1967-68	2,735	1,388	20	264	34	4,441
1968-69	2,083	1,368	79	2	320	3,852
Average	1,633	1,102	271	359	53	3,417

Source: Timber Production on Federal Lands, Forest Management Institute, Canadian Forestry Service, Department of Fisheries and Forestry, Ottawa.

TABLE 5-6. Forest fires in the Northwest Territories 1959-68

Year	No. of fires	Acreage burnt	Average fire size in acres	Total suppression costs in $	Suppression cost/acre in $
1959	78	110,845	1,421	59,844	.54
1960	92	101,682	1,105	55,293	.54
1961	167	758,230	4,540	279,804	.37
1962	82	26,325	321	77,806	2.95
1963	69	19,897	288	73,059	3.67
1964	162	470,484	2,905	315,167	.67
1965	109	9,204	84	85,732	9.31
1966	248	540,941	2,181	368,858	.68
1967	129	165,507	1,283	173,407	1.05
1968	117	566,952	4,846	132,713	.23
Average	125	277,007	2,216	162,168	.59

Source: Forest Fire Research Institute, Canadian Forestry Service, Department of Fisheries and Forestry, Ottawa.

TABLE 5-7. Timber loss by fire in the Northwest Territories 1959-68

Year	Sawtimber M f.b.m.	Small material cords	Total '000 cu. ft.
1959	-	194,020	16,492
1960	59,514	652,800	67,090
1961	-	255,698	21,734
1962	-	135,696	11,534
1963	-	18,132	1,541
1964	152	853,883	72,610
1965	422	14,158	1,287
1966	83,988	710,069	76,453
1967	20,097	113,521	13,668
1968	6,571	237,196	21,476
Average	17,074	318,517	30,389

Source: Forest Fire Research Institute, Canadian Forestry Service, Department of Fisheries and Forestry, Ottawa.

TABLE 5-8. Forest fires in The Yukon Territory 1960-69

Year	No. of fires	Acreage burnt	Average fire size in acres	Total suppression costs in $	Suppression cost/acre in $
1960	49	21,722	443	24,602	1.13
1961	50	95,277	1,906	36,853	.38
1962	46	19,855	432	15,501	.78
1963	44	11,679	265	45,421	3.88
1964	25	480	19	3,120	6.50
1965	75	18,674	249	142,088	7.60
1966	103	393,048	3,816	595,816	1.51
1967	98	283,610	2,874	257,136	.90
1968	86	33,811	313	172,544	5.10
1969	137	1,229,155	8,972	1,255,407	1.02
Average	71	210,731	2,956	254,849	1.20

Source: Yukon Forest Service, Whitehorse, Yukon Territory.

TABLE 5-9. Timber loss by fire in The Yukon Territory 1960-69

Year	Sawtimber M f.b.m.	Small material cords	Total '000 cu. ft.
1960	23	401	39
1961	2,095	1,446	542
1962	1,402	16,952	1,721
1963	4,396	2,689	1,108
1964	-	543	46
1965	6,577	39,793	4,697
1966	25,769	1,322,401	117,538
1967	1,260	142,041	12,325
1968	441	3,869	417
1969	107,951	1,151,656	119,481
Average	14,991	255,399	25,791

Source: Yukon Forest Service, Whitehorse, Yukon Territory.

WOOD BUFFALO NATIONAL PARK[1]

The total park area is 17,704 square miles or 11.3 million acres. Forty-eight per cent of the park is classed as productive forest; 45% being stocked and 3% unstocked cutover or burn. Non-productive forest, comprising marsh, brush, grass, and muskeg, accounts for 43%; water makes up the remaining 9%.

Gross merchantable timber volume on the forested areas of the park amounts to about 4 billion cubic feet. Softwood species, mostly white spruce and jack pine, account for 69% of this gross volume and hardwoods, led by aspen poplar, make up the difference.

The estimated gross merchantable board foot volume for the park is 4.4 billion f.b.m. on some 385,283 acres of mature forest. White spruce is the principal sawtimber species with 64% of total f.b.m., followed by aspen poplar (24%) and balsam poplar(10%).

Although timber production may not be a primary management objective for Wood Buffalo Park, a substantial forest industry exists there now (23 million f.b.m. cut in 1968-69). Logging is confined to mature and over-mature stands on the alluvial flats along the Peace River. Operations should be encouraged in similar stands on the Athabasca River, which are mostly overmature, many to the point of decadence. Such stands are not productive game-habitats but are excellent breeding areas for insects and diseases and could be the starting point for disastrous epidemics or a major fire.

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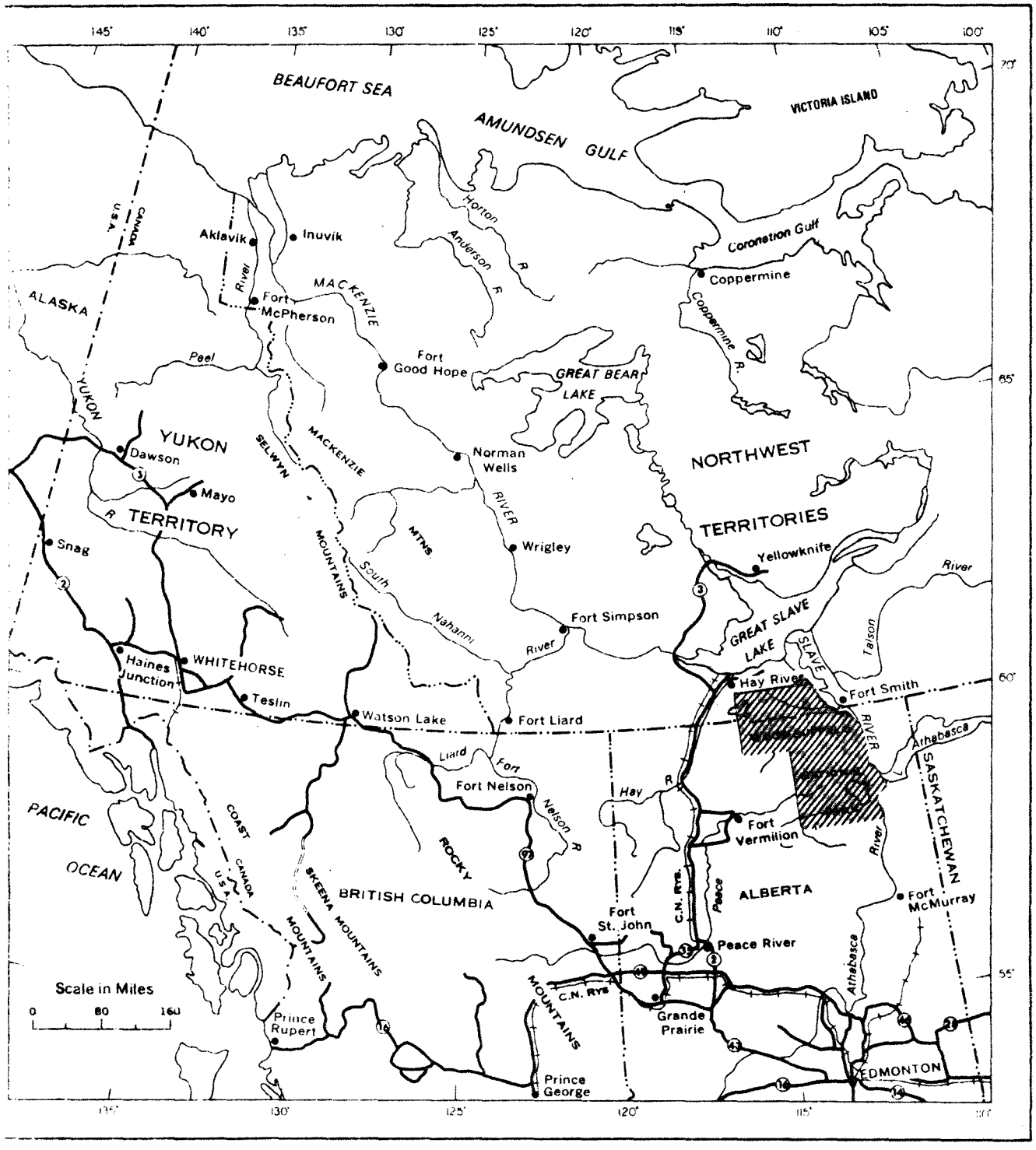
[1] Summary of "Report on Forest Surveys Wood Buffalo National Park Alberta-N.W.T. 1949-61" put out by the Forest Management Institute, Canadian Forestry Service, Department of Fisheries and Forestry, Ottawa, December 1969.

MAP 6-1

WOOD BUFFALO NATIONAL PARK



MAP 6-1

WOOD BUFFALO NATIONAL PARK

TABLE 6-2. Productive forest area by cover type and location - Wood Buffalo National Park

Location	'000 acres			
	Softwood	Mixedwood	Hardwood	Total[1]
Alberta	1,557	1,779	725	4,061
N.W.T.	452	539	21	1,012
Total park	2,009	2,318	746	5,073
% of total	39	46	15	100

[1] Does not include burned, cut-over or other non-stocked forest land.

Source: Report on Forest Surveys Wood Buffalo National Park Alberta-Northwest Territories 1949-61, Forest Management Institute, Canadian Forestry Service, Department of Fisheries and Forestry, Project No. FM 58, Ottawa, December 1969, Table 2.

TABLE 6-3. Gross timber volumes by location and species - Wood Buffalo National Park

Species	'000,000 cu. ft.			% of all species
	Alberta	N.W.T.	Total	
Softwood				
White spruce	1,320	343	1,663	42
Jack pine	623	333	956	24
Black spruce	99	41	140	3
Total softwoods	2,042	717	2,759	69
Hardwood				
Aspen poplar	707	246	953	24
Balsam poplar	228	22	250	6
White birch	14	8	22	1
Total hardwoods	949	276	1,225	31
Total all species	2,991	993	3,984	100

Source: Report on Forest Surveys Wood Buffalo National Park Alberta-Northwest Territories 1949-61, Forest Management Institute, Canadian Forestry Service, Department of Fisheries and Forestry, Project No. FM 58, Ottawa, December 1969, Table 3.