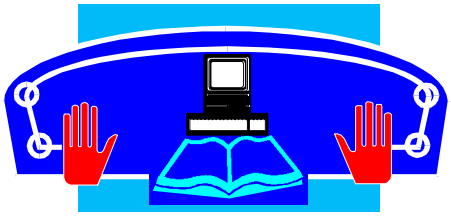


The Forest Industry In The Economy Of The Northwest Territories 1980-1981
Type of Study: Statistics / Economics
Forestry, Nwt Forestry General
Date of Report: 1986
Author: Canadian Forestry Service
Catalogue Number: 4-1-6

The Northern Forestry Centre (NoFC) of the Canadian Forestry service is responsible for fulfilling the federal role in forestry research, regional development, and technology transfer in Alberta, Saskatchewan, Manitoba, and the Northwest Territories. The main objectives of the center are research and regional development in support of improved forest management for the economic, social, and environmental benefit of all Canadians. Since 1982 thecenterhas also assumed responsibility {or the implementation of federal-provincial forestry agreements and employment stimulation programs in the forestry sector.

One of six regional centers, two national forestry institutes, and a headquarters unit, NoFC is located in Edmonton, Alberta, and has district offices in Prince Albert, Saskatchewan, and Winnipeg, Manitoba. Until joining Agriculture Canada in 1984 undera Minister of State (Forestry), the Canadian Forestry Service was part of Environment Canada.

cover photos:

Clockwise from upper left: exceptional sawlogs from the Slave Lake area, lumber produced at Slave River Sawmill Co. Ltd., portable sawmill, and pilings at Inuvik, NWT.

THE FOREST INDUSTRY IN THE ECONOMY OF THE NORTHWEST TERRITORIES, 1980-81

R.A. Bohning

1NFORMATION REPORT NOR-X-277

NORTHERN FORESTRY CENTRE
CANADIAN FORESTRY SERVICE
1986

Bohning, R.A. 1986. The *forest* industry in the economy of the *Northwest* Territories, 1980-82. Can. For. Serv., North. For. Cent., Edmonton, Alberta. Inf. Rep. NOR-X-277.

ABSTRACT

The forest industry and consumers of forest products in the Northwest Territories were assessed in 1981. The results are analyzed in terms of forest resources, employment, production, consumption characteristics, and socioeconomic impact, and information on commercial forest industry producers is provided in a directory. Numerous tables and figures provide detailed information.

RESUME

L'industrie forestière ainsi que les consommateurs de produits forestiers clans Ies Territoires du Nerd-Ouest ' furent évalués en 1981. Ce rapport présente Ies résultats de l'évaluation en terrnes de resources forestkres, des emplois, de la production, des caract6ristiques de consummation, et de I'impact socio-économique. L'information sur Ies producteurs commerciaux de l'industrie foresti6re est présentée sous forme d'annuaire. On y trouve un grand nombre de tableaux et de figures qui fournissent des renseignements détaillés.

CONTENTS

		Page
L	INTRODUCTION	1
	Study Area	1
	Study Methods	1
11.	THEFOREST RESOURCESOFTHENWT	3,
111.	THEFORESTINDUSTRYINTHENWT-A PERSPECTIVE	7
	Histoncrd Development	7
	Current Forest Industry	7
lv.	EMPLOYMENT INTHEFOREST INDUSTRYOFTHENWT	**10**
V.	PRODUCTION, CAPACITY, AND DOMESTIC MARKETSOF THEFOREST INDUSTRY lNTHENWT	13
	Production	13
	Sawmilfindustry	13
	Miscellaneousroundwoodindustry	16
	Fuefwoodindustry.	16
	Capacity.	16
	Domestic Markets	17
W.	CONSUMPTIONOFFORESTPRODUCTS lNTHENWT	19
	Consumption by Market Area	19
	Consumptionby Major ConsumingGroups	21
	Importsand Product Flows	21
	Originofimports	24
	Woodproductdistribution	27
	Woodproducttransportation	27
	Types of Forest Products Used	30
	DemandforForest Products	34
	Wood Product Availability	35
VII	THESOCIOECONOMIC IMPACTOFTHE FOREST INDUSTRYINTHENWT	37
	Employmentand WagesandSalaries	37
	Value Added	38
	The Economic Stabihtyo fNWTCommunities	38
	SUMMARY	41
	Forest Industry	41
	Resourcebase	41
	Industriafbase.	41
	Woodproductsproduced.	41
	Economic and social impacts	41
	Forest ProductConsumption	42
	Consumptioncharacteristics	42
	Product imports	42
	Productdistribution.	42
	Producttransportation	42
	Product type.	42

Page

ACKNOWLEDGMENTS 43

REFERENCES 43

APPENDIXES

1. Population by market area in the NWT, 1982 46
2. Wood producer questionnaire 47
3. Directory of primary wood-using industries in the Northwest Territories, 1981 51
4. Reasons for inadequate fuelwood records and method of estimating total fuelwood use 71
5. List of wood consumers 72
6. Selected metric units and conversion factors 73

FIGURES

1. Wood product market areas 2
2. Classification of forest regions in the NWT 4
3. Forest inventory areas 6
4. Location of milk 8
5. Seasonality of employment in the forest industry, 1980 12
6. Forest industry production by industry group, 1980-81 14
7. Consumption of forest products by market, 1980-81 20
8. Lumber consumption by market area, NWT, 1980-81 22
9. Consumption of forest products by consumer group, 1980-81 23
10. Zones of origin of imported wood products, 1980-81 25
11. Origin of wood products imported into the NWT, 1980-81 26
12. Wood product distribution, 1980-81 28
13. Major transportation routes 29

TABLES

1. Area classification of the NWT 3
2. Wood volume estimates for the NWT 5
3. Direct employment by forest industry group in the NWT 1980-81 10
4. Regional distribution of forestry employment in the NWT, 1980-81 11
5. Native employment in the forest industry in the NWT, 1980-81 12
6. Forest industry production by market area in the NWT, 1980-81 13
7. Products from NWT sawmill-planing mills and shingle mills, 1980-81 15
8. Output of forest products in the NWT 16
9. Engineered capacity, normal output, and operating ratios by sawmill group in the NWT, 1980-81 17
10. Markets for forest products in the NWT, 1980-81 18
11. Value of production of the forest industry in the NWT, 1980-81 18
12. Consumption of forest products by market area in the NWT, 1980-81 19
13. Consumption of forest products by consumer groups in the NWT, 1980-81 24
14. Imports of wood products into the NWT by area of origin, 1980-81 27
15. Final mode of transportation for wood products consumed in the NWT by market area, 1980-81 30

Page

16. Highway distance from points in Alberta, British Columbia, the Yukon, and the NWT and corresponding average tariff for truckload lots. 31
17. Barge tariffs for the Mackenzie River and western arctic 31
18. Lumber prices of distributors by market area in the NWT, 1980-81, in dollars per M fbm 32
19. Detailed breakdown of lumber product consumption in the NWT, 1980-81 33
20. Plywood use by thickness and finish in the NWT, 1980-81 34
21. Wood products not readily available in the NWT, 1980-81 36
22. Employment, earnings, and average income per employee by forest industry group in the NWT, 1980-81 37
23. Sales in relation to wages and salaries in the foreat industry in the NWT, 198041 38
24. Value added and sales of the forest industry in the NWT, 1980-81 39
25. Employment in the forest industry in some NWT communities, 1981 40

NOTE

'he exclusion of certain manufactured products does not necessarily imply disapproval nor does the mention of other products necessarily imply endorsement by the Canadian Forestry Seruice.

CHAPTER I

INTRODUCTION

The importance of the forest resource to the social welfare of residents in the Northwest Territories (NWT) cannot be defined in monetary terms alone. This is because of the intrinsic and invaluable contribution of the forest to traditional native lifestyles and its part in the cultural heritage of northern society. Historically the forest has played a particularly diverse and important role in the development of the north and in the future this role is expected to continue to evolve in terms of the type and nature of forest resource use. In order to ensure sound management decisions, more information is required on resource characteristics, production attributes, and resource development opportunities.

This report investigates a single[1] aspect of the forest resource in the NWT: forest products. Forest products in the NWT include fuelwood, building logs, lumber, shingles, pilings, and posts and poles. These products are either traded in active product markets or produced and consumed in local markets without the exchange of money. Both of these market structures areconsidered in this report.

In his 1977 report on the proposed Mackenzie Valley pipeline development, Chief Justice T. Berger (1977) recommended a 10-year moratorium on resource development. One of the reasons fortherecommendation was to allow time to develop the renewable-resource sector in the NWT so that alternative employment opportunities appropriate to traditional lifestyles would be available. Development of the renewable-resource sector, however, is contingent on the existence of markets within which products from the sector will be competitive. An additional objective of this report, therefore, is to assess characteristics of wood consumption in the NWT and to analyze the extent to which locally produced forest products could substitute for imported materials.

In summary, the purpose of this report is to assess and describe various aspects relating to the production and consumption of forest products in the NWT. The report considers both the wage and nonwage sectors of the northern economy and provides improved information for use by development and resource management agencies in the NWT.

Study Area

The study area was defined as the portion of the NWT that lies south and west of the tree line and the parts of the arctic coast where communities would be supplied from distribution centers within the forested area. The area is generally referred to as the western NWT. For ease of interpretation, the study area is divided into six market areas (Fig. 1). The delineation of the market areas is based on the present transportation infrastructure. Geographically, these areas generally correspond to the forest administration regions or subregions of Indian and Northern Affairs Canada (INAC). Community population figures by market area are provided in Appendix 1.

Study Methods

Due to the lack of existing detailed information with which to fulfill the study objectives, a survey was undertaken to obtain the necessary data. In July 1981, a survey team from the Northern Forestry Centre, Canadian Forestry Service, Edmonton, conducted interviews with wood producers and major wood consumers in the NWT. Where personal interviews were not possible, telephone surveys were completed. Sample questionnaires are shown in Appendix 2. INAC records were initially used to determine the number and location of wood producers, and additional information was provided by field staff and other producers. Wood consumers were located through telephone and business directories and other consumers. The survey was based on a 12-month period beginning in 1980 and ending in 1981. Fiscal year-ends varied among respondents.

The information in this report was summarized by forest industry group and consuming group. For the purpose of this report, the definition of the forest industry is limited to primary wood-using industries. h includes only firms using roundwood in their manufacturing processes or engaging in logging activities. Three industry groups were identified: sawmill-planing mill complexes, miscellaneous roundwood producers, and fuelwood producers. Appendix 3 contains a directory of commercial producers and other relevant information on sawmill owners.

---

[1] Other goods and services associated with the forest include country food, fur-bearing animals, and tourism opportunities.

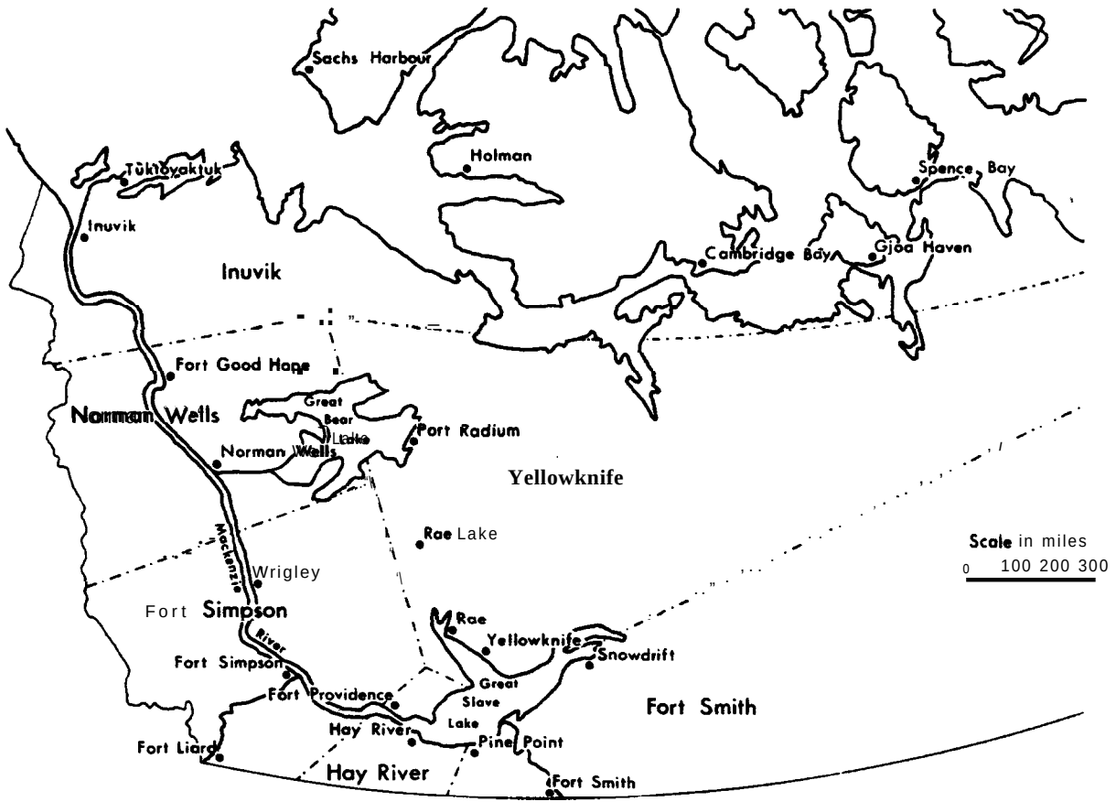


Figure 1. Wood product market **areas.**

In attempting to determine the total amount of fuelwood produced by commercial operators and individual users, it was found that INAC timber permit records did not adequately reflect the total amount of fuelwood used. In view of the limitation on time and monies available for an in-depth survey of the individual or domestic fuelwood users (those who cut fuelwood for their own use), estimates of total fuelwood consumption were derived. Reasons for inadequate fuelwood records and the method of estimating total fuelwood use are given in Appendix 4.

Consumers of wood products were classified into five major industrial groups. These were identified as constmction industry, mining industry, oil industry, government agencies, and others. The others group includes individual private consumers and other industrial firms not included in the designated groups. Wood product distributors (principally building supply firms) **were identified and** their role was explained. Surveyed wood consumers are listed in Appendix 5.

All measurements are provided in imperial units, because the industry has yet to convert to metric standards. Metric conversion values and timber product equivalents are provided in Appendix 6.

CHAPTER 11

THE FOREST RESOURCES OF THE NWT

The totaf area of the Northwest Territories is 1304294 sq. mi., 40% of which is within the tree line[2]. Within this area approximately 237390 sq. mi. are considered to be forest land[3], of which 55 198 sq. mi. (23%) areconsideredto beproductiveforest land (Table 1). Reductive forest landis defined by Bonnor (1982) as land capable of producing tree stand heights greater than 16.5 feet at base age of 50 years.

The forested area of the NWT is classified as Boreal Forest (Rowe 1972). The Boreal Foreat in the NWT includes parts of seven forest sections; however, only three sections — Upper Liard, Hay River, and Upper Mackenzie — support forests of commercial significance (Fig. 2). Within these areas the river valleys have the most favorable environment for tree growth, and it is here that the best timber is found.

White spruce (*Picea gZauca* (Moench) Voss) and **baisam poplar** (*Populus balsamifera* L.) are the predominant species bordering the rivers. White spruce, trembling aspen (*Populus tremuloides* Michx.), white birch (*Betula papyrifera* Marsh), and jack pine (*Firms' banksiana* Lamb.) are found on the benches above the flood plains. In moist and wet locations, black spmce (*Picea* mariana {Mill) B.S. P.) and tamarack (*Larix laricina* (Du Roi) K. Koch) dominate. On the upland plateaus, black spruce and jack pine are the main tree species; however, scattered stands of white spruce are also found here. White spruce is the most important commercial tree species in the NWT and is the only species utilized to any extent.

Table 1. Area classification of the NWTa

Classification	Area (Sq. mi.)
Forest land	
Productive	55198
Unproductive	182192
Total	237390
Wildland	290110
Totaf land area within tree fine	527500
Tundra	725456
Totaf land area	1252956
Total water area	51338
Total area	**1304294**

a Source: Bonnor 1982.

Long distances, transportation and communication constraints, labor limitations, and a lack of other resources have made forest inventory work difficult in the NWT. As a resuh, comprehensive forest resource inventory data are not available, and precise estimates of wood volumes and forest productivity projections are not possible. Bonnor (1982) estimated gross merchantable volume (to 4-in. top diameter) for all tree species in the NWT at 15 750 MM (million) cu. ft., with 11114 MM CU. ft. (70.6%) being coniferous. Approximately 68% of this total volume is mature and overmaturetimber. These volumes are found on 53032 sq. mi. of the productive nonreserved forest land based

Productive forest land suitable for contmerciaf development is estimated at 21767 sq. mi., with a mean annuaf increment of 11.4 merchantable cubic feet per acre (Bickerstaff et al. 1981). This results in totaf merchantable timber growth of approximately 155 MM cu. ft. annually. Bickerstaff et af. (1981), however, assumed that 25% (38.6 MM cu. ft.) is unavailable for forest production because of factors such as low volume stands, size utilization, or local terrain problems influencing logging; therefore, 116.4 MM cu. ft. of new timber are available annually. Depletion was not considered in these estimates.

Depletion includes all reductions in growing stock caused by fire, insects and diseases, harvesting, and other physicaf factors. Depletion statistics are available only for harvests and fire. in the NWT, depletion of the forest resource by cutting is negligible, but fire losses are significant. In 1979, 31% of the totaf inventoried

[2] This area covers latitudes 60-70°N and longitudes 95-137°W and is very diverse in terms of vegetation, climate, soils, and landforms.

[3] The forest resources of the NWT are administered by the Timber Management Section and tfre District Resource Management officers of INAC.

[4] Of the productive forest lend base, 2166 sq. mi. ar, reserved and not available for harvesting of forest crops.

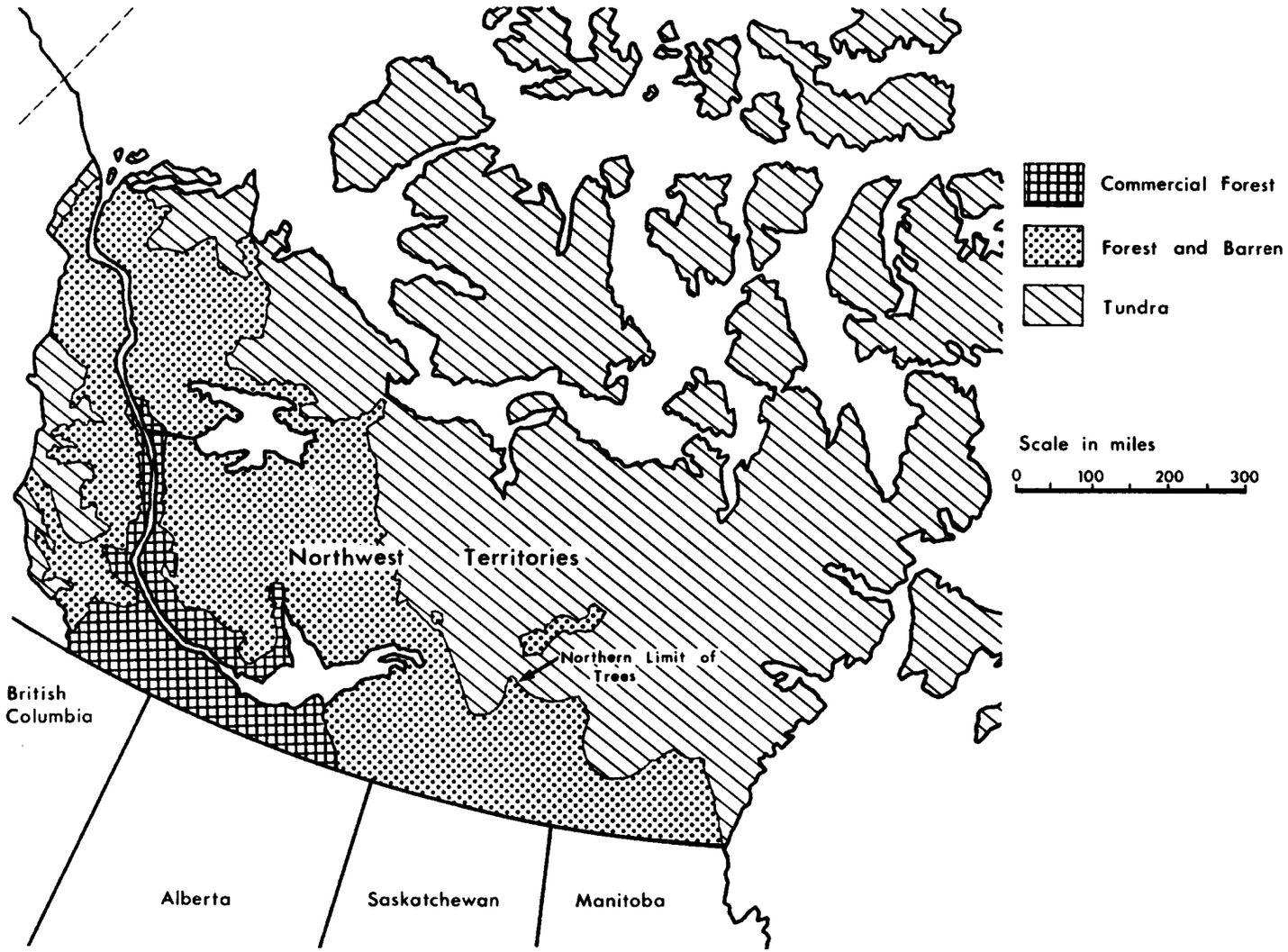


Figure 2. Classification of forest regions in the NWT.

Table 2. Wood volume estimates for the NWT

FMU[a] or district	Area (sq. mi.)	Volume[b] (MM fbm)	Source	Comment
Slave FMU	3641	132	Gilmourc	32 MM fbm of volume from stands with marginal merchantability ,
Hay FMU	5375	74	Gilmourd	17.6 MM fbm of volume from stands with marginal merchantability
Mackenzie River Valley, southern section	11770	2645	Hirvonen 1975	Volume for softwood stands only = 1824 MM fbm
Mackenzie River Valley, central section	7150	489	Hirvonen 1975	Volume for softwood stands only = 356 MM fbm
Mackenzie River Valley, northern section	16850	390	Hirvonen 1975	
Lower Liard FMU, survey area NWT only	4200	2754	Hirvonen 1968	
Lower Liard FMU, survey area only	2727	1857	Cilmoure	Spruce ptdpwood volume 568 MM CU. ft.

[a] Forest Unit.
[b] Spruce sawtimber trees with height ≥ 60 ft. end diameter at breast height ≥ 10 in.
[c] Cifmour, J. 1979. White spruce sawtimber inventory, Steve Forest Unit. Indian and Norihern Affairs Canada, Fort Smith, NWT. File report.
[d] Gilmour, J. 1979. An analysis of the forest resowes of the NWT. Indian and Northern Affairs Canada, Fort Smith, NWT. File report.
[e] Cilmour, J. 1982. Lower Liard timber inventory, 1982. Indian and Northern Affairs Canada, Fort Smith, NWT. File report.

merchantable sawtimber in the Slave Forest Management Unit (FMU) was lost to fire (Gilmour[6]). Statistics show that annually from 1964 to 1973, 1.3% of the productive forest land in the NWT was burned over by fire (Bickerstaff et al. 1981). This loss is two times larger than losses in the Yukon (which has the second-largest fire loss value) and 10 times larger than those in Alberta. At the national level, 0.1-0.2% of the productive forest land area is burned over annually.

Volume estimates (mainly spruce sawtimber) for the Slave, Hay, and Lower Liard forest management units and the Mackenzie Valley (Fig. 3) are summarized in Table 2. While volumes estimates vary significantly, a resource of considerable value is evident. Gilmour[7] has suggested that due to fire losses a sustained sawtimber yield, given the present harvest, is probably not possible in the Slave River and Hay River units.

The Liard FMU contains the largest and most productive single tract of good timber in the NWT. There have been at least five different forest inventory surveys of this area. All surveys cover somewhat different areas and methods vary among investigators; however, all estimates indicate that substantial volumes of mature spruce timber exist. The new all-weather road from Fort Nelson, B. C., to Fort Simpson provides direct access to this timber resource, and commercial exploitation of this timber will therefore now be more attractive.

[5] Intfrecontext of a theoretical totaf wood increment, cutting is negligible; however, sawlog production from suitable environments, such as the riverine stands along the Slave River or stands on the dopes of the Cameron Hills, is predicted on a controlled depletion cut from a limited production base.

[6] Gilmour, J. 1979. White spruce sawtimber inventory, Slave Forest Management Unit. Indian and Northern Affairs Canada, Fort Smith, NWT. File report,

[7] Cilmour, J. 1979. An analysis of the forest resources of the NWT. Indian and Northern Affairs Canada, Fort Smith, NWT. File report.

The most recent survey by Gilmour[8] shows that the Lower Liard FMU covers an area of 5.3 million acres, 81% of which is classified as productive, stocked land. The reliable minimum estimate for white spruce sawtimber[9] in the Lower Liard FMU harvest area is 1857 MM foot board measure (fbm). White spruce pulpwood[10] volume was calculated to be about 568 MM cu. ft. and hardwood pulpwood volume to be 874 MM cu. ft.

All stands in the Lower Liard FMU with a mean height of less than 50 ft. were considered to be immature stock. Estimates of volumes or growth were not made for these stands. Immature productive strata on site classes 1 and II occupy 968580 acres; class I and II sites are considered good sites capable of growing white spruce to sawtimber size. Gilmour[11] did not consider these sites because sufficient data were not available to allow for any sound conclusions about their potential.

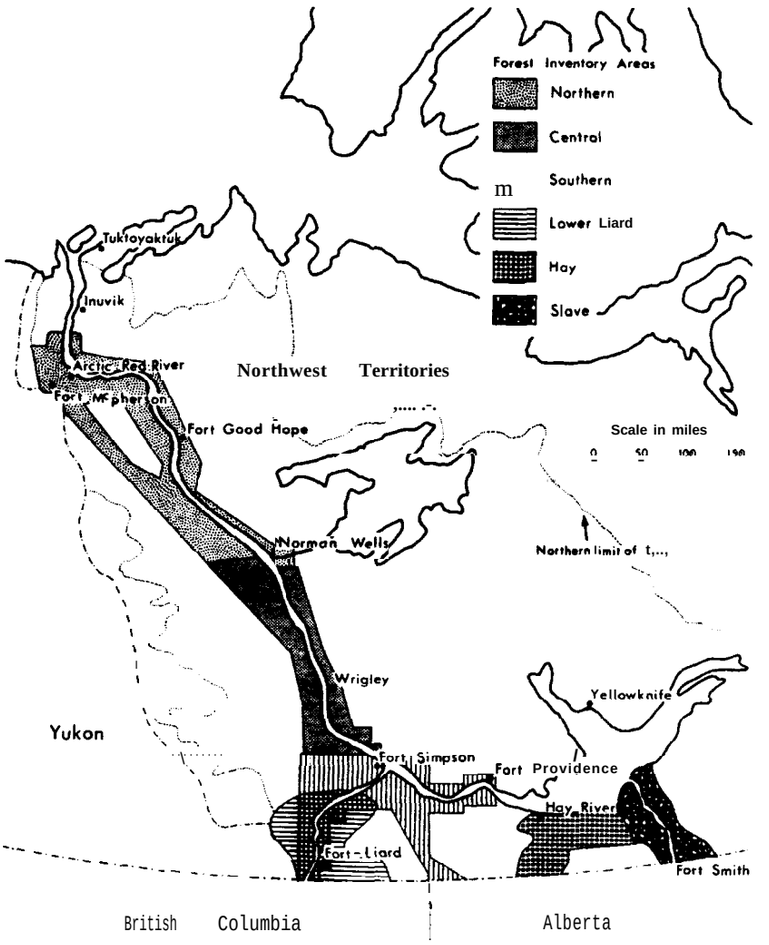


Figure 3. Forest inventory areas.

[8,11] Gilmour, J. 1982. Lower Liard timber inventory, 1982. Indian and Northern Affairs Canada, Fort Smith, NWT. File report.

[9] Spruce sawtimher includes trees with heights equal to or greater than 60 fs. and with diameter at breast height equal to or greater than 10 in.

[10] Pulpwood includes trees with a minimum diameter at breast height of 6 in. and a 3-in. top diameter inside bark.

CHAPTER 111

THE FOREST INDUSTRY IN THE NWT-A PERSPECTIVE

Historical Development

The first permanent settlements in the Northwest Territories were established by the European fur trade in the early part of the nineteenth century (Kitto 1930). The native people of the area gradually congregated around the trading posts. During this period wood was used for fuel and building logs.

The RCMP and religious organizations followed; Anglican and Roman Catholic orders established churches, schools, and hospitals. The growth of communities created a market for milled lumber and resulted in the establishment of several community sawmills. One of the earliest sawmills was constructed at Fort Resolution in the 1840s (Government of the Northwest Territories 1977); however, the demand for lumber was not significant and the sawmifls were operated on a local demand basis onfy untif the 1920s.

Demand for timber increased again with the development of the mining and petroleum industry in the NWT. Oil was discovered in 1920 at Norman Wells, and mineral exploration work began at Pine Point in 1929. Trees around these development sites were harvested for mine props, timbers, and construction lumber.

The forest resource played an important role in the development of the mining sector (INAC 1973):

> After the discovery of pitchblende at Port Radium on Great Bear Lake in 1930, the development of the mine was dependent to a large extent on the availability of a good supply of mine timbers. Although the timber around Port Radium was not large, it was physically and economically suitable, and many millions of linear feet were cut and used, during the 30 years of its operating life.

Other developments, including the gold mines at Yellowknife and later the Canada Tungsten mine on the Upper Flat River adjacent to the NWT-Yukon border, created similar demands for lumber. Both mines had sawmills associated with their early development.

By the 1930s, four sawmills were operating in the NWT, two at or near Fort Smith, one at Fort Resolution, and one at Fort Simpson. Products from the mills were transported by boat along the Mackenzie and Slave rivers from Fort Smith to Aklavik.

Early records on volumes of wood harvested are not available or are incomplete. Statistics from the Lands, Parks, and Forests Branch of the federaf Department of the Interior (1931) indicate that timber permits were issued for the cutting of 57000 linear feet of timber, 120 M (thousand) fbm of lumber, 893 roof poles, and 2466 cords of fuelwood in 1930. These figures do not include the volumes harvested on timber berths located mainly in Wood Buffalo National Park.

In the 1950s and 1960s, development evolved around an expansion of communication, transportation, and government service centers such as Inuvik, Hay River, Yellowknife, and Fort Smith. The growing demand for improved education, housing, and other social services sparked a period of intensive construction in both the private and public sectors.

During the 1970s and early 1980s, petroleum exploration in the Mackenzie Delta and the Beaufort Sea, continued activity in the Norman Wells production field, and a general expansion phase in the mining sector sustained the demand for wood products.

Current Forest Industry

The forest industry is currently composed of three industry groups: sawmills, miscellaneous roundwood producers, and fuelwood producers. In 1981 the sawmill industry consisted of nine operating sawmills: three in the Fort Smith area, three in Hay River, two in the Fort Simpson area, and one in the Norman Wells area (Fig. 4). The replacement value of the capital stock invested in the nine operating sawmills was estimated to be $5.5 million. There were five community-managed sawmills (none operational in 1981) located at Jean Mane River, Wrigley, Arctic Red River, Fort Franklin, and Fort McPherson. Annual sawmill production totaled just over 6 MM fbm; however, only two sawmills (one at Fort Resolution and one near Hay River) each produced 1 MM fbm or more annually.

There were 25 miscellaneous roundwood producers holding timber permits and a number of producers without permits. The producers without permits were primarily located in isolated communities or were

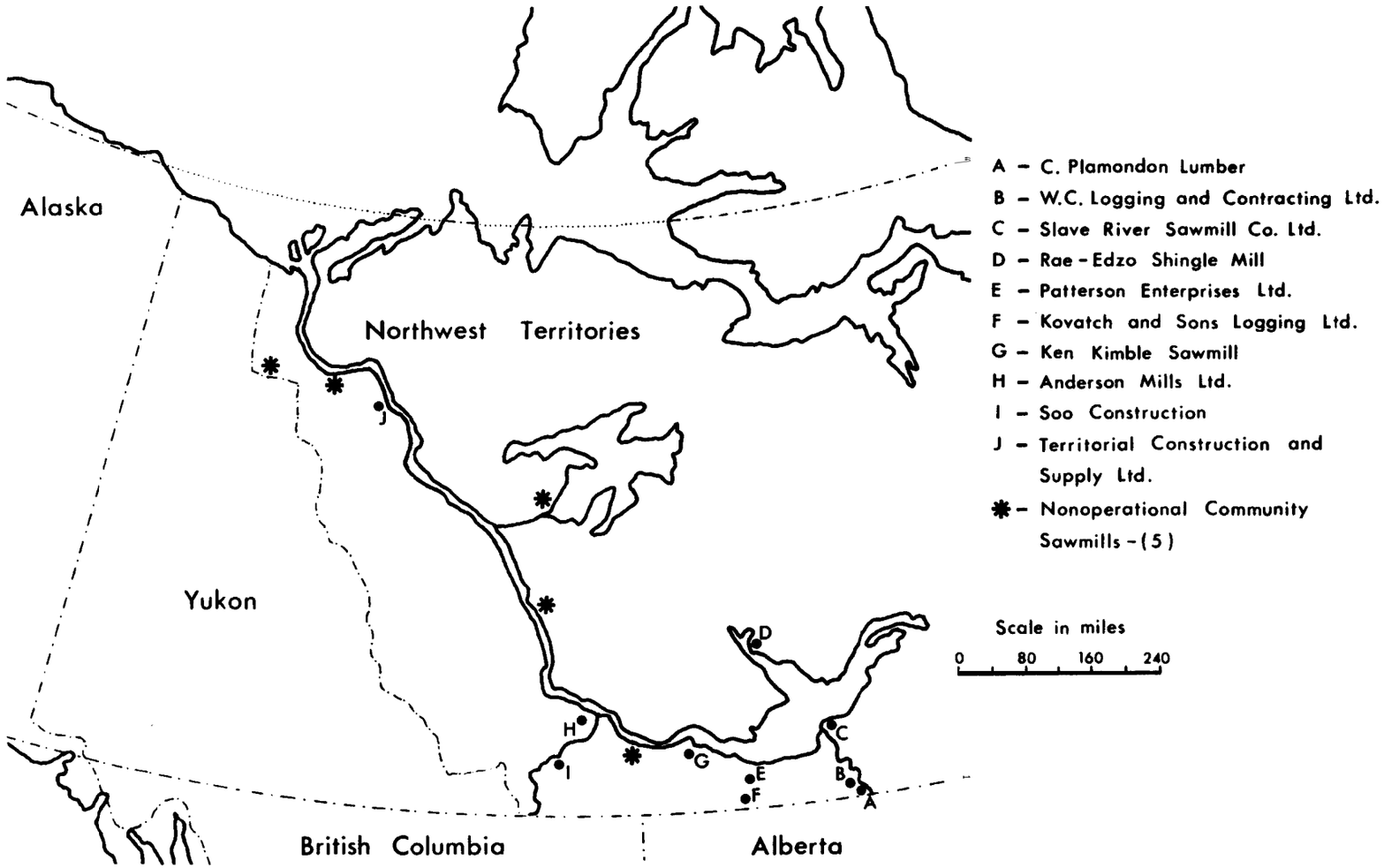


Figure 4. Location of mills.

removing timber from Commissioner's Lands. Annual output per producer ranged from less than 100 cu. ft. to more than 50000 cu. ft. Most of this timber was used as construction material for log homes in the local communities.

Fuelwood consumption in the NWT has steadily increased with population growth. With the initiation of rent and fuel oil subsidies in the 1950s, fuelwood demands dropped, especially in the larger communities. **Fuelwood use** in the more traditional, isolated communities was not affected. Escalating oil prices since the 1970s have led to renewed interest and demand for wood as fuel.

Today fuelwood is supplied by commercial operators and is harvested by individuals for their own use. There are 18 commercial operators producing anywhere from 30 to 1200 cords of wood annually. The domestic user can require from 8 to over 15 cords of wood per' year. Domestic consumption is influenced by location, severity of winter, size of home, insulation, type of wood available, heating system, and probably most importantly, individual demands for heat.

CHAPTER IV

EMPLOYMENT IN THE FOREST INDUSTRY OF THE NWT

In 1980–81, the commercial forest industry in the Northwest Terntones provided 91.4 person-years[12] (1097 person-months) of direct employment (Table 3). The sawmifl-phuting miU complex group provided 67% of this employment, while miscellaneous rourtdwood producers and commercial fuelwood suppliers contributed 15% and 18%, *respectively*.

In determmm'ng employment figures for fuelwood production, onlythecommercial operators wereincluded, and no employment figures were gathered for the individual or domestic fuefwood producer. The domestic producer, however, accounted for 69% of the total fuelwood volume harvested. By applying the average employment productivity factor calculated for commercial fuelwood operations[13] to domestic production, the employment created-by domestic fuelwood production was conservatively estimated to be 470 person-months. The combined calculated domestic and commercial employment totafed 55.5 person-years (667 person-months) and accounted for 43% of the total forest industry employment, which is significantly greater than the 18% represented by using commercial fuelwood production data only (Table 3). Because the domestic fuelwood employment does not contribute to wage or employment statistics and an accountable cash income,' however, it cannot be considered a measurable component of the wage economy. Even though domestic fuelwood production generates local economic activity, its employment impact is not fully considered in this report.

Most opportunities for employment existed in the Fort Smith area, which provided approximately 50% of forest industry employment. The Hay River and Yellowknife market areas wereafsofairly important employment centers, generating 21% and 17%, respectively, of forest industry employment. The other market areas of Fort Simpson, Norman Wells, and Inuvik had fewer jobs associated with the forest industry (Tabfe 4).

There was a definite seasonal employment pattern in the NWT forest industry (Fig. 5). During a 6-month period (November to April) almost all Iogging associated

Table 3. Direct employment by forest industry group in the NWT, 1980-81

	Person-years of employment			% of forest industry
	Logging	Milf	Totaf	
Sawmills-planning mills and shingle mills	205	532	737	67
Miscellaneous roundwood: building logs, pillings, and posts and poles	163	N/A	163	15
Commercial fuelwood suppfiers	197	N/A	197	18
Totaf	565	532	1097	100a

a Logging is 51% and mills are 49%.
N/A Not applicable.

12 A full person-year is defined as one person working 8 hours per day, 5 days per week, 48 weeks per year (1920 hours per year).
13 Theproductionof20 cords of delivered stove-iength fuelwood requires one person-month of labor.

with sawmill operations is Completed. Access to the largerlogging operations is often possible only during the winter months, when the ground is frozen and inexpensive, temporary roads can be constructed. During the summer months some miscellaneous roundwood and fuefwood producers fog in areas where access is not a problem. Almost aff sawmiffing occurs during the warm months (May to October). In some operations, the loggers double as mill workers, doing both jobs at different times of the year. The available labor force is gerterafly adequate, but experienced, skiffed workers are difficult to attract and retain when operations involve only a 6month working period.

Native[14] participation in the NWT forest rndustry is high, comprising 83% of the work force in 1981 (Table 5). AsirtgIeperson-year statistic often represents financial support for severaf families, as some mtive people seek only short-term employment each year in order to finance their traditional activitieaof hunting, fishing, and trapping. Native employment is abnost equally distributed between logging and sawmiIl workers.

Table 4. Regional distribution of forestry employmentin the NWT, 1980-81

Market area	Total person-months of employment	%employment by region
Fort Smith	523	48
Hay River	235	21
Fort Simpson	57	5
Yellowknife	189	17
Norman WefIs	40	4
Inuvik	53	5
Total	1097	100

ThemisceUaneous roundwood industry employed a higher percentage of natives (93%)than any other forest industry group. The Government of the Northwest , Territories (GNWT) sponsors programs such as the Smaff Settlement Home Assistance Grant (SSHAG), which sI1ows peopfe in designated communities to make use of indigenous materials such as logs to construct homes.

In the forested area of the NWT, people of native ancestry made up only 37% of the population but comprised 83% of the direct forest industry employment. It is evident, therefore, that the forest industry is very important to the native peoples of the NWT. It is one of the few wage-oriented industries in the region dominated by a native work force.

To calculate the total employment impact, indirect employment as weff as direct employment must be considered. Indirect employment is created when forest industry firms purchase fuel, power, operating suppfies, machinery, transportation, and other services. Indirect employment is also created as a result of foreat workers purchasing Consumer goods and services in the marketplace. Those job-creating effects are referred to as indirect employment impacts and are measured by an empfoymertt muftipfier. Empirical evidence from the United States and Canada suggests that an average forest industry multiplier of 2.0 is reasonable for forest-based communities.[15] Using anempioyment muhipiierof 2.0 meartsthat for every person-month of direct employment in the forest industry, one person-month of indirect employment is created elsewhere in the NWT economy. Based on the employment multiplier, the total employment impact (both direct and indirect) was 183 person-years (2194 person-months) for the NWT forest industry in 1980-81.

[14] Natives are defined as Dene, Inuit, and Metis peoples.

[15] For a discussion of indirect employment impacts in the forest industry, seeOndro and Williamson (1984).

Table 5. Native employment[a] in the forest industry in the NWT, 1980-81

Industry group	Total industry employment[b]		Native employment			
			Logging		Mill	
	Logging	Mill	No.[b]	% of industry	No.[b]	% of industry
Sawmills-planning milk and shingk mills	205	532	151	74	425	80
Misc&us roundwood: building logs, pilings, and posts and poks	163	0	152	93	0	0
Commercial fuelwood suppliers	197	0	179	91	0	0
Total	565	532	482	85	425	80

[a] Defined as Dene, Inuit, and Metis peoples of the NWT.
[b] In person-months.

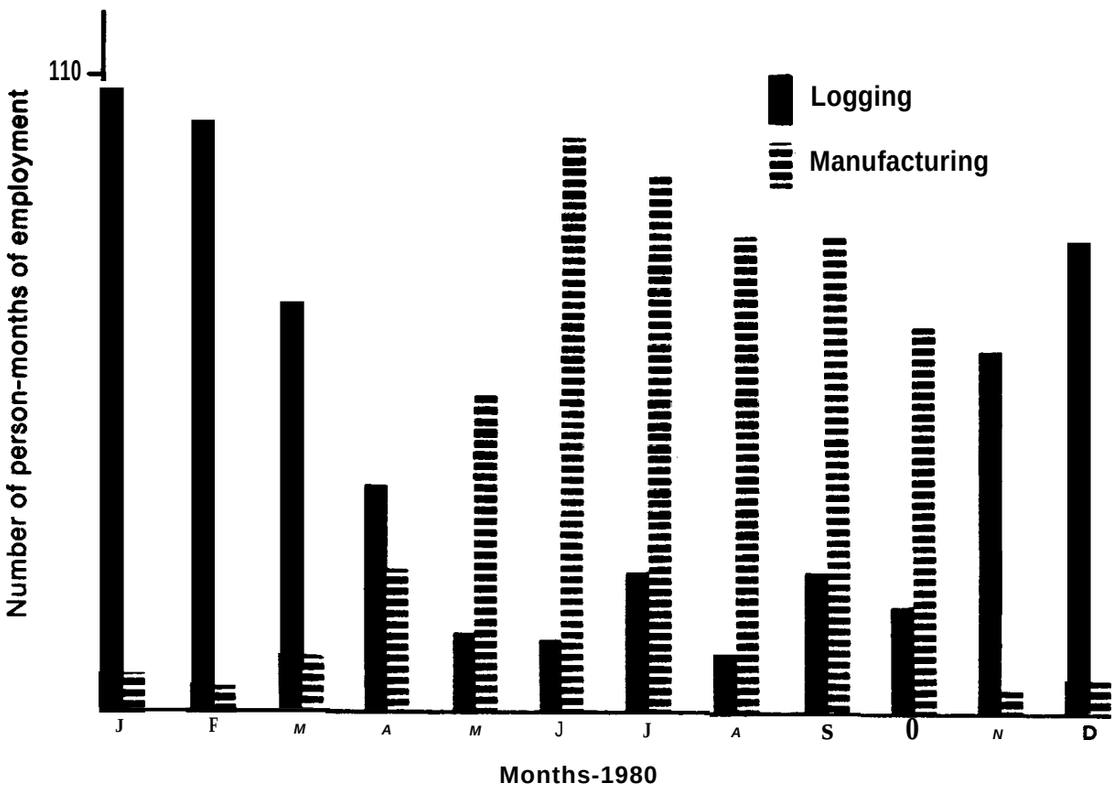


Figure 5. Seasonality of employment in the foreat industry, 1980.

CHAPTER V

PRODUCTION, CAPACITY, AND DOMESTIC MARKETS OF THE FOREST INDUSTRY IN THE NWT

Reduction

Totaf forest industry production in the Northwest Territories for 1980–81 was 2624 M cu. ft. Of this totaf, 1255 M cu. ft. (47.8%) were produced by the sawmill industry, 277 M cu. ft. (10.6%) by the miscellaneous roundwood industry, and 1092 M cu. ft. (4 1.6%) by the commercial and domestic fuelwood industry (Fig. 6).

Totsdproduction varied considerably among market areas (Table 6). Fort Smith and Hay River were the largest producing areas, accounting for 32% and 29%, respectively, of all forest products. Yellowknife and Fort Simpson together produced 26%, and the rest was accounted for by Norman Wells and Inuvik.

The sawmifl industry was concentrated in the Fort Smith and Hay River market areas and accounted for 90% of the totaf lumber production. More than 50% of the miscellaneous roundwood was produced in the Yellowknife area, approximately 20% in each of the Inuvik and Hay River areaa, and 10% distributed among the three remaining market areas of Fort Smith, Fort Simpson, and Norman WeUs. Total fuelwood production (commercial and domestic) was more evenly distributed throughout the six market areas. It is important to note that the Yellowknife and Fort Smith areas were the biggest producers, each accounting for approximately, 25% of the total. Commercial fuelwood production was concentrated in the Yellowknife area (39%), and domestic fuelwood production was greateat in the Fort Smith area, which had a 28% share.

Sawmill industry

Nine sawmills and one shingle mill were operated in the NWT during 1980-81. In addition, there were five community-owned sawmills that were not utifized during the survey period. Total sawmill production was 6275 M fbm of milled lumber, of which 4529 M fbm (72%) were planed or dressed (Table 7). The majority of the dimension and boards were cut in 16-ft. lengths, but timber lengths varied up to a length of 30 feet. All timber products were air-dried. At the time of this study, a dry kiln was being constructed in the Hay River area.

White spruce was the most important lumber species, accounting for 97% of the total lumber production. Small amounts of jack pine and white birch were cut on special orders.

Table 6. Foreet industry production by market area in the NWT, 1980-81

Market area	Totaf production (cu. ft.)	Sawmill production (M fbm)	Miscellaneous roundwood (cu. ft.)	Commercial fuelwood (cords)	Domestic fueiwood (cords)	Total fuelwood (cords)
Fort Smith	850840	2880	11800	620	2668	3288
Hay River	771460	2625	49100	930	1537	2467
Fort Simpson	278220	580	9100	400	1514	1914
Yellowknife	409860	---a	144900	1645	1667	3312
Norman Wells	188760	190	13000	500	1222	1722
lnuvik	125020	0	49100	160	789	949
Total	2624160	6275	277000	4255	9397	13652

a 560 bundles of shingles not included in totsf.

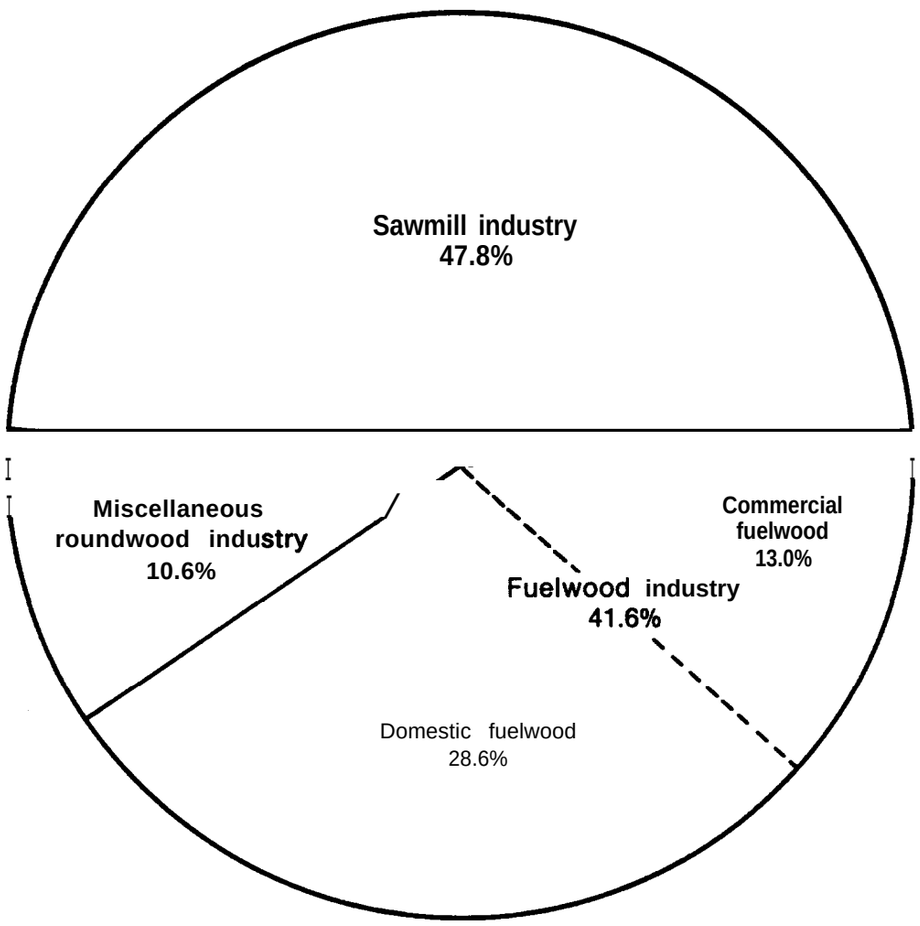


Figure 6. Forest industry production by industry group, 1980-81.

Table 7. **Products** from **NWT** sawmill-planing **mills** and shingle **mills,** 1980-81

Lumber product	size (in.)	**Planed** (M fbm)	Rough (Mfbm)	**Total (M fbm)**	% by size	**%** of **all** products
Dimension	2 X 4	1416	234	1650	45.1	
	2 X 6	889	232	1121	30.6	
	2 X 8	195	73	268	7.3	
	2 x 10	371	54	425	11.6	
	2 x 12	168	29	197	5.4	
Total		3039	622	3661	100	58.3
Boards	1 X 4	440	35	475	28.6	
	1 X 6	882	94	976	58.8	
	1 X 8	152	31	183	11.0	
	1 x 10	10	10	20	1.2	
	1 x 12	6	—	6	0.4	
Total		1490	170	1660	100	26.5
Timbers	3 X 8	—	50	50	5.2	
	3 x 10	—	100	100	10.5	
	3 x 12	—	141	141	14.8	
	4 x 4	—	193	193	20.2	
	4 X 6	—	11	11	1.2	
	4 X 8	—	5	5	0.5	
	4 x 12	—	15	15	1.6	
	6 x 6	—	187	187	19.6	
	6 x 8	—	12	12	1.3	
	8 x 8	—	182	182	19.0	
	10x 10		43	43	4.5	
	12x 12	—	15	15	1.6	
Total		—	954	954	100	15.2
Total lumber				6275		100

Other **products**

Building **logs**	200 M fbm
Pilings	60 M fbm
Shingles	560 bundles
Fuelwood	330 cords

Dimension lumber comprised 58% (3661 M fbm) of all lumber produced, with boards and timbers comprising 27% and 15%, respectively, of the total output. Other products produced by sawmills included building logs, pilings, and fuelwood (Table 7).

The most important dimension lumber sizes were 2 X 4s and 2 X 6s. Together they comprised 75% of the totaf dimension materiaf produced. The most common board sizes were 1 X 6s and 1 X 4s, representing 59% and 29%, respectively, of production. Timber sizes varied from 3 X 8s to 12 X 12s; no size dominated production, though 4 X4S, 6 X 6s, and 8 X 8s were most preferred.

The shingle mill at Rae-Edzo began operating in 1981. At the time of this study approximately 560 bundles of shirtgleshad been produced for the community. Shingles are normally 16 in. long, of different widths, and either treated with presewative or untreated. Shingles could be produced for sale given adequate demand.

Miscellaneous roundwood industry

Most miscellaneous roundwood production consisted of building logs, and there was a small percentage of pilings, posts, and poles. Buildinglogs were peeksd and cut into varying sizes to suit the requirements of home construction. Pilings were cut to 8-10 in. top diameter and used as is for temporary purposes or peeled and treated with preservative for more permanent installation. Pilings were used as foundation support for docks or buildings, especially in ice-rich soils.

Fuelwood industry

Fuelwood production was estimated to be 13652 cords; approximately 31% (4255 cords) was harvested by commercial suppliers and 69% (9397 cords) by the individual domestic users. Fuelwood was produced and sold in 8-ft. lengths or 16-24 in. stove-length pieces.

Capacity

The sawmill industry was the only group for which empirically accurate data were available; therefore, capacity is addressed only for the sawmill industry. In the last decade, sawmill industry output has averaged 6-7 MM fbm per year. Production increased during years when the commeraai demand for lumber was high (e.g., 1973-74 and 1978-79) (Table 8). It is important, however, to note that full sawmill capacity was never attained. Operators offered a number of reasons for this:

1. Most operating costs are associated with the milling operation. Milling is completed in the summer months when production can be sold quickly and cash flow problems reduced.

Table 8. Output of forest products[a] in the NWT[b]

Fiscal year	Lumber (Mfbm)	Miscellaneous roundwood (M cu. ft.)	Fuelwood (M cu. ft.)	Totaf production (M cu. ft.)
1970-71	7710	159	192	1893
1971-72	5050	148	249	1407
1972-73	6765	267	321	1941
1973-74	9585	274	144	2335
1974-75	5985	120	142	1459
1975-76	7700	118	176	1834
1976-77	5610	59	256	1437
1977-78	6255	79	240	1570
1978-79	8980	61	237	2094
1979-80	7410	82	320	1884
1980-81	8095	100	196	1915
1981-82	9270	120	265	2239

a The eatimates were derived from infomration supplied on timber permits and may not reflect actual harvest.

b Source: Personal communication from J. Gilmour, Indian and Northern Affairs Canada. Fort Smith, NWT. 1982.

2. Mills are not enclosed or heated for winter operation.

3. There are shortages of reliable skilled labor.

4. The present operating period suits the sociaf system of the Dene, who makeup the majority of the fabor force.

5. inadequate access to harvestable stands of timber fimits summer logging operations.

6. Timber volumes are inadequate in areas within economical haufing distance of the sawrnilfs.

7. Operators are not interested in increasing production.

To determine sawmill capacity, this analysis was established around a6-monthoperating period consisting of 120 working days during the warm months. In order to determine operating ratios, the nine sawmiUs were divided into three classes: sawrnilfs with an armuaf production greater than 1 MM fbm; mills with annuaf production of 1 MM to 100 Mfbm; andmilfs with annuaf production of less than 100 M fbm (Table 9). Aif mills surveyed operated with one shift per day.

SawmiUswith annual production greater than 1 MM fbm achieved an average **operating ratio** per8-hr. shift of 4196 of their engineered capacity (Table 9). Operating ratios measure the extent of underutilization of the productive potential of capitaf stock and shows the gap between potential and actuaf use of the capital stock (Statistics Cartada 1978). Sawmifl operators cod-f increase production by utifizing the **full** engineered capacity of their mills and by operatirtgtwo shifts per day, assuming adequate demand, a quafified labor force, and funding for modest improvements (e.g., lighting). I Operating at **full capacity** woufdincreaseproduction by a factor of 2.5; twoshiftsperday would increase production by a factor of 5. Increased production by the other two srnafler sawmiff groups is also possible if operations were expanded in the same manner. Given sufficient demand and the absence of constraints such as an inadequate timber supply or shortage of labor, sawmiff production in the NWT could be increased to 15-31 MM fbm annually with a fimited capitaf investment.

Domestic Merkets

The forest products of the NWT were almost exclusively used within the region. All miscellaneous roundwood (277 M cu. ft.), **all fuelwood** (13 652 cords), and **87%** (5488 M fbm) of the lumber was sold and used in the NWT. Lumber was marketed in all six market areas in the NWT. Normafly, miscellaneous roundwood is marketed locally within the production area. Fuelwood sales are also restricted to the local market.

The marketing flow of domestic lumber in 1980-81 was as follows: commercial distributors (building supply

Table 9. Engineered capacity, nonnaloutput, **and operating ratios[a] by** sawmill group inthe NWT, 1980-81

Sawmiff group by production	No. of firms	Average **engineered** Capaaty per **8-hr.** shift **(fbm)**	Average normaf output per **8-hr.** shift (fbm)	Average operating days (8-hr. day)	Average operating ratio per 8-hr. Shift	Average operating ratio Per Production year[b] One shift per day	Two shifts per day
1 MM fbm or over	2	44350	19189	114	0.41	0.41	0.21
100 M fbm to 1 MM **fbm**	4	11510	7042	60	0.61	0.31	0.15
Less than 100 M fbm	3	14580	2258	31	0.16	0.04	0.02

a Operating ratio = $\frac{\text{Number of operating shifts X } \textit{normaf} \textbf{ output}}{\textbf{Total number of potential shifts X capaaty per shift}}$

b**Production year is assumed** to **be** a **period** of **120 operating** days, usrralty from May to October.

companies) purchased 81% (5123 M fbm) of sawmifl production and consumers purchased 6% (365 M fbm) directfy; 13% (790 M fbm) was exported to Alberta (primarily the Edmonton area). In view of the fact that the information was collected for a composite year, some inconsistencies intheaggregatedata base were identified. For exampfe, the amount of Iumbersokfin the NWTand the amount exported by one particular sawmilf varied from the volume that commercial distributors indicated they purchased. The amount of lumber exported to Alberta couid therefore be greater than the reported 13%. Volumes as large rts50% of totaf production have been documented for some years.

his not clearly understood how sawmill operators can compete in the highly competitive Alberta market, especially in view of high transportation costs. It is poasiblethat truckers returning to Alberta afterdefivering freight in the NWT reduce transportation tariffs in order to obtain a payload for the return ttip.

Table 10. Markets for foreat products_ in the NWT, 1980-81

Market area	Lumber (M fbm)	Miscellaneous roudwood (cu. ft.)	Fuelwood[a] (cords)
Fort Smith	779	11800	3288
Hay River	3525	49100	2467
Fort Simpeon	378$	9100	1914
Yellowknife	198	144900	3312
Norman Wells	202	13000	1722
Inuvik	403	49100>	949
Alberta	790>	o“	0
Total	6275	277000	13652

[a] Includes both commercial and domestic fuelwood.

The market area accounting for the greatest proportion of consumption of domesticzdiy produced lumber was the Hay River region (Table 10). Most of this lumber is purchased by distributors in the Hay River market area. It is difficult to determine the finaf destination and amount used in each individual market area because the domestic lumber is grouped with imported lumber and redistributed to all market areas.

Miscellaneous roundwood is used locally for the construction of loghomea. More than 50% (144900 cu. ft.) of the domestic miscellaneous rmmdwood was purchased for use in the Yellowknife market area.

Residents in the Yellowknife and Fort Smith market areas consumed 48% (6600 cords) of the fuelwood. These two market areas had the greatest percentage of residents dependent on fueiwood and except for the Inuvik market area, which does not have a readily available wood source, had the largest populations of the NWT.

The estimated value of the NWT forest industry production totaIed $2123880 in 1980-81 (Table 11). Lumber accounted for 73% of the gross value of sales, and rniscenaneousroundwood and commercial fuelwood accounted for 16% and 11%, respectively. If the calculated value of domestic fuehvood is added to this figure, the total value of forestry production woufd be $2684570.

Table 11. Value of production of the forest industry in the NWT, 1980-81

Product	Value ($)	% of total
Lumber: dimension, boards, and timbers	1546600	72.8
Miscellaneous roundwood: building logs, @ill@, and posts and poles	340900	16.1
Commercial fuelwood	236380	11.1
Totaf value of production	2123880	100

[a] If the domestic component of fodwood were considered in value calculations, total value would increase by $560690 to $2684570.

CHAPTER VI

CONSUMPTION OF FOREST PRODUCTS IN THE NWT

Consumption by Market Area

Consumption of forest products in 1980-81 by market area is outlined in Table 12. The largest consumption zone for wood products was the Inuvik market area, where 55% (17 078 M fbm) of the lumber, 46% (3335 M sq. ft.) of the plywood, and 57% (337 M cu. ft.) of the miscellaneous roundwood were consumed (Fig. 7). Onfy 7% (949 cords), however, of the total fuelwood was consumed here. Most wood consumption was directly refated to oif exploration and associated construction activities.

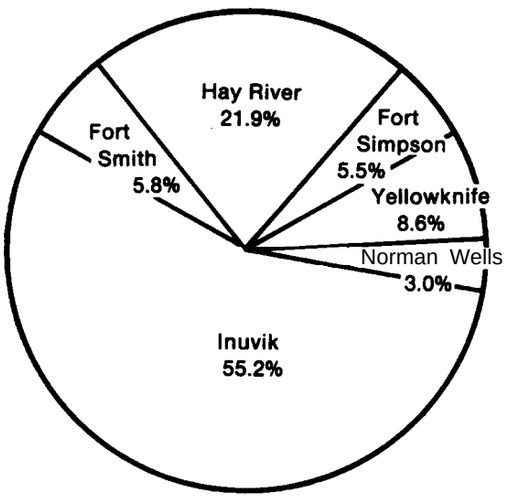
Residents in the Hay River market area consumed the second-largest volume of lumber and plywood at 22% and 17%, respectively. Most of the wood products were used by construction firms such as Ranger Homes Ltd., which constructed prefabricated homes under contract to the GNWT and shipped them to northern settlements.

The Yellowknife market area was the third-largest consumption zone for lumber (8.6%) and plywood (16.3%). Though the Yellowknife market area has the largest population, it is an established service center for government and local gold mines, and most of the building infrastructure is afready in place. Theordy major activity in 1980431 revolved around the construction of the Echo Bay gold mine (Lupine project) at Contwoyto Lake. Residents of the Yeffowknife market area consumed thesecond-fargest volume (23%)of miscellaneous , rormdwood in 1980-81. Most roundwood materiafs were used to construct log homes in the Rae-Edzo area and further north. Residents of the Yeffowknife market area consumed the largest amount of fuelwood (24%). This high consumption rate was partially attributed to high fueI oil prices in the western NWT. In addition, fuelwood was readily available in Rae-Edzo, whose residents were among the highest per-capita users of fuelwood in the NWT.

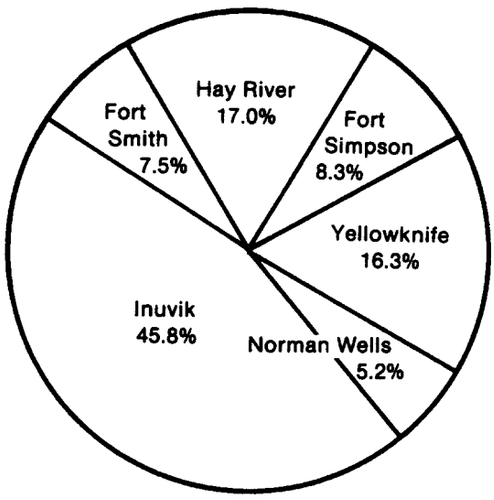
Residents of the Fort Smith, Fort Simpson, and Norman Wells market areas were minor consumers of most forest products. The data indicate each area used approximately 5% of the lumber and 8% or less of the plywood; when combined, residents from these market areas consumed approximately 2% of the miscellaneous roundwood. The main wage employers m the Fort Smith market area were the GNWT, the Government of Canada, mining companies, and some sawmills. There was no expansion of the existing industrial base nor any new developments to warrant an increase in the consumption of processed wood products. In the Fort Simpson market area, mining companies consumed most

Table 12. Consumption of forest products by market area in the NWT, 1980-81

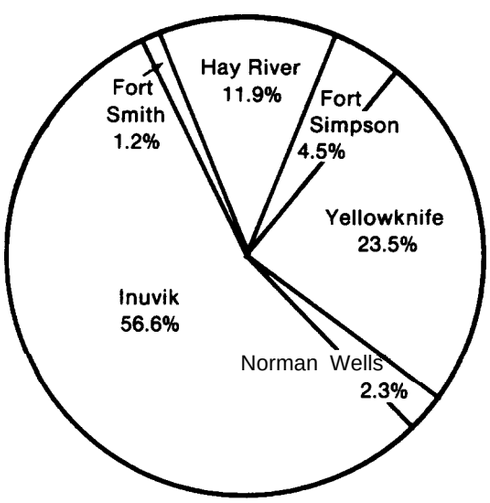
Market area	Lumber (M fbm)				Plywood (M MI. ft.)	Misceffaneous roundwood (M CU. ft.)	Fuefwood (cords)
	Dimension	Boards	Timbers	Total			
Fort Smith	1460	491	200	2151	542	7	3288
Hay River	6493	325	1252	8070	1239	71	2467
Fort Simpson	1048	217	778	2043	601	27	1914
Yellowknife	1403	800	984	3187	1184	140	3312
Norman Wefls	755	87	252	1094	380	14	1722
Inuvik	17078	118	3211	20407	3335	337	949
Total	28237	2038	6677	36952	7281	596	13652



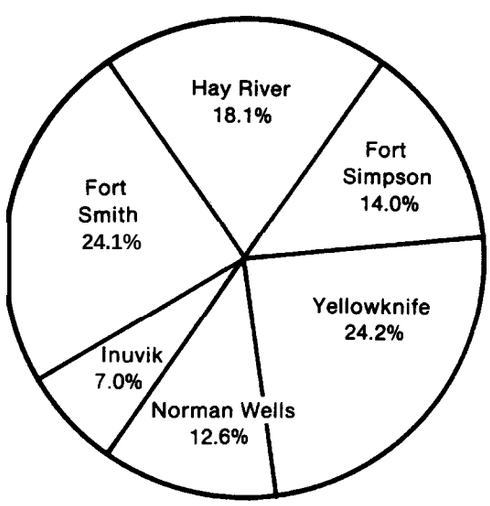
Lumber — 36953 M fbm



Plywood — 7281 M sq. ft.



Miscellaneous roundwood
596 M cu.ft.



Fuelwood — 13652 cords

Figure 7. Consumption of forest products by market, 1980-81.

of the processed wood products. The Norman Wells market area, which had the smallest population, accounted for the smallest consumption rate of wood products. The oil industry centered in Norman Wells utilized most of the wood products in that area.

Fuelwood use patterns were different from those documented for other forest products. Fuelwood consumption was more evenly distributed among the market areas with the exception of Inuvik, as noted above. Almost all fuelwood was used in the same area in which it was produced, and most of the fuelwood was consumed by residents of the more traditional communities. Fuelwood use ranged from 24% (3300 cords) in the Yellowknife and Fort Smith market areas to 7% (950 cords) in the Inuvik area.

The consumption patterns per market area for dimension lumber and timbers (Fig. 8) were similar to the total lumber consumption ratios described earlier. The Inuvik market area dominated consumption and was followed by Hay River and Yellowknife. The consumption patterns for boards were different; the Yellowknife market area residents dominated consumption (39% of the market), Fort Smith market area residents consumed 24%, and Hay River market area residents consumed 16%. The residents of the remaining market areas collectively consumed 21%.

Boards were used for a variety of purposes, including fencing material, form cribbing, and small home-oriented projects (activities for which kiln-dried material is not necessarily required). In addition, some boards were used for siding and trim andin manufacturing pallets and core boxes. In Yellowknife and Fort Smith there was a greater demand for fencing material than in other communities due to a larger number of privately owned homes.

Consumption by Major Consuming Croups

Consumers can be divided into five major groups: construction companies, mining companies, oil companies, government agencies, and others. The last group includes individual consumers, community groups, social and church organizations, cooperatives, and miscellaneous consumers. Consumption by the others group was determined by totaling purchases from distributors of the four major groups and subtracting that amount from the total sold by the distributors. The remaining volume plus direct sales to identified members of this group were allocated to the others category. High transportation costs for small orders of goods shipped into the NWT combined with the nonpermanent or transient status of a large percentage of the residents led to the assumption that only a small, insignificant volume of wood products would be brought into the NWT by individuals. The location and number of firms per consumer group are listed in Appendix 5.

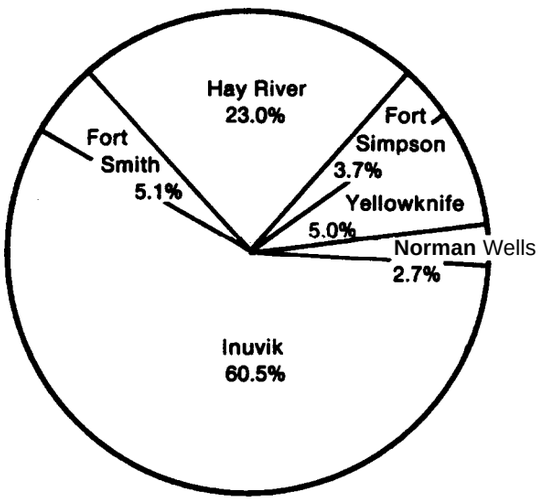
In examining totaf lumber and plywood requirements for each of the consumer groups, it was determined that (by weight) significantly more lumber than plywood is used in the NWT. In comparing the consumption on a weight basis, oil companies used 2 times more lumber than plywood, mining companies and government agencies used approximately 3.5 times more Iumberthan plywood, and construction companies used over 10 times more lumber than plywood.

Total consumption by consumer group is shown in Table 13 and Figure 9. The construction companies group was the largest consumer of lumber and plywood: 24486 M fbm (66%) and 2652 M sq. ft. (36%), respectively. As expected, a large percentage of construction work was completed by companies for other users in industry and government. An analysis of the miscellaneous roundwood statistics indicates that the others group consumed 229 M cu. ft. (38%) of the total volume; the oil companies and construction companies groups each consumed 150 M cu. ft. (25%). This material was primarily used for pilings. The volume consumed by the others group was primarily used for building log homes. Although government agencies (such as Parks and Social Services) purchased and distributed a percentage of the total fuelwood consumed, the results from this study show that most of the fuelwood was consumed by people in the others category.

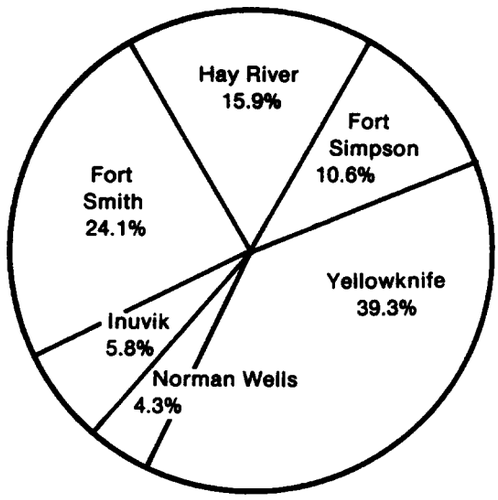
in considering the detailed breakdown of lumber consumption, it was apparent that the construction companies were the largest users of dimension material and timbers. The others group consumed the greatest volume of board material, which was attributed to use in home improvements.

Imports and product Flows

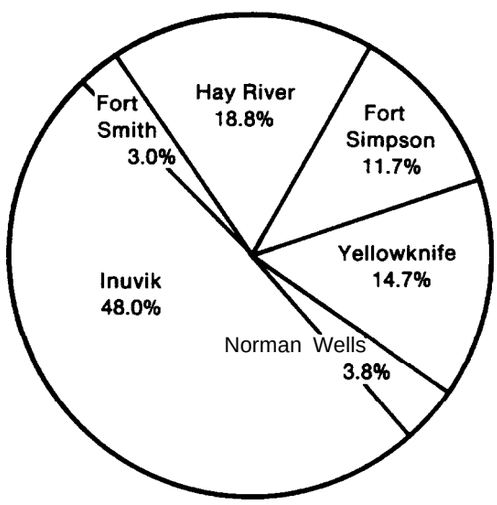
The majority of wood products used in the NWT in 1980-81 were imported. Eighty-five percent of the lumber (31.5 MM fbm), 100% of the plywood (7281 M sq. ft.), and 54% of the miscellaneous roundwood (319 M cu. ft.) that was consumed was produced outside the NWT. In contrast, aU of the fuelwood consumed was produced in the NWT. Wood products were imported principally by two groups: distributors (building supply companies); and commercial consumers, principally the construction, mining, and petroleum companies.



Dimension –28 237 M fbm (76%)

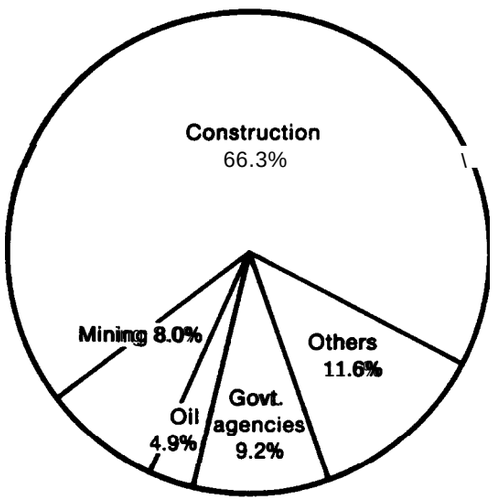


Boards — 2038 M fbm (6%)

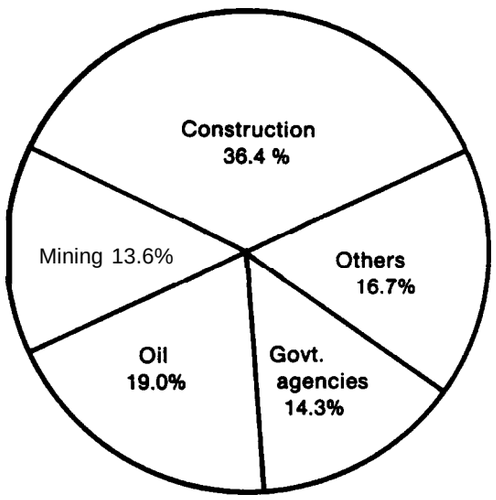


Timbers — 6677 M fbm (18%)

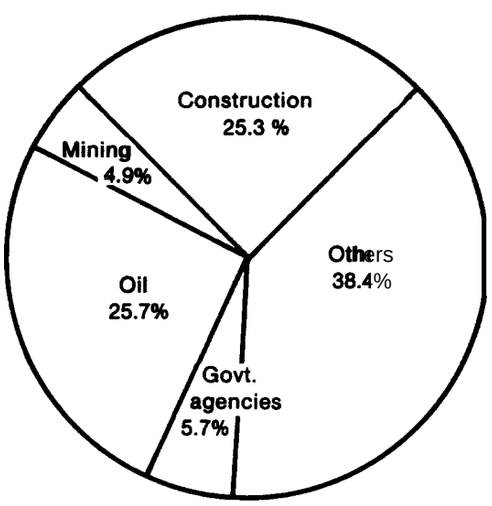
Figure 8. Lumber consumption by market area, NWT, 1980-81.



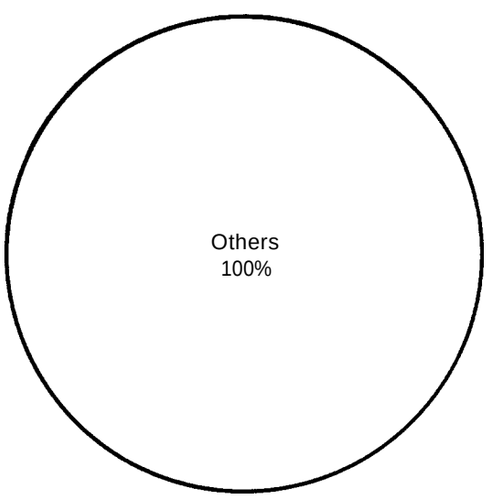
Lumber — 36952 M fbm



Plywood — 7281 M sq. ft.



Miscellaneous roundwood
596 M CU. ft.



Fuelwood — 13652 cords

Figure 9. Consumption of forest products by consumer group, 1980-81.

Table 13. Consumption of foreat products by consumer groups in the NWT, 1980-81

Consumer group	Lumber (M fbm) Dimension	Boards	Timbers	Total lumber (Mfbm)	Plywood (M sq. ft.)	Miscellaneous roundwood (M CU. ft.)	Fuelwood (cords)
Constmction companies	20049	124	4313	24486	2652	151	—
Mining companies	1448	312	1213	2973	991	29	—
Oil companies	1426	47	323	1796	1379	153	—
Government agencies	2685	506	208	3399	1042	34	—
Others[a]	2629	1049	620	4298	1217	229	13652
Total	28237	2038	6677	36952	7281	596	13652

a Includes individual consumers, community groups, social and church organizations, cooprrativss, and other private groups.

origin of imports

The points of origin of imported[16] wood products were divided into five zones: the Yukon, Edmonton, northern Alberta, southern B. C., and northern B.C. (Fig. 10). The main supply centers in the Yukon were Watson Lake and Whitehorse. Most of this material went to the Inuvik market area; however, a small percentage was shipped to the Fort Simpson market area (tungsten mine). Edmonton is a major wood products distribution center, and materiaf was shipped from Edmonton to all six NWT market areas in 1980-81. Northern Alberta is defined as the area of the province north of an east-west line drawn through the town of Peace River, and the principal supply points in northern Alberta are High Level, La Crete, Hines Creek, and Peace River. Distributors from northern Alberta serviced the four most southern market areas of Fort Smith, Hay River, Fort Simpson, and Yellowknife. The northern B.C. import area is defined as the part of the province north of an east-west line that bisects Chetwynd, just south of Dawson Creek. Distributors in Fort Nelson serviced the Fort Simpson market area via the Liard highway (winter only) and the Inuvik market area. The southern B.C. import zone includes all parts of the province south of the Chetwynd line. The largest supply center in this zone is Vancouver and surrounding area, and other distribution centers include Kamloops, Smithers, and Prince George. Inuvik, Hay River, YeUowknife, and Fort Simpson were serviced by distributors in southern B.C. The amount of wood product imports by region of origin is shown in Table 14.

Of the 31.5 MM fbm of lumber imported into the NWT, the largest share (36%) originated in Edmonton; 32% was imported from southern B. C., distributors in the Yukon accounted for 21% of the imports, and the remaining (approximately 1 1%) volumes originated in northern Alberta and northern B.C. (Fig. 11). It is not clear why the majority of lumber (68%) was imported from Edmonton and southern B.C. instead of the Yukon, northern Alberta, and northern B. C., all of which are considerably closer to the NWT. In northern Alberta, sawmills produced over 120 MM fbm of kiln-dried lumber (spruce-pine-fir) per year, 66% of which is dimension stock. Northern B.C. mills produced more than 160 MM fbm, most of which was also kiln-dried dimension stock. Most of this production was exported to the United States, which is considerably further from the producing area than the NWT. The location of brokers and wholesalers, amount of sale per transaction, tied markets, and the selection and price of the products are ail factors that influence distribution patterns.

All plywood consumed in the NWT is imported from the south. Most plywood (51%) originated in

[16] Wood product imports are identified as to area of purchase, but not necessarily area of production. For example, most plywood bought in Edmonton is produced in British Columbia.

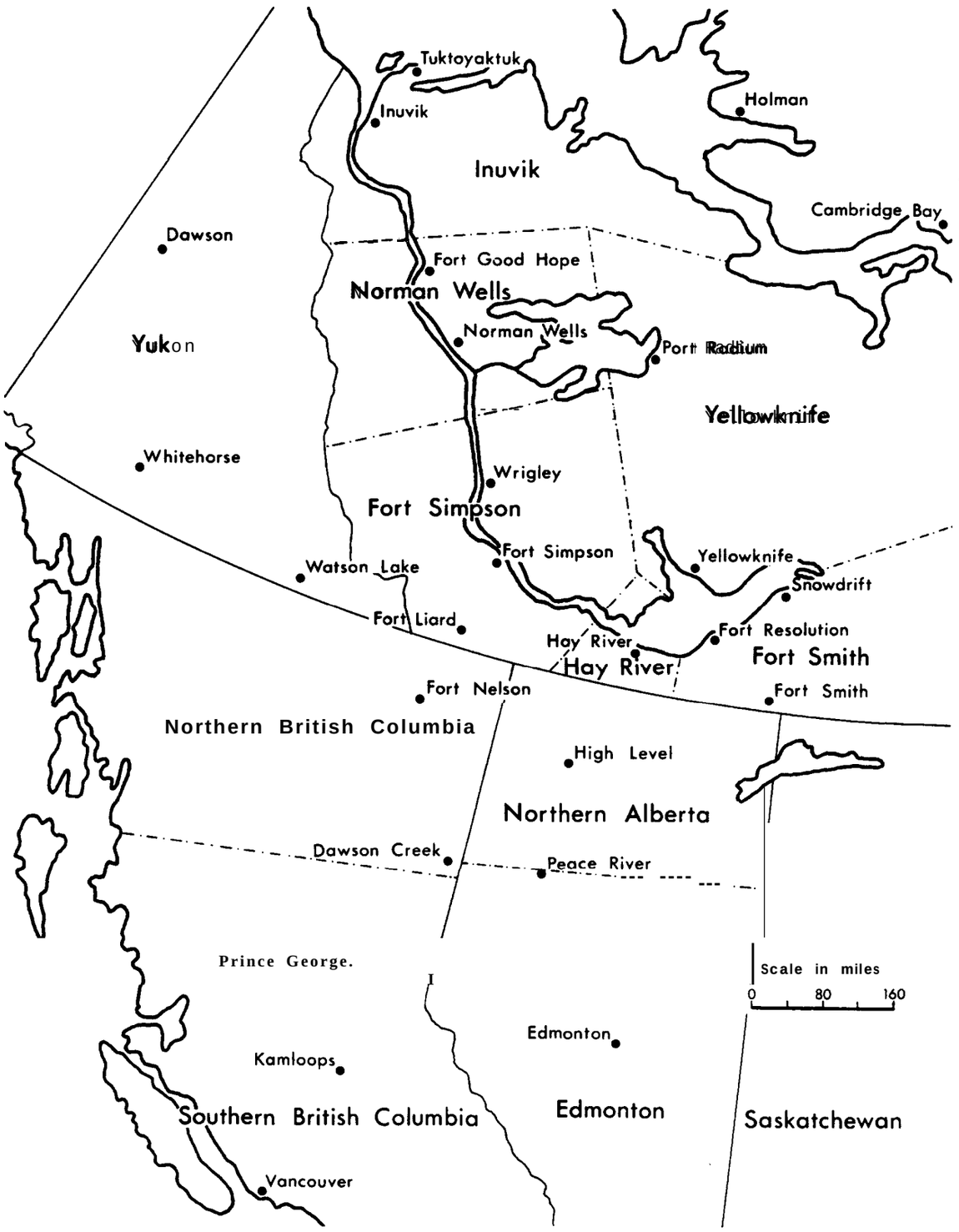
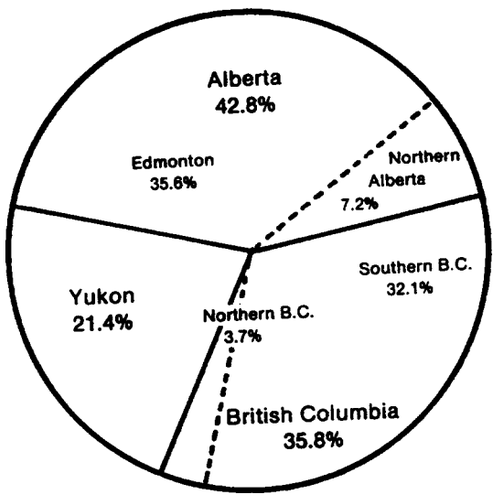
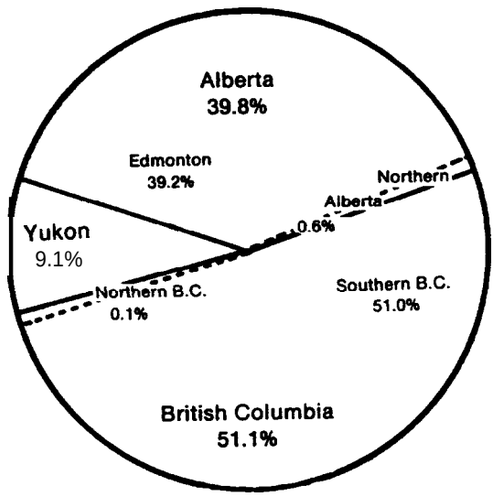


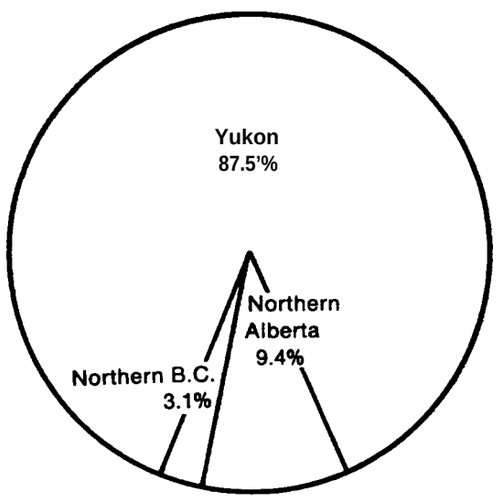
Figure 10. Zones of origin of imported wood producta, 1980-81.



Lumber —31 467 M fbm (85%)



Plywood – 7281 M sq. ft. (100%)



Miscellaneous roundwood
319 M CU. ft. (54°/0)

Figure 11. Origin of wood **products** imported into the NWT, 1980-81.

southern B. C., although 39% was imported from Edmonton.

The Yukon supplied 88% of the imported miscellaneous roundwood, and the bulk of that materiaf was consumed in the Inuvik market area for use as pilings.

Wood product distribution

The distribution of forest products in the NWT was shared among three groups: NWT distributors (building supply firms), NWT producers, and a number of consumers who import a percentage of their needs directly.

The lumber market was almost equally divided between consumers who imported directly (51%) and distributors (48%), and approximately 1% of the product was sold by NWT sawmills directly to consumers (Fig. 12). Possible reasons for consumers bypassing the NWT distributors and ordering from wholesalers outside the NWT included product price, selection, availability, and defivery time.

NWT distributors controlled 73% of the plywood market, and consumers purchased 27% of the plywood directly from southern wholesalers. Northwest Territories distributors handled more plywood because it generates a greater return on per-item and per-weight bases. The markup price for lumber averages 16-27%; however, the markup price for plywood can be as high as45%. On a relative-weight basis, more lumber than plywood is required by consumers. Consumers may have need for lumber by the truck load; however, the amount of plywood per load is more than is normally required by most individual consumers. Smaller amounts are therefore purchased locally.

The misceffaneous roundwood market was almost equally split between consumers who import directly (53%) and NWT producers (47%) (Fig. 12). Distributors generally did not handle roundwood because the demand was not large enough and product selection range was very diverse.

The fuehvood distributing system was producer. , oriented, with all fuelwood being handled by producers.

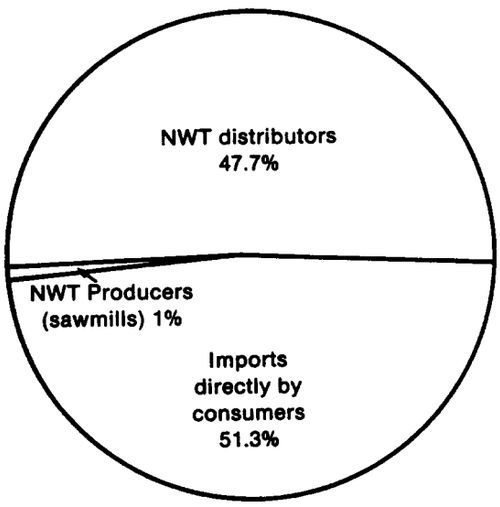
Wood prochrct transportation

Wood product movement in the NWT is a complex web involving all forms of transport, including road, water, air, and rail. Figure 13 illustrates the main tranaportationroutea and shows the major supply centers. Most large communities are serviced by all-weather roads; however, communities in the arctic coast area, the Norman Wells district, Snowdrift, and other areas are supplied through a barge service. There are some communities (e.g., Rae Lakes, and Lac La Martre) and mines that are serviced by winter roads. In addition, most areas in the NWT are serviced by air.

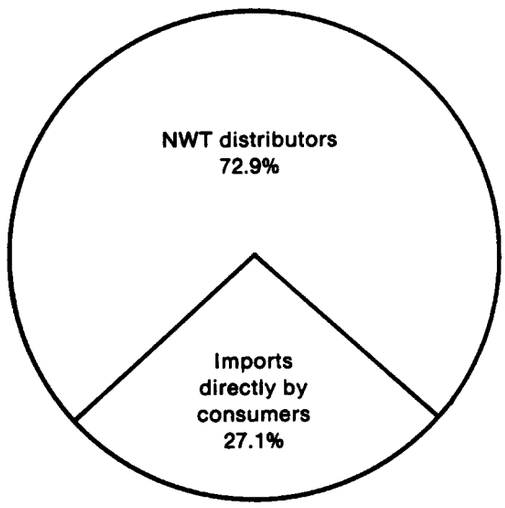
In many instances wood products are delivered using a variety of transportation techniques and routes. For example, lumber and plywood can be transported to Inuvik via truck from Vancouver or Edmonton. The wood is then trucked through the Yukon along the Dempster Highway. On the other hand, wood products can be trucked to Hay River and barged down the Mackenzie River to Inuvik. In winter, products can be transported via the winter roads to Tuktoyaktuk. If time is critical, freight can be shipped by air. Table 15 outlines the final mode of transportation of wood products in the NWT by market area.

Table 14. Imports of wood products into the NWT by area of origin, 1980-81

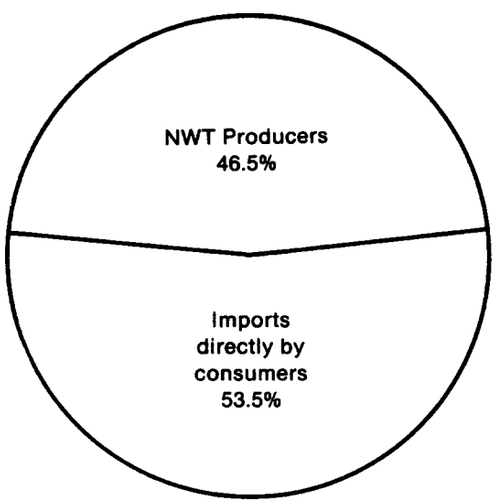
	Area of origin							
Wood products	Yukon	Alberta (Edmonton)	Alberta (Northern)	British Columbia (Southern)	British Columbia (Northern)	Total imported	Total consumed	% imports of total consumed
Lumber (M fbm)	6720	11191	2307	10097	1152	31467	36952	85
Plywood (M sq. ft.)	662	2851	46	3716	6	7281	7281	100
Miscellaneous roundwood (M CU. ft.)	279	0	30	0	10	319	596	54



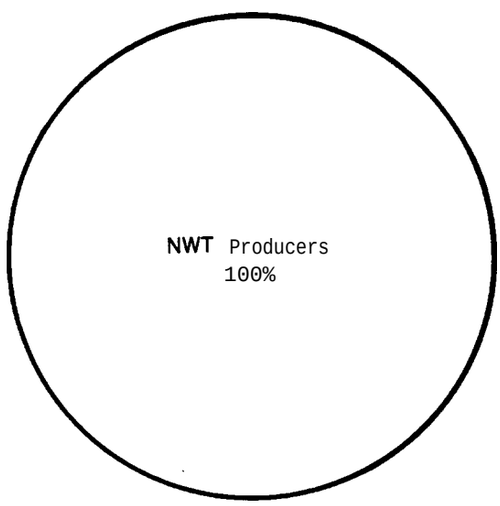
Lumber — 36952 M fbm



Plywood — 7281 M sq. ft.



Miscellaneous roundwood
596 M cu. ft.



Fuelwood — 13652 cords

Figure 12. Wood product distribution, 1980-81.

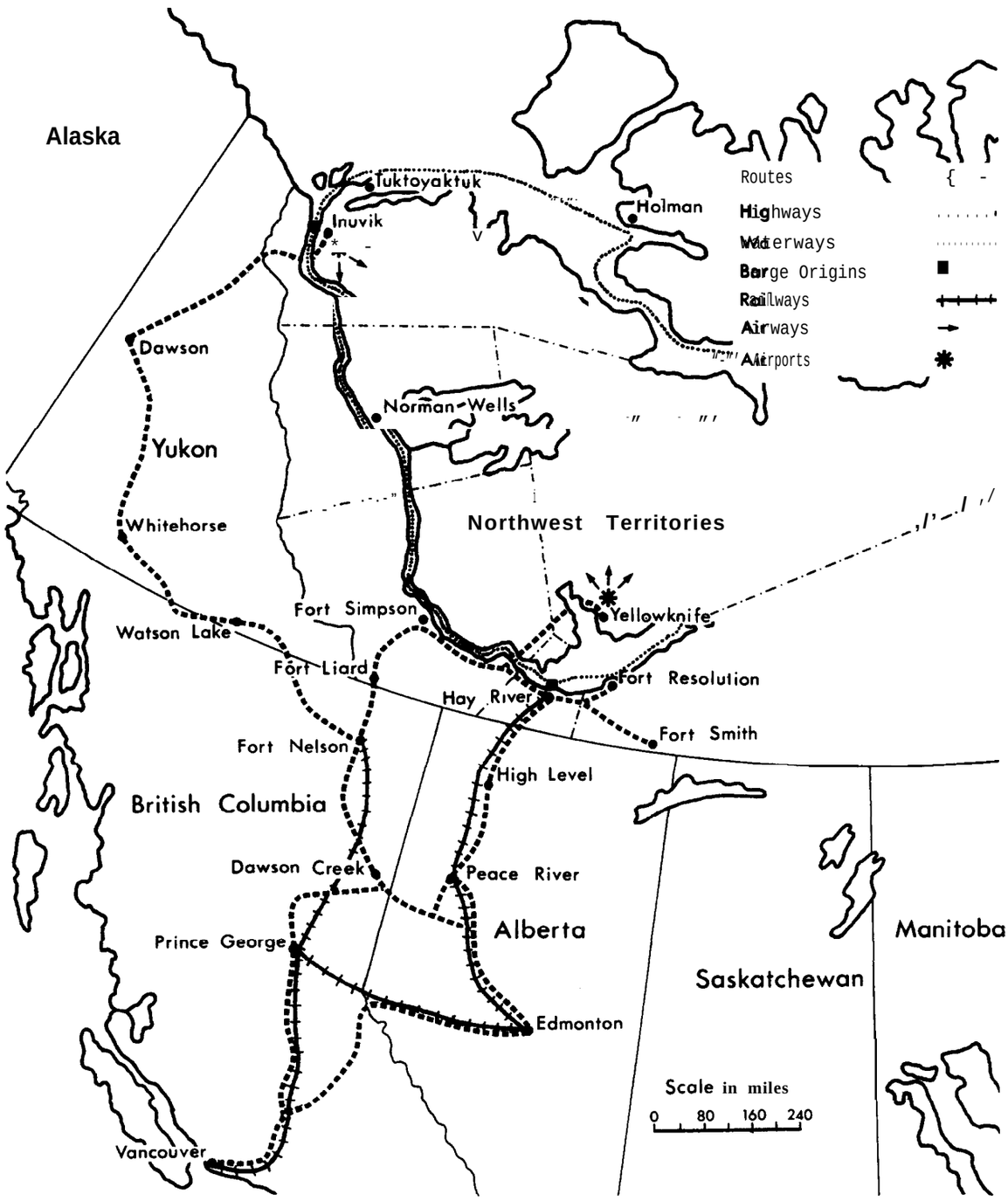


Figure 13. Major transportation routes.

Table 15. Find mode of transportation[a] for wood producta conaumed in the NWT by market area, 1980-81

Market area of use	Lumber (M fbm)				Plywood (M sq. ft.)			
	Air	Water	Roadb	Total	Air	Water	Roadb	Total
Fort Smith	—	20	2131	2151	—	12	530	542
Hay River	—	—	8070	8070	—	–	1239	1239
Fort Simpson	—	20	2023	2043	—	13	589	602
Yellowknife	892	—	2295	3187	601	—	583	1184
Norman Wells	—	1094	—	1094	—	380	—	380
Inuvik	2659	869	16879	20407	558	370	2406	3334
Total	3551	2003	31398	36952	1159	775	5347	7281
% total	9.6	5.4	85	100	15.9	10.6	73.5	100

a Approximately 739 M fbm of lumber and 947 M sq. ft. of plywood are brought into the NWT (Hay River) by rail and then redistributed by truck, barge, and air.

b Includes all-weather and winter roads.

In 1980-81 most of the lumber (85%) and plywood (74%) was transported to its final destination via roads. Table 16 lists distances and corresponding tariffs for supply centers in British Columbia, Alberta, the Yukon, and the NWT.

Approximately 5% of the lumber and 11% of the plywood was transported by barge. Most barge traffic serviced the Norman Wells and Inuvik market areas. The main terminal for barge freight was Hay River. Eighty-eight percent (by weight) of afl barge traffic of wood products originated in Hay River. Barge tariffs are listed in Table 17.

Air transport accounted for shipment of 10% of the lumber and 16% of the plywood used in the NWT. Most of this air freight originated at the airports in Yellowknife and Inuvik. The principal destinations were arctic coast communities, mine sites, and industrial exploration sites in the Inuvik and Yellowknife market areas. A significant percentage of the airfreight was transported via chartered flights. Unfortunately, associated freight costs for these shipments could not be obtained. Because tariffs listed for scheduled routes are much higher, no air freight costs are given.

The Canadian National Railway (CNR) transported approximately 29o of the lumber and 13% of the plywood used in the NWT. These products were unloaded at the CNR railhead at Hay River and redistributed by truck to the four southern market areas.

Lumber price differentials largely reflect transportation costs incurred in moving the wood products to the area of use. For example, the price of lumber in the two most northerly market areas (lnuvik and Norman Wells) was 100% higher than in the four southern market areas (Table 18).

Types of Forest Products Used

Spruce-pine-fir[17] (79%) and Douglas-fir (21940) were the main tree species utilized for lumber in the NWT in 1980-81. Unmeasurable amounts of other species

17 These Canadian timber species have similar performance properties that make them interchangeable in use. For the purpose Of identification, certain species are given a common designation on grade stamps because they cannot be visually separated in lumber form. A complete explanation of grading standards is provided by the Nationaf Lumber Grades Authority (1982).

Table 16. Highway distance from points in Alberta, British Columbia, the Yukon, and the NWT and corresponding average tariff for truckload lotsa

Point of lading	Destination	Distance (miles)	Tariff (cents per 100 lb.) 1981	1982
Vancouver	**Inuvik**	**2150**	**22.00**	**23.00**
Edmonton	**Inuvik**	**2064**	20.00	20.57
Fort Nelson	Inuvik	1395	12.50	14.60
Whitehorse	Inuvik	778	10.50	9.85
Dawson	lnuvik	457	5.31	5.31
Vancouver	**Hay River**	**1526**	**11.85**	**12.64**
Edmonton	Hay River	683	4.89	5.94
Peace River	Hay River	381	3.00	3.65
High Level	Hay River	197	1.96	2.39
Vancouver	**Yellowknife**	**1833**	**14.12**	**15.06**
Edmonton	**Yellowknife**	**941**	**6.88**	**8.36**
High Level	**Yellowknife**	**451**	**3,85**	**4.70**
Hay River	Fort Smith	174	1.86	2.27
Hay River	Yellowknife	307	2.54	3.09
Hay River	Fort Simpson	272	2.30	2.79

a A truckload lot is 40000 lb. or more.

Table 17. Barge tariffsa for the Mackenzie River and western arcticb

Point of lading	Destination	Tariff (cents per 100 lb.) 1981	1982
Hay River	Fort Simpson	2.71	3.11
	Wrigley	3.23	3.72
	Fort Norman	3.49	4,01
	Norman Wells	3.49	4.01
	Fort Good Hope	4.23	4.87
	Arctic Red River	5.13	5.90
	Inuvik	5.40	6.21
	Tuktoyaktuk	6.08	6.99
	Holman	9.16	10.54
	Cambridge Bay	12.14	13.96
	Gjoa Haven	14.12	16.24
	Spence Bay	14.84	17.06
	Snowdrift	3.60	4.14
Fort Good Hope	Arctic Red River	1.35	1.56
Ontaratue River	Inuvik	2.71	3.11
	Tuktoyaktuk	3.80	4.37
Tuktoyaktuk	Holman	5.00	5.74
	Cambridge Bay	7.99	9.19
	Gjoa Haven	9.96	11.46
	Spence Bay	10.68	12.29

a Tariff based on shipments of 40000 lb. or more.
b Source: Personal communication in 1982 from Northern Transportation Company Limited, Hay River, NWT.

(e.g., exotic hardwoods) were also consumed. Table 19 presents a detailed description of lumber consumption by product type and size. Dimension lumber (76.4%) was the most common lumber product consumed, followed by timbers (18.1%) and boards (5.5%). Most dimension and board lumber was planed, but most timbers were sold rough.

Moat lumber products, with the exception of timbers, were kiln-dried. Lower weight and therefore lower transport costs, Canadian Mortgage and Housing Corporation building code standards, and builders' preferences all contributed to the high demand for kiln-dried material.

The most common length of imported dimension lumber and boards was 16 feet. With 16-ft. material, shorter lengths can be made as needed. Timber lengths vaned from 8 to 30 ft.; no standard length prevailed. Almost all lumber imported from Alberta, British Columbia, and the Yukon was graded under the authority of the different grading associations found in those areas. The NWT Grade Stamping Agency was established in 1979 and will eventually grade all lumber produced in its jurisdiction.

Of the dimension lumber used, 2 X 4s accounted for 51% of the total. Consumption of 2 X 10s (18.4%) was higher than that of 2 X 6s (15.3%) or 2 X 8s (9.3%). This pattern was expected because 2 X 10s are predominantly used by the construction industry for floor joist material. It should be noted that the Douglas-fir component of the dimension lumber consumed was mostly in the larger size classes (2 X 10s and 2 X 12s).

The greatest demand in board material was for 1 X 6s, with a 56% share of the board market. On the other hand, 1 X 4s and 1 X 8s each represented 20% of the market; 1 X 2s, 1 X 10s, and 1 X 12s represented less than 5% of the market. Almost all spruce board lumber was supplied by NWT producers; however, 15% of the boards were imported Douglas-fir.

The demand for 8 X 10 timbers represented 35% of the market, This particular size group was composed primarily of laminated beams (dressed Douglas-fir). Other preferred timber sizes included 8 X 8s, 6 X 6s, and 3 X 12s, which represented 50% of the timber market. Sixty-seven percent of the timbers were rough and usually air-dried.

Most of the plywood consumed was manufactured from Douglas-fir (88%). Approximately 10% of the plywood was manufactured from spruce, and the remaining 2% was manufactured from other species. The amount of plywood consumed was determined on a

Table 18. Lumberpricesaof distributorsbymarketareaintheNWT, 1980-81, in dollars par M fbm

Market area	Kilrtdried dressed lumber		Partially air-dried dressedlumber(spruceb)	Timber (rough)	
	Spmceb	Douglas firc		Spmceb	Douglas fire
Fort Smith	325	NIA	260	300	N/A
Hay River	325	380	300	300	N/A
Fort Simpson	N/A	NfA	300	310	NIA
Yellowknife	320	NfA	320	320	NfA
Norman Wells	650	N/A	650	600	N/A
Inuvik	650	796	N/A	690	680

a Price quoted is average price of safes, which may be one or any combination of retail, wholesale, or contract bid prices.
b Includes spruce, pine, and balsam fir but commonly referred to as just spmce.
c Fir is generaffy used for larger dimension stock (2 X 10, 2 X 12 in.).
N/A Product or prices not available.

Table 19. Detailedbreakdownof lumberproductconaumptioninthe NWT, 1980-81

Lumber Product	Size (in.)	Planed (M fbm)	Rough (Mfbm)	% by size	% of all products
Dimension	2 X 4	14170	280	51.2	
	2 X 6	4094	238	15.3	
	2 X 8	2536	93	9.3	
	2 x 10	5072	110	18.4	
	2 x 12	1600	44	5.8	
Total		27472	765	100	76.4
Boards	1 X 2	2	0	0.1	
	1 X 4	445	23	23.0	
	1 X 6	1008	144	56.5	
	1 X 8	350	25	18.4	
	1 x 10	15	5	1.0	
	1 x 12	15	6	1.0	
Total		1835	203	100	5.5
Tiibers	3 x 4		5	0.1	
	3 X 6	—	9	0.2	
	3 X 8	—	105	1.6	
	3 x 10	—	76	1.1	
	3 x 12	9	800	12.1	
	4 x 4	33	280	4.7	
	4 X 6	—	162	2.4	
	6 x 6	86	795	13.2	
	6 x 8		138	2.1	
	8 x 8	90	875	14.4	
	8 X 10[a]	2000	354	35.3	
	8 X 12	—	70	1.0	
	10x 10	—	85	1.3	
	10x 14		35	0.5	
	12x 12		670	10.0	
Total		2218	4459	100	18.1
Total		**31525**	**5427**		100

a Most planed timbers of this size are laminated beams.

surface, square-foot basis. Sheet thickness varied from l/8-in. **paneling** to 3/4 in., with no specific thickness dominating. Approximately 20% of the market was represented by each of the l/4-in., 3/8-in., l/2-m., and 3/4-in. plywood size groups (Tabk 20). **All plywood** was purchased as 4 X 8 ft. sheets (standard dimension) unless speciafly ordered in other sizes. The most preferred plywood finishes were good-one-side and standard-sheatbing. Each product represented approximately 40% of the market. (Table 20).

The miscellaneous rourtdwood market was composed of three groups: building logs, pilings **(spruce),** and post and poles (cedar, pine, or fir). **Building logs and pifings combined represented 95% of the total market; posts and poles** comprised 5% of the market. There was great variability in size classes, both in diameter and in lengths; however, a detailed description within this group was not developed. Products were sold by the piece or by cubic-foot measure. In total, 596 M cu. ft. of miscellaneous roundwood were consumed.

ln 1980-81, 13652 cords of fue[wood were consumed. Species utilized by commercial fuelwood operators were spmce (60%), jack pine (35%), and birch and poplar (5%). These operators delivered 55% of their product in 8-ft. lengths and the remaining 45% in 16- to 24-ii. stove lengths. No attempt was made to determine species or size of fuelwood gathered by individuals for their own use.

Demand for Forest **Products**

Previous forecasts of forest product demand in the NWT vary considerably in approach and in **final** assessment of market size. Schultz (1970) estimated forest product consumption in 1970 at 1000 fbm per capita for the NWT. This estimate of forest product consumption inciuded lumber, plywood, and miscellaneous rotmdwood. Schultz (1975) reviewed previous estimates of forest product demand and used the 1000 fbm per-capita consumption figure to estimate the demand for forest products for 1980 **in** the NWT. Forest product demand was thus estimated to be 40200 M fbm.

Schultz (1975) also examined the market potential for lumber only and projected the demand for NWT in 1980 at **17 350** M fbm (per-capita consumption of 432 fbm). Data from our study show lumber consumption at 36952 M fbm, or a per-capita consumption of 1118 fbm. Plywood and miscellaneous roundwood consumption on a per-capita basis was 220 sq. ft. and 18 cu. ft., respectively, for 1980-81.

Table 20. Plywood use by thickness and finish in the NWT, 1980-81

	Thickness (in.)							
Quantity	l/8a	1/4	5/16	3/8	1/2	5/8	3/4	Totaf
Number of sheets	1906	40031	13656	50969	46875	31063	43031	227531
M sq. ft.	61	1281	437	1631	1500	994	1377	7281
% of total	0.8	17.6	6.0	22.4	20.6	13.7	]8.9	100.0

	Finish						
Quantity	**Panefinga**	**Good two** sides	**Good** one side	**Tongue and groove**[b]	Formplyc	**Standard** sheathing	Total
M sq. ft.	61	6	3055	752	544	2863	7281
% of total	0.8	0.1	42.0	10.3	7.5	39.3	100.0

a Paneling, usually I/S-in. thickness or more.
b Select and better (plywood grades).
c Select one side (plywood grades).

Although the principal goaf of this survey was to determine the amount of forest products consumed in the NWT during 1980-81, future demand was afso considered relevant. All consumers were questioned about their anticipated future requirements. Most respondents quafified their answers by indicating that demand depended on a number of factors. Almost aflrespondents felt that a significant increase in wood product demand would depend on the start-up of proposed megaprojecta. Projects such as the Slave River power dam or the construction of pipelines south from the Beaufort Sea or Norman Wells were cited. Other respondents indicated that an active and expanding economy was necessary before demand would nseto any extent. As megaprojects have been delayed and the economy has not expanded rapidly, a projected increase in wood consumption might have been optimistic.

The greatest increase in demand for lumber and plywood was expected in the Inuvik market area. This increase in demand was dependent on continued growth in the oil exploration field and the construction of the proposed Mackenzie Valley pipeline.

The construction companies anticipated the largest increase in use of wood products, and oil companies and government agencies predicted smallerrncreases. Mining companies envisioned a decrease in demand for wood products. With the projected increase in population[18] and the continued increase in the price of oil (and if government policy promotes the substitution of wood for fuel oil in heating), the domestic demand for fuelwood could increase substantially in the future.

Wood Product Availability

All consumers were questioned about the availability of wood products in their area (Table 21). Two products, kiln-dried lumber and preserved wood, were most often cited as being unavailable; however, 41% of the consumers responded that all products sought were readily available within a reasonable delivery time.

[18] A comparison of the 1971 census to the 1981 census shows that the NWT population over the last 10-year period increased an average of 3% per year.

Table 21. Wood products not readily available in the NWT, 1980-81

Product	Number of consumer responses by market area							
	Fort Smith	Hay River	Fort Simpson	Yellow-knife	Norman Wells	Inuvik	Total	%
Kifndried lumber	5	1	2	—	—	1	9	16
Graded lumber	1	—	—	—	—	—	1	2
Fir lumber in quantity	—	—	—	1	—	1	2	4
Timbers	1	1	—	—	—	—	2	4
Preserved lumber, plywood, posts, and pilings	4	—	—	2	—	1	7	13
Miscellaneous roundwood: posts, mine timbers, and building logs	—	1	1	1	—	1	4	7
Machined wood stock mouldings, paneling, tongue and groove, siding	1	—	2	1	—	1	5	9
Hardwoods: plywood, lumber	1	—	—	—	—	—	1	2
Fireproofed wood	—	—	—	1	—	—	1	2
All products available	2	1	2	7	3	8	23	41
Totaf	15	4	7	13	3	13	55	100

CHAPTER VII

THE SOCIOECONOMIC IMPACT OF THE FOREST INDUSTRY IN THE NWT

No single criterion is appropriate to measure adequately the socioeconomic contribution of aparticufar industry to a regional, territorial or national economy. This report assesses the economic contribution of the Northwest Territories forest industry to the territorial economy using information on employment, wages and salaries, value of sales, value added, and community stability.

Employment and Wages and Salaries

Descriptive measures of employment associated with the forest industry in the NWT were discussed in Chapter IV. This section discusses the economic impact of the forest industry by describing the proportion of product value spent on wages and salaries, totaf wages and safaries paid, and the totaf number employed.

The total employed Iaborforce in the NWT in 1981 was estimated to be 17615 persons (NWT Bureau of Statistics 1983). Approximately 92 person-years of employment were in the forest industry (primary wood-using). By including the cafcufated employment value for domestic fuelwood, 39 addition person-years were identified. This totaf, however, represents less than 1% of the totaf employed work force in the NWT.

Total person-years of employment, total wages and salaries paid, and average income per employee for each of the NWT forest industry groups are outfined in Table 22. The sawmifl industry generated most of the jobs and showed the highest income per employee.

The average income (for each occupational category) for all income tax filers in the NWT in 1981 was $15406 (NWT Bureau of Statistics 1984). Average annual income for people working in the forest industry was $9425, higher than that for farmers and fisherman ($9098) and unclassified employees ($8284), but well below the average territorial income.

The proportion of finaf sales expended on wages and salaries for each of the NWT forest industry groups is shown in Table 23. The commercial fuelwood industry spent the greatest proportion of sales on wages and safaries (60%). Wages and salaries were approximately 41% of the totaf vafue of shipments in the NWT, compared to 25% in the prairie provinces (Alberta, Saskatchewan, and Manitoba) as a whole (Ondro and Williamson 1982, 1984, 1985). Wages and salaries were the greatest single expenditure in all forest industry groups in the NWT.

Table 22. Employment, earnings, and average income per employee by forest industry group in the NWT, 1981

Industry group	Totaf employment (person-years)	Total wages and salaries ($)	Average income per person-year of employment ($)
Sawmilfs	61.4	602266	9809
Misceflarteous roundwood	13.6	117360	8629
Commercial fuelwood	16.4	141840	8649
Total	91.4	861466	9425
Domestica fuelwood	39.2	300800	7673

[a] These vafues are not included in the total but are presented for information.

Table 23. Sales in relation to wages and salaries in the foreat industry in the NWT, 1981

Industry group	Value of shipments of gwds of own manufacturing ($)	Wages and salaries ($)	% of sales spent on wages and salaries
Sawmills	1546600	602266	38.9
Miscellaneous roundwood	340900	117360	34.4
Commeraal fuelwood	236380	141840	60.0
Total	2123880	861466	40.6
Domestic[a] fuelwood	560690	300800	53.6

a These values are not included in the total but are preaentad for information.

Value Added

The value added for the country as a whole is often described as its gross domestic product (GDP). The vafue added generated by a particular industry is a measure of that industry's contribution to a total regional, territorial, or national income; therefore, value added is a useful parameter for assessing the economic contribution of the forest industry to the territorial economy.

Value added can be defined as the difference between the total revenue of a firm and the cost of raw materials, services, and components. Thus it measures the value that has been added to materials and components by the processes of production. Value added includes labor costs (salaries and wages), capital costs (interest, rent, depreciation), and the return to the enterprise (profits).

The GDP in the Northwest Territories in 1981 was estimated at $650 million at factor cost, with the goods-producing sector accounting for 56%.[19] The manufacturing sector was small, contributing only 1.1% of value added in the goods-producing sector. Within the manufacturing sector, the forest industry contributed 3490 to total value added. This large contribution by the forest industry is the result of the relatively small manufacturing sector in the NWT. In contrast, the manufacturing sector in the prairie provinces contributed between 13 and 41% to the goods-producing sector, and the forest industry accounted for approximately 18% of value added in manufacturing (Ondro and Williamson 1982, 1984, 1985). In terms of contribution to the GDP, the forest industry in the prairie provinces contributed from 1.2 to 2.8%, but in the NWT the forest industry made up only 0.2% of the GDP.

Table 24 outlines the value added and the value of shipments by forest industry group. A total of $1 387 824 of value added was created by the industry, with the total value of shipments amounting to $2 123880. Sawmills were the most important group in terms of value added and value of shipments, contributing 72% to each category. In terms of value added per person-year of employment, the miscellaneous roundwood group ranked firstat$17 546, and sawmills were second at $16 406.

The Economic Stability of NWT Communities

Most communities within the forested area of the NWT rely to some extent on forest resources (e.g., for fuelwood, building logs, lumber, and indirect benefits such as wildlife habitat). The relationship between the

[19] Personal communication from J. Carbonneau, Statistics Canada, Ottawa, Ontario. 1982.

forest industry and the community was addressed in terms of the dependence of a particular community on the forest industry for continued economic and social benefit. The criterion used for judging economic dependence is the percentage of the total population of a particular community directly employed in the forest industry. **Forest industry employment** in this regard was considered to include all sawmill, miscellaneous roundwood, commercial fuelwood, domestic fuefwood, and governmental forest-related employment.

In order to attain community stability, Hornberger (1974) suggests that 25% of the total population should represent the labor force and that "a single industry should not employ more than 5% of the labor supply initially and 10% ultimately for the financial protection of the community." If more than 2.5% of the total population is employed in one industry, the financial security of the community is subject to the continued vitality of that industry. In this report, communities with 2.5% or more of their populations employed in the forest industry are considered fully dependent. Communities with 1.0-2.5% employed in the forest industry are deemed to be heavily dependent.

Northwest Territories communities with **forest** industry reliance are listed in Table 25. Five of the communities are considered fully dependent: Fort Resolution, Fort Liard, Trout Lake, **Colville** Lake, and Norman Wells. Fourteen communities are considered heavily dependent, and a number of other communities accounted for additional forest industry employment. These communities could be considered marginally dependent, but because less than 1% of each of their populations was employed in the forest industry, they were not listed.

Table 24. Value **added and** sales of the forest industry in the NWT, 1980-81

Forest industry group	Value added of manufacturing activity ($)	Value of shipments ($)	Average value added per person-years of employment ($)
Sawmill and planing industry	1007366	1546600	16406
Miscellaneous roundwood	238630	340900	17546
Commercial fuelwood	141828	236380	8648
Total	1387824	2123880	15184
Domestica fuelwood	392483	560690	10012

a These values are not included in the total but are presented for information.

Table 25. Employment in the foreatindustry inaome NWTcommunities, 1981

Employment center	Totaf population	Forest industry[b] employment (person-months)	% of population employed by forest industry
Fully dependent communities			
Fort Resolution	480	512	8.9
Fort Liard	405	136	2.8
Trout Lake	59	18	2.5
Colville Lake	57	17	2.5
Norman Wells[c]	420	127	2.5
Heavily dependent communities			
Fort Smith	2298	643	2.3
Kakisa Lake	36	9	2.1
Fort Simpson	980	248	2.1
Paradise Gardens	48	9	1.6
Wrigley	137	24	1.5
Snowdrift	253	41	1.4
Fort Providence	605	100	1.4
Enterprise	46	7	1.3
Fort Good Hope	463	64	1.1
Rae-Edzo	1378	180	1.1
Reliance	15	2	1.1
Red River	120	16	1.1
Rae Lakes	200	24	1.0
Snare Lakes	69	8	1.0

a Source: Statistics Canada 1982.

b Includes all governmental forest-related employment in the Northern Affairs Program, which includes empfoymentrefating to fire rmdlandueemanegement activities. Government activity accountefor4596 of the totrd employment represented in this tabfe.

c Totaf popufetion does not incfude oil-field workers who reside outside the area end therefore may be misleading in terms of dependency.

SUMMARY

The following summary provides highlights of the report.

Forest Industry

Resource baae

- lnthe NWT, 237390 sq. mi. (19% of the total land area) are forested. Productive forest land is estimated to be 55198 sq. mi. (23% of the forested area).
- In 1980-81, 2624 M cu. ft. of timber were harvested.
- The Liard Forest Management Unit contains the largest, most productive single tract of timber in the NWT.

Industrial base

- In 1980-81, the primary wood-using industry of NWT consisted of 9 sawmills, 1 shingle mill, 25 miscellaneous roundwood producers, 18 commercial fuelwood producers, and numerous domestic fuelwood producers.
- The nine sawmills varied in productive capacity from less than 3000 fbmto30000 fbm per 8-hour shift.
- Two sawmills (Slave River Sawmill and Patterson's Sawmill) produced over 1 MM fbm per year, accounting for 70% of lumber production in the NWT.
- The total replacement value of the capital stock of NWT sawmills was greater than $5.5 million.

Wood products produced

- The primary wood-using industry produced 6275 M fbm of lumber, 277 M cu. ft. of miscellaneous roundwood, and approximately 13600 cords of fuelwood.
- All production was marketed in the NWT, except for 790 M fbm of lumber that was exported to Alberta.
- White spruce was the most important tree species, accounting for 97% of lumber production.
- The Fort Smith and Hay River market areas accounted for 90% of lumber production and 65% of all other forest products produced.
- Dimension material was the major lumber product, representing 58% of total production. Approximately 72% of all lumber produced was planed.
- The Yellowknife market area produced the greatest amount of miscellaneous roundwood (52%).
- The Fort Smith and Yellowknife market areas together, with almost equal shares, produced 48% of the fuelwood.

Economic and social impacts

- Gross sales in the forest industry amounted to over $2.1 million in 1980-81.
- Exported lumber generated an estimated $172000 in income to the territory.
- Total direct employment in the forest industry was 91.5 person-years. An additional 91.5 jobs were supported indirectly by the industry.
- Employees of native ancestry comprised over 80% of the forest industry labor force.
- The total direct payroll of the forest industry was $861000. The average income per person-year of employment was $9425.
- Value added by NWT primary forest industry groups was$l 388000. Tbeseindustries accounted for over 30% of the total value added to the manufacturing sector.
- Value added per employee was $16406 in the sawmill industry group, $17546 in the miscellaneous roundwood industry group, and $8648 in the commercial fuelwood industry group. This resulted in an average value added per person-year of employment in the forest industry of $15184.
- Five NWT communities, with a total population of 1381 people, were fully dependent on the forest industry, and 14 communities were considered heavily dependent.

Forest Product Conaurnption

Conuurnption characteristics

- NWT users consumed 37 MM fbm of lumber, 7.3 MM sq. ft. of plywood, 600 M cu. ft. of miscellaneous roundwood, and 13600 cords of fuelwood in 1980-81.

- The largest consumption zone for wood products was the Inuvik market area, which used 56% of the lumber, 46% of the plywood, and 57% of the miscellaneous roundwood.

- The Yellowknife and Fort Smith market areas were the largest consumers of fuelwood; their combined consumption represented 50% of the totaf fuelwood production.

- Considering the lumber market onfy, the Inuvik market area consumed most of the dimension material (60%) and timbers (48%). Users in the Yellowknife market area consumed the largest amount of board materiaf (39%).

- There were five major consuming groups: construction companies, oil companies, mining companies, government agencies, and others.

- The largest consuming group was composed of the construction companies, which consumed 66% of the lumber, 36% of the plywood, and 25% of the miscellaneous roundwood.

- On a per-capita basis, the NWT consumed 1118 fbm of lumber, 220 sq. ft. of plywood, and 18 cu. ft. of miscellaneous roundwood in 1980431.

Roduct imports

- Most wood products were imported: 85% of the lumber, 100% *of* the plywood, and 54% of the miscellaneous roundwood. No fuelwood was imported.

- Most of the lumber was imported from Edmonton (36%) and southern B.C. (32%).

- Plywood was mainly imported from southern B.C. (51%) and Edmonton (39%).

. Most of the imported miscellaneous roundwood (88%) was suppfied from the Yukon.

Product distribution

. The lumber market was almost equally divided between consumers who import directly (51%) and distributors (building supply companies), which handfed 48% of the product.

- The largest portion of the plywood market was handled by distributors (73%); 27% was imported directly by consumers.

. The miscellaneous roundwood market was almost equally spfit between consumers who imported directly (53%) and NWT producers (47%).

. AU fuelwood was handled by NWT producers.

Product transportation

. The majority of wood products, 85% of the lumber, and 74% of the plywood were transported by road to their final destinations.

- Even though most wood products were moved by road, air and water transport were identified as other important modes of transportation.

. To a large extent, lumber prices reflect transportation costs involved in moving the product into a market area.

Product type

- Of lumber consumed, 79% was spruce and the rest was primarily Douglas-fir.

- Of plywood used, 88% was Douglas-fir and the rest was mainly spruce.

. Dimension material was the major lumber product, representing 76% of the demand. Timbers and boards accounted for 18% and 6%, respectively, of the market.

- Of the total dimension materiaf consumed, 51% was 2 X4S, 18% was 2 X 10s, 15% was 2 X 6s, 9% was 2 X 8s, and 7% was 2 X 12s.

ACKNOWLEDGMENTS

The author wishes to thank personnel of all forest industry groups and wood-consuming groups for their cooperation in providing confiderttial information on their operations. In addition, thanks are duetoall headquarters and field staff of INAC in the NWT for their assistance in providing information and transportation when needed. Thanks are extended to P. Gray and J. Gilmour for their valuable critical comments on the manuscript. Finally, the assistance of members of the Northern Forestry Centre, particularly H. Stewart, D. Kuhnke, and W.J. Ondro, in data collection and compilation, table presentation, figures and graphs, and verification is gratefully acknowledged.

REFERENCES

Berger, T.R. 1977. Northern frontier, northern homefaod. Report of the Mackenzie Vefleypipetine enquiries, Vof. 2. Publ. Cent., Suppfy Serv. Can., Ottawa, Ontario.

Bickerataff, A.; Wallace, W. L.; Evert, F. 1981. CrOwth of forests in Caoa&. Part 2: A quantitative description of the land base and the mean annual increment. Environ. Can., Can. For. Sew., Petawawa Nati. For. Inst., Chstk River, Ontario. fnf. Rep. PI-x-1.

Bonnor, G.M.1982. Csnsda's forest inventory—1981. EnvisosI. Can., Can. For. Serv., Stat. Syst. Branch, Ottawa, Ontario.

Department of hrdian Affaireand Northern Development. 1973. North of 60. The forests of Northern Canada. Indian Aff. North. Dw. Pubf. QS-0849.000-BBA3.

Department of the Interior. 1931. 1930 Annual Report-Lands, Parke, and Forests Branch. Ottawa, Ontario.

Government of the Northwest Territories. 1977. The forest induetry in Fort Resolution: an hiatoricaf rwiew. Dep. Plann. Prog. EvaL, Yettowknife, Northwest Territories.

Hirvonen, R.P. 1968. Report orrtheforestconditionsin thelower Liard River basin Yukon/NWT. Dep. Environ., Can. For. Sew., For. Manage. Inst., Ottawa, Ontario. North. Surv. Rep. 3.

Hirv-, R.P. 1975. Forest resources of the Mack- River valley, NWT. Dep. Environ., Can. For. Serv., For. Manage. Inst., Ottawa, Ontario. Inf. Rep. FMR-X-71.

Homberger, G.A. 1974. Pages 85-86 in L.R. Whiting, editor. Rural industrialization: probkme and potential. fowa State University Press, Ames, Iowa.

Kitto, F.H. 1930. The North West Territories. Dep. Int., Ottawa, Ontario.

Nationaf Lumber Grades Authority. 1982. Canadian lumber grading manuaf. Vancouver, B.C.

Northwest Territories Bureau of Statistics. 1983. Lahour force statistics, 1981. Census Data Pubf. SPE81B30. Yellowknife, NWT.

Northwest Territories Bureau of Statistics. 1984. Personal income statistics, NWT. Yeftowknife, NWT.

Ondro, W. J.; Wiffiamemr, T.B. 1982. The forest industry in the economy of Alberta, 1978-79. Environ. Can., Can. For. Serv., Nortfs. For. Res. Cent., Edmonton, Alberta. Inf. Rep. NOR-X-246.

Ondm, W.J.; Witfiamacm, T.B. 1984. The forest industry in the economy of Manitoba, 1979-80. Environ. Can., Can. For. Serv., North. For. Res. Cent., Edmonton, Alberta. Inf. Rep. NOR-X-263.

Ondro, W.J.; Wiffiamson, T.B. 1985. The forest irrdustry in the economy of Saskatchewan, 1979-80. Environ. Can.', Can. For. Sew., North. For. Res. Cent., Edmonton, Alberta. hrf. Rep. NOR-X-270.

Rowe, J.S. 1972. Forest regioneof Canada. Dep. Environ., Can. For. Serv., Ottawa, Ontario. Pubf. 1300.

Schultz, C.D. 1970. Preliminary appreciation of prospects for forest conversion plant development in tha Northwest Territories, Canada. C.D. Schultz ewd Company, Vancouver, B.C.

Schuftz, C.D. 1975. A study of location and feasibility of a poieyard and sawmill operation in the Mackenzie Valfey, NWT. C.D. Schuftz and Company, Vancouver, B.C.

Statistics Canada. 1978. Capacity .tifizatio. rates in Canadian manufacturing third quarter, 1978. Cat. No. 31-003. Ottawa, Ontario.

statistics Canada. 1982.1981 census of Canada. Cat. No. E.570. Ottawa, Ontario.

APPENDIX=

Appendix 1. Population by market area in the NWT, 1982.

Appendix 2. Wood producer questionnaire.

Appendix 3. Directory of primary wood-using industries in the Northwest Territories, 1981.

Appendix 4. Reasons for inadequate fuelwood records and method of estimating total fuelwood use.

Appendix 5. List of wood consumers.

Appendix 6. Selected metric (Sl)units and conversion factors.

APPENDIX 1

Population BY MARKET **AREA IN THE NWT, 1982b**

HAY RIVER

Communities	Population
Hay River	2863
Fort Providence	605
Paradise Gardens	48
Enterprise	46
Kakisa Lake	36
Unorganized	47
Total	3645

NORMAN **WELLS**

Communities	Population
Norman Wells	420
Fort Franklin	521
Fort Good Hope	463
Fort Norman	286
Colville Lake	57
Unorganized	5
Total	1752

FORT SIMPSON

Communities	**Population**
Fort Simpson	**980**
Fort Liard	**405**
Tungsten (Mine)	**320**
Wrigley	**137**
Nahanni Butte	85
Jean Mane River	69
Trout Lake	59
Unorganized	66
Total	2121

FORT SMITH

Communities	Population
Fort Smith	2298
Pine Point	1861
Fort Resolution	480
Snowdrift	253
Reliance	15
Fitzgerald[c]	21
Wood Buffalo Parke	188
Unorganized	46
Total	5162

YELLOWKNIFE

Communities	Population
Yellowknife	9483
Rae-Edzo	1378
Lac La Marte	268
Rae Lakes	200
Detah	143
Snare Lakes	69
Port Radium	56
Unorganized	68
Total	11665

INUVIK

Communities	Population
Inuvik	3147
Tuktoyaktuk	772
Aklavik	721
Fort McPherson	632
Arctic Red River	120
Unorganized	6
Western arctic coast	
Cambridge Bay	815
Coppernine	809
Gjoa Haven	523
Spense Bay	431
Holman Island	300
Paulatuk	174
Sachs Harbour	161
Bay Chimo	60
Bathurst hdet	20
Unorganized	30
Total	8721

a Total population of western NWT: 33066

b Source: Statistics *Canada.* **1982.1981 census of Canada. Cat. No. E-570 Ottawa, Ontario.**

c Area supplied from Fort Smith and considered part of the market area.

APPENDIX 2

WOOD PRODUCER QUESTIONNAIRE

Industry Group: **Size:** Region:

NAME & ADDRESS/PHONE NO.

LOCATION OF MILL:

PRODUCTS: MARKETS:

Dimension:

Boards:

Timbers:

Pilings:

PIywood:

Fuelwood:

Others:
(By grades, lengths, and price **if** possible)

SPECIES USED BY%:

WOOD SOURCE:

EMPLOYMENT:

(Numbers) Wage _____ Salary _____ Contract _____

No. of employees by Month

Woodlands _____

Mill _____

% Employees of native origin _____

TRANSPORTATION OF WOOD INPUTS (type and distance) (mIs):

MILL CAPACITY (8-hr. shift):

EST. REPLACEMENT COST (New cost): Mills _____

Mobile and woodlands equipment _____

TOTAL APPRAISED ASSET-VALUE OF MILL OPERATIONS: _____

USE: Stationary

Portable

AGE OF EQUIPMENT:

OWNERSHIP:

% PERSONAL INCOME DERIVED:

MANAGEMENT:

SPECIAL SERVICES:

MEMBERSHIPS (if NWT Grading Assoc. - Mill Stamp No.):

MILL FACILITIES/EQUIPMENT:

COST OF PRODUCTION:

Maintenance & repairs _____

Fuel & electricity costs _____

Payment for stumpage _____

Totaf wages paid _____

Other costs:

TOTAL COST: _____

ENERGY SUPPLY FOR MILL:

USAGE OF WOOD RESIDUES:

NOTES AND OBSERVATIONS:

WOOD USER'S QUESTIONNAIRE

Consumer: (e.g. building contractor, mine, oil company, government regular lumber use)

NAME & ADDRESS/PHONE NO.:

PRESENT CONSUMPTION (1980/81 or specify) lumber in M fbm or cu. ft.:

Plywood ft^2 basis or number _____

of sheets by size _____

PRODUCTS (% Rough or Dressed)

Dimension (2 X X):

Boards (1 X X):

Timber (4 X X):

Pilings:

Plywood:

Fuelwood:

Other (e.g. mine props, panel products)
(specify % kifn dried)

SPECIES USED BY %:

WOOD SOURCE (origin by %):

NWT region

1) **Fort Smith** _____

2) Hay River _____

3) Fort Simpson _____

4) Yellowknife _____

5) Norman Wells _____

6) Inuvik _____

7) other (specify) _____

lMPORTS FROM ALBERTA (specify region of origin) _____

IMPORTS FROM BRITISH COLUMBIA (specify region of origin) _____

IMPORTS FROM ELSEWHERE _____

TRANSPORTATION (in miles) (Indicate points of origin, transfer points, and final destination).

Tmck:

Raik

Barge:

Air:

Other:

TOTAL PRODUCT PRICE AND TRANSPORTATION COSTS

	Price per unit	Estimate of transportation costs (redate to points of origin)
Dimension		
Boards		
Timbers		
Other (specify)		

LIMITING FACTORS FOR HIGHER CONSUMPTION IN NWT

1. Time lag in product delivery
2. Market fluctuation (uncertainty for selling) for consumer's product
3. Seasonality
4. Product quafity
5. Other (specify):

EXPECTED CONSUMPTION IN 1982: _____

EXPECTED CONSUMPTION IN 1985: _____

PRODUCTS DESIRED THAT ARE PRESENTLY NOT READILY AVAILABLE: _____

PRODUCT TREATMENT(e.g. kiln dried, preserved)

APPENDLX3

DIRECTORY OF PRIMARY WOOD-USING INDUSTRIES IN THE NORTHWEST TERRITORIES, 1981

ANDERSON MILLS LTD.

ADDRESS:	Box 344 Fort Simpson XOE ONO
TELEPHONE:	(403) 695-2770 **Mobile** 2M4610
MILL LOCATION:	4 miles south of Fort Simpson
OWNERS:	G. AlIan Anderson and Company
MILL CAPACITY:	sawmill: 10 M fbm/8-hr. Shift **Planing mill:** 20 M **fbm/8-hr.** shift
PRODUCTION 1980-81:	**Lumber:** 500 M fbm Building logs: 70 M fbm
PRODUCTS:	Dimension lumber: 2 X 4—23%, 2 X 6—20% 2 X 8—7%, 2 X 10—13%, 2 X 12—3% **Board lumber:** 1 X 4-3%, 1 X 6-6%, 1 X 8–3% Random lengths, dressed, P. A.D.a Timbers: 4 X 4—2%, 6 X 6—3%, 8 X 8—3%, 10X 10—1%, 12 x 12—1% Building **logs: all** SKIM 12% **Firewood:** 80 cords
SPECIES UTILIZED:	White spruce
WOOD SUPPLY:	**Timber permit**
AVERAGE LOG-HAUL WOODS TO MILL:	5 miles
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1972
AVERAGE EMPLOYMENT-MONTHS OF OPERATION:	LANDS: **5b** ----- J ----- N **Dc** MILL: 5 --- A M J --------

---

a Partial air dried.
b Indicates number of employment months.
c Indicates months of cmpfoyment during thcalendar year.

TRANSPORTATION:	INPUTS: Truck OUTPUTS: Truck
MARKETS:	Hay River and Fort Simpson
SPECIAL SERVICES	Cut to customer's specifications, graded, unit strapped, specializes in timbers up to 20 ft. Will supply pilings and power poles.
MEMBERSHIPS:	NWT Grade Stamp Agency, Stamp #8
ENERGY SUPPLY FOR MILL:	Electricity-Northem Canada Power Commission
USAGE OF WOOD RESIDUES:	Slabs and edgings: 5% used for firewood, rest burned. Tops and culls: firewood. Sawdust: piled. Shavings: 5% used for insulation, rest piled
WOODLANDS EQUIPMENT:	1 - Tree Farmer skidder 1 - Hough skidder 1 - International log truck 1 . 175 Michigan loader 1 . Logging Arch 1 - Caterpillar 337 light plant
MILL FACILITIES AND EQUIPMENT:	Stationary sawmill—planing complex 1 - Prince Albert #2 sawmill with 48 in. circular headsaw 1 - Edger 1 - Resaw 1 - Alco planer 1 - Trimsaw 1 - 24" resaw
ESTIMATED REPLACEMENT COST OF BUILDINGS, FIXED AND MOBILE EQUIPMENT:	$340000

C. PLAMONDON LUMBER

ADDRESS:	BOX 672 Fort Smith XOE OPO
TELEPHONE:	None
MILL LOCATION:	17 miles west of Fort Smith
OWNERS:	C. Plamondon
MILL MANAGEMENT:	C. Plamondon
MILL CAPACITY:	Sawmill: 20 M fbrn/8-hr. shift Planing mill: 48 M fbm/8-hr. shift
PRODUCTION 1980-81:	80 M fbm
PRODUCTS:	Dimension lumber: 2 X 4—14%, 2 X 6–22%, 2 x 8—12%, 2 x 10—2% Board lumber: 1 X 4–12%, 1 X 6–18%, 1 X 8–12% Random lengths, 50% dressed, P.A.D. Timbers: 6 X 6—4%, 8 X 8—4%
SPECIES UTILIZED:	White spruce
WOOD SUPPLY:	Timber permit
AVERAGE LOG-HAUL WOODS TO MILL:	35 miles
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1967
AVERAGE EMPLOYMENT MONTHS OF OPERATION:	WOODLANDS: 1 J F- ------- N D MILL: 2- --- M J J A S 0--
TRANSPORTATION:	INPUTS: Truck OUTPUTS: Truck
MARKETS:	Fort Smith
SPECIAL SERVICES:	Cut to customer's specifications, custom sawing, graded, unit strapped
MEMBERSHIPS:	NWT. Grade Stamping Agency, Stamp ##6
ENERGY SUPPLY FOR MILL:	Self-generated
USACE OF WOOD RESIDUES:	Slabs and edgings: 5% use for firewood, rest burned Sawdust and shavings: burned

WOODLANDS EQUIPMENT:	1 - Timberjack skidder 1 - Kenworth logging truck
MILL FACILITIES AND EQUIPMENT:	Stationary sawmill - planing mill complex 1 - 44-in. circular headsaw 1 - Edger 1 - Ako 007 planer 1 - Timber toter forklift
ESTIMATED REPLACEMENT COST OF BUILDINCS, FIXED AND MOBILE EQUIPMENT:	$220000

KEN KIMBLE SAWMILL

ADDRESS:	Box 91 Hay River XOE ORO
TELEPHONE:	None
MILL LOCATION:	2 miles west on Fort Simpson turnoff, mile 119 on Mackenzie Highway.
OWNERS:	Ken Kirnble
MIU MANAGEMENT,	Ken Kimhk
MILL CAPACITY:	18 M fbrn/8-hr. shift
PRODUCTION 1980-81:	50 M fhm
PRODUCTS:	Dimension lumber: 2 X 4—16%, 2 X 6—12%, 2 X 8—2% Board Iumber: 1 X 4–2%, 1 X 6-8% 16-ft. lengths, rough, P.A.D. Timbers: 6 X 6–24%, 8 X 8–24%, 4 X 6–12%
SPECIES UTILIZED:	White spruce
WOOD SUPPLY:	Timber permit
AVERAGE LOG-HAUL WOODS TO MILL:	32 miles
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1978
AVERAGE EMPLOYMENT MONTHS OF OPERATION:	WOODLANDS: 4 J F ---------- MILL: 4 --- A M -------
TRANSPORTATION:	INPUTS: Truck OUTPUTS: Tmck
MARKETS:	Yellowknife
SPECIAL SERVICES:	Cut to customer's specifications, custom sawing
MEMBERSHIPS:	None
ENERGY SUPPLY FOR MILL:	SeU-generated
USAGE OF WOOD RESIDUES:	Slabs and edgings: no use, burned Sawdust: burned
WOODLANDS EQUIPMENT:	1 - C7D Tree Farmer skidder 1 - D7 Caterpillar crawler 1 - 955 Caterpillar with grapple loader 1 - Kenworth logging truck
MILL FACILITIES AND EQUIPMENT:	Stationary sawmiU 1 - 46-in. circular headsaw 1 - Edger 1 - D4 Caterpillar crawler 1 - Shingle mill
ESTIMATED REPLACEMENT COST OF BUILDINGS, FIXED AND MOBILE EQUIPMENT:	$100000

KOVATCH AND SONS LOGGING LTD.

ADDRESS:	Box 1362 Hay River XOE ORO
TELEPHONE:	(403) 874-6431 Mobile 2M4217
MILL LOCATION:	10 mile west of Enterprise on Mackenzie Highway (portable mill)
OWNERS:	Steve Kovatch and Sons
MILL MANAGEMENT:	Steve Kovatch
MILL CAPACITY:	3 M fbm/8-hr. shift
PRODUCTION 1980-81:	200 M fbm
PRODUCTS:	Dimension lumber: 2 X 4—22%, 2 X 6–28%, 2 X 8—10%, 2 X 10—10% Board lumber: 1 X 4–6%, 1 X 6–6%, 1 X 8–3% Random lengths, dressed, P.A.D. Timbers: 4 X 4—15%
SPECIES UTILIZED:	White spruce: 90% Jack pine: 10%
WOOD SUPPLY:	Timber permit
AVERAGE LOG-HAUL WOODS TO MILL:	1/2 mile
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1981
AVERAGE EMPLOYMENT MONTHS OF OPERATION:	WOODLANDS (Contract) 3 -- M A M J J - - - - - MILL: 5 .- M A M J J -----
TRANSPORTATION:	INPUTS: Skidder OUTPUTS: Truck
MARKETS:	Hay River
SPECIAL SERVICES:	Cut to customer's specifications, graded, unit strapped, specialty products - tongue and groove, siding, custom sawing.
MEMBERSHIPS:	NWT Grade Stamp Agency, Stamp #11
ENERGY SUPPLY FOR MILL:	Self-generated

USAGE OF WOOD RESIDUES:	**Slabs and** edgings: energy conversion at Fort Providence Sawdust and shavings: no use, piled
WOODLANDS EQUIPMENT:	1 - 518 Caterpillar skidder
MILL FACILITIES and EQUIPMENT:	Portable sawmill - planing mill complex 1 - **Mobile** 30-in. circular saw 1 - Alco planer 1 - Koehring loader 1 - Homelite 5KW power plant ***Installing edger,** trim saws and green **chain to be operational** in 1982.
ESTIMATED REPLACEMENT COST OF BUILDINGS, FIXED AND MOBILE EQUIPMENT:	$280000

PATTERSON ENTERPRISES LTD.

ADDRESS:	Box 979 Hay River XOE ORO
TELEPHONE:	(403) 874-6814
MILL LOCATION:	12 miles south of Hay River
OWNERS:	Eugene Patterson and Company
MILL MANAGEMENT:	Eugene Patterson
MILL CAPACITY:	Sawmill: 25 M fbm/8-hr. shift Planing miU: 25 M fbm/8-hr shift
PRODUCTION 1980-81:	Lumber: 2375 M fbm Building logs: 125 M fbm
PRODUCTS:	Dimension lumber 2 X 4—16%, 2 X 6—16%, 2 X 8–2%, 2 x 10-4%, 2 x 12—2% 60% dressed, 40% rough Board lumber 1 X 4—1096, 1 X 6—18%, 1 X 8—5%, 1 x 10—296 85% dressed, 15% rough Mainly 16-ft. lengths, P.A.D. Timbers all sizes, from 3 X 10 to 12 X 12–20% Building logs, au sizes • 5%
SPECIES UTILIZED:	White spmce- 95% Jack pine: 2% Poplar and birch: 3%
WOOD SUPPLY:	Timber permit
AVERAGE LOG-HAUL WOOD TO MILL:	75 miles
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1972
AVERAGE EMPLOYMENT MONTHS OF OPERATION:	WOODLANDS: 6.5 J F M ------- N D MILL 6.5 --- AM JJ A SO-- OFFICE/SALES: 1.5 J F M A M J J A S O N D
TRANSPORTATION:	INPUTS: Truck OUTPUTS: Truck, barge

MARKETS:	**Hay** River, Yellowknife, Pine Point, and Beaufort Sea.
SPECIAL SERVICES:	Cut **to customer's specifications, Timbers up to** 35 feet long, unit strapped, graded
MEMBERSHIPS:	NWT Grade Stamping Agency #2 and #3
ENERGY SUPPLY FOR MILL:	Self-generated
USAGE OF WOOD RESIDUES:	Slabs and edgings: burned Sawdust, shavings: burned
WOODLANDS EQUIPMENT:	**1 -** 667 Clark skidder 1 - 667 C Clark skedder 2 - Kenworth logging trucks
MILL FACILITIES AND EQUIPMENT:	Stationary sawmill - planing complex 1 - **54-in.** circular headsaw 1 - Alco Beaver planner 1 - Clark loader **1 - Terex loader** * **Constructing** dry kiln to be in operation in 1982
ESTIMATED REPLACEMENT COST OF BUILDINGS, FIXED AND MOBILE EQUIPMENT:	$750000

RAE-EDZO SHINGLE MILL

ADDRESS:	Box 68 Rae XOE OYO
TELEPHONE:	(403) 392.6500
MILL LOCATION:	Rae
OWNERS:	Hamlet of Rae-Edzo
MILL MANAGEMENT:	Pete Anderson
MILL CAPACITY:	13 bundles of shingles per 8-hr. day
PRODUCTION 1980-81:	560 bundles (approximately 15 M fbm)
PRODUCTS:	Shingles #1 roof grade - 60% #2 siding - 40% 16-in. lengths, treated with preservative
PRESERVATIVES USED:	Pentachlorophenal
SPECIES UTILIZED:	Black spruce
WOOD SUPPLY:	Timber permit
AVERAGE LOG-HAUL WOODS TO MILL:	12 miles
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1981
AVERAGE EMPLOYMENT MONTHS OF OPERATION:	WOODLANDS: 2 J ---------- MILL: 5 ----- J J A S ---
TRANSPORTATION:	INPUTS: Truck OUTPUTS: Truck
MARKETS:	Own use, NWT
SPECIAL SERVICES:	**Cut to customer's specifications, treating with preservative**
MEMBERSHIPS:	None
ENERGY SUPPLY FOR MILL:	Self-generated
USAGE OF WOOD RESIDUES:	**All** burned
WOODLANDS EQUIPMENT:	None
MILL FACILITIES AND EQUIPMENT:	Shingle mill
ESTIMATED REPLACEMENT COST OF BUILDING, FIXED AND MOBILE EQUIPMENT:	$10000

SLAVE RIVER SAWMILL CO. LTD.

ADDRESS:	General Delivery Fort Resolution XOE OMO
TELEPHONE:	(403) 394-4331 Telex 034-4344 394-3191
MILL LOCATION,	Town of Fort Resolution
OWNERS:	People of Fort Resolution
MILL MANAGEMENT,	Ray Orbell Office Manager - Tim Acey
MILL CAPACITY:	Sawmill: 68 M fbm/8-hr. shift Planing milk 80 M fbm/8-hr. shift
PRODUCTION 1980-81:	2 MM fbm
PRODUCTS:	Dimension lumber: 2 X 4—45%, 2 X 6—16%, 2 X 8—2%, 2 X 10—8%, 2 X 12—4% Board lumber: 1 X 4—15%, 1 X 6—4%, Other: 1% Random lengths, dressed, P.A.D. Timbers: 4 X 4—4%, 6 X 6—8 X 8, 10 X 10 and other—1%
SPECIES UTILIZED:	White spruce
WOOD SUPPLY:	Timber permit
AVERAGE LOG-HAUL WOODS TO MILL:	30 miles
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1974
AVERAGE EMPLOYMENT MONTHS OF OPERATION:	WOODLANDS: CONTRACT: 22 J F M --------- OWN: 12 J F M --------- MILL: 55 --- Y2MJJ A so-- OFFICE/ SALES: 3 J F M A M J J A S O N D
TRANSPORTATION:	INPUTS: Truck OUTPUTS: Truck
MARKETS:	Edmonton, Fort Smith, Hay River, and Yellowknife
SPECIAL SERVICES:	Cut to customer's specifications, precision end trimmed, end coated, unit strapped, graded

MEMBERSHIPS:	NWT Grade Stamp Agency, Stamp #9
ENERGY SUPPLY FOR MILL:	Self-generated
USAGE OF WOOD RESIDUES:	Slabs and edgings: burned Sawdust and shavings: burned Tops and culls: firewood
WOODLANDS EQUIPMENT:	1 - D6 Caterpillar crawler 1 - HD4 Allis Chafmers crawler 1 - M100 Allis Chalmers grader 1 - Wabco grader 1 - 666 Ranger skidder 1 - 544 John Deere loader 1 - 45B Michigan loader
MILL FACILITIES AND EQUIPMENT:	Stationary sawmill-planing complex 1 - 8-in. Salem drive feedworks 1 - 54-in. top and bottom circufar headsaw 1 - 8-in. bull edger 1 - 36-in. line bar resaw 1 - double end trimsaw 1 - greenchain 2 . Caterpillar 346 power units 1 - 8V92 Detroit, 550 volt generator 1 . A20 Yates planer 1 - W18 Case loader 1 . 7251 Terex loader * Installing small log CanCar chipping saw to be operational in 1982.
ESTIMATED REPLACEMENT COST OF BUILDINGS,FIXED AND MOBILE EQUIPMENT:	$2500000

S00 CONSTRUCTION

ADDRESS:	BOX 28 Fort Simpson XOE ONO
TELEPHONE:	None
MILL LOCATION:	103 miles southeast of Fort Simpson on the Liard Highway
OWNERS:	Edwin Lindberg
MILL MANAGEMENT:	Edwin Lindberg
MILL CAPACITY:	7 M fbm/8-hr. shift
PRODUCTION 1980-81:	**Lumber: 80 M fbm** Building logs: 5 M fbm Dimension lumber: 2 X 4–6%, 2 X 6–12%, 2 X 8—18%, 2 X 10—6%, 2 X 12—6% **Board lumber: 1 X 4–2%, 1 X 6–3%, 1 X 8–6%,** **Random** lengths, rough, P.A.D. Timber: 4 X 4–6%, 4 X 6–6%, 4 X 8–6%, 4 X 12–17% **Building logs: 6%**
SPECIES UTILIZED:	White spruce
WOOD SUPPLY:	**Timber permit**
AVERAGE LOG-HAUL WOODS TO MILL:	1/2 mile
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1980
AVERAGE EMPLOYMENT MONTHS OF OPERATION:	WOODLANDS: 2-- M A -------- MILL: 2 ---- M J J A S ---
TRANSPORTATION:	INPUTS: **Skidder** **OUTPUTS:** Truck, barge
MARKETS:	Fort Simpson area.
SPECIAL SERVICES:	**Cut** to customer's specifications, custom sawing, unit strapped
MEMBERSHIPS:	None
ENERGY SUPPLY FOR MILL:	Self-generated

USAGE OF WOOD RESIDUES:	**Slabs and edgings: 5%** for firewood, rest burned Sawdust: piled.
WOODLANDS EQUIPMENT:	1 - Ford 4000 tractor 1 - John Deer skidder 1 - D4 Caterpillar crawler
MILL FACILITIES AND EQUIPMENT:	Portable sawmill 1- #127 Dimension sawmiff with 34-in. circular saw plus edger. **1 -** HD5 Allis Chalmers crawler 1 - 3 ton truck
ESTIMATED REPLACEMENT COST OF BUILDING, FIXED AND MOBILE EQUIPMENT:	$90000

W.C. LOGGING AND CONTRACTING LTD.

ADDRESS:	fbX 623, Fort Smith X0E OPO
TELEPHONE:	None
MILL LOCATION:	10 miles west of Fort Smith
OWNERS:	Joe Kennedy and Company
MILL MANAGEMENT:	Joe Kennedy
MILL CAPACITY:	Sawmill: 15 M fbm/8-hr. shift Planing mill: 45 M fbm/8-hr. shift
PRODUCTION 1980-81:	800 M fbm
PRODUCTS:	Dimension lumber: 2 X 4–18%, 2 X 6–18%, 2 X 8–9%, 2 X 10–9%, 2 X 12–6% Board lumber: 1 X 4–7%, 1 X 6–16%, 1 X 8—1% Random lengths, dressed, P.A.D. Timbers: 4X 4–6%, 6 X6—6%, 3 X 12–2%, 6 X 8—2%
SPECIES UTILIZED:	White spruce
WOOD SUPPLY:	Timber permit
AVERAGE LOG-HAUL WOODS TO MILL:	30 miles
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1979
AVERAGE EMPLOYMENT MONTHS OF OPERATION:	WOODLANDS: (Contract): 6 J. ---------- D MILL: 7 ------ J J A S ---
TRANSPORTATION:	INPUTS: Truck OUTPUTS: Truck
MARKETS:	Fort Smith, other NWT communities, and Alberta
SPECIAL SERVICES:	Cut to customer's specifications, end trimmed, graded, unit strapped, specializes in timbers
MEMBERSHIPS:	NWT Grade Stamp Agency, Stamp #10
ENERGY SUPPLY FOR MILL:	Electricity . Northern Canada Power Commission

USAGE OF WOOD RESIDUES:	Slabs and edgings: burned Sawdust and shavings: burned
WOODLANDS EQUIPMENT:	1 . HD5 Allis Chalmers crawler 1 - D6 Caterpillar crawler 1 . D7 Caterpillar crawler 1 - Hays log truck 1 - Kenworth log truck
MILL FACILITIES AND EQUIPMENT:	*Stationary* sawmill-planing mill complex 1 - 44-in. circular headsaw 1 . 4-in. edger 1 . Pini Kay Wiens gangsaw 1 - Bandsaw 1 - Trimsaw 1 - 35A American planer 1 - Blue Chip forklift 1 - Massey Ferguson forklift
ESTIMATED REPLACEMENT COST OF BUILDINGS, FIXED AND MOBILE EQUIPMENT:	$1000000

TERRITORIAL CONSTRUCTION AND SUPPLY LTD.

ADDRESS:	General Delivery Fort Good Hope XOE OHO
TELEPHONE:	Mobile JS3-6678
MILL LOCATION:	60 miles north of Fort Good Hope on the Mackenzie River at the mouth of the Ontaratue River
OWNERS:	Fred Sorenson and family
MILL MANAGEMENT:	Fred Sorenson
MILL CAPACITY:	10 M fbm/8-hr. shift
PRODUCTION 1980-81:	Lumber: 190 M fbm Piings: 60 M fbm
PRODUCTS:	Dimension lumber: 2 X 4—4%, 2 X 6—12%, 2 X 8—12% Board lumber: 1 X 4-4%, 1 X 6–4%, 1 X 10 -4%, 16-ft. lengths mainly, all rough and P.A.D. Timbers: 3 X 12—22%, 8 X 8—7%, 10 X 10—7% Pilings: 600 pieces - 24%
SPECIES UTILIZED:	White spmce
WOOD SUPPLY:	Timber permit
AVERAGE LOG-HAUL WOOD TO MILL: 5 miles	
YEAR MILL WAS CONSTRUCTED OR REBUILT:	1975
AVERAGE EMPLOYMENT MONTHS OF OPERATION:	WOODLANDS: (Contract): 3 ½ J F M A ------- MILL 6 ----- J J -----
TRANSPORTATION:	INPUTS: Skidder on river ice OUTPUTS: Barge
MARKETS:	Inuvik, Tuktoyaktuk, Fort Good Hope, and own use
SPECIAL SERVICES:	Cut to customer's specifications, dressed and unit strapped
MEMBERSHIPS:	None
ENERGY SUPPLY FOR MILL:	Setf-generated

USAGE OF WOOD RESIDUES:	**Slabs and** edgings: burned Sawdust: 5% use for insulation rest burned
WOODLANDS EQUIPMENT:	1 - 664 Clark Ranger skidder
MILL FACILITIES AND EQUIPMENT:	Stationary sawmill 1 - Coutts #4 sawmill with 48-in. circular headsaw 1 - Edger 1 - Patrick forklift 1 - D6 Caterpillar crawler 1 - 4600 CaterpiUar power unit 1 - 471 General motors power unit * Installing Alco planer
ESTIMATED REPLACEMENT COST OF BUILDINGS, FIXED AND MOBILE EQUIPMENT:	$230000

Miscellaneous Roundwood Producers[a] in NWT

Name	Address	District of operation
Bourke, G	Fort Smith	Fort Smith
Government of NWT, Vocational Education	BOX 600, Fort Smith	Fort Smith
Latourneau, W.	Fort Smith	
Braithwaite, W.	Pine Point	Hay River
Coolson, W.	Hay River	
Desnoyers, J.	Hay River	
Hay River Dene Band	Box 1638, Hay River	
South Mackenzie Correctional Centre	Box 160, Hay River	
Vandell, N.	Fort Providence	
Beaulieu, S.	Fort Liard	Fort Simpson
Jean Marie Co-op	Jean Mane River	
McKee, J.	Fort Liard	
Bmn, A.	Yellowknife	Yellowknife
Haluska, J.	Yellowknife	
Larabie, H.	Box 1202, Yellowknife	
Larkin, C.	Yellowknife	
Rae-Edzo Dene Housing	Rae	
Schneides, E.L.	Yellowknife	
Fort Good Hope Band Councif	Fort Good Hope	Norman Wells
Fort Norman Contracting	Fort Norman	
Firth, E.	Fort McPherson	Inuvik
Fort McPherson Band Council	Fort McPherson	
Htin, J.	Inuvik	
Harrison, Bros. J & H	Inuvik	
Villebmn, P.	Fort McPherson	

a Producers with permits or production of 50 logs or trees or graater.

Commercial Fuelwood Producers in NWT

Name	*Address*	District of operation	Amountaincords
C. Plamondon Lumber	Box 672, Fort Smith	Fort Smith	80
Trans North Expediting Ltd.	Box 1077, Fort Smith		120
Fitz-Smith Dene Band	Box 960, Fort Smith		200
Salt River Company	Box 564, Fort Smith		50
Slave River Sawmill Co. Ltd.	General Delivery, Fort Resolution		170
Hay River Dene Band	Box 1638, Hay River	Hay River	515
South Mackenzie Correctional Centre	Box 160, Hay River		200
Vandell, Norman	General Delivery, Fort Providence		115
Town of Hay River	Box 1306, Hay River		100
Anderson Mills Ltd.	Box 979, Fort Simpson	Fort Simpson	80
Browning, Tom	Box 55, Fort Simpson		70
Fort Simpson Dene Band Council	Box 469, Fort Simpson		165
Friesen, R.W.	General Delivery, Fort Liard		35
Village of Fort Simpson	Box 438, Fort Simpson		50
Koyine, Eddie	General Delivery, Rae	Yellowknife	1200
Larabie, Henry	Box 1202, Yellowknife		300
Smith, Alberta	Box Box 703, Yellowknife		145
NWT Housing Corp.	Fort Franklin	Norman Wells	500
Button, Dave	Box 2357, Inuvik	Inuvik	40
Fort McPherson Band Council	General Delivery, Fort McPherson		120

APPENDIX4

REASONS FOR INADEQUATE FUELWOOD RECORDS AND METHOD OF ESTIMATING TOTAL FUELWOOD USE

Reasons for inadequate fuelwood records include the following:

1. Many residents of the NWT consider fuelwood a free commodity and normally do not obtain timber permits when harvesting fuelwood for personal consumption.

2. People pursuing a transient life (e.g., trappers, prospectors, and hunters) do not require a timber permit when cutting fuelwood for their own use.

3. Under current forestry regulations, up to 25 cords of stacked wood are made available free by timber permit to NWT residents. This amount of wood is more than is needed for a year's heating needs. It is unlikely that those who do obtain a 25-cord permit cut the totaf amount permitted.

4. In some communities there is no practical system of registering fuelwood permits.

5. The land surrounding most of the communities is Commissioner's Land managed by the Government of the Northwest Territories. Regulatory control of timber cutting on these lands is not within the jurisdiction of lNAC and as a result, complete records were not available.

6. A considerable amount of driftwood is still used for fuelwood, especially by residents of the northern communities, and no records of such use are available.

7. Especially in the larger communities, people gather wood on a part-time basis in association with other activities to reduce fuel oil costs. It is doubtful that many permits are obtained.

Estimates of total fuelwood consumption were developed by the following steps:

1. determining production of commercial fuelwood supplies;

2. gathering information locally by talking to knowledgeable people in the different communities in order to determine the number of homes using fuelwood for heating or cooking purposes;

3. estimating the amount of fuelwood used in each home for all communities, which provides a total consumption value; and,

4. subtracting thecommerciaf production from thetotal consumption value to compute the domestic fuel. wood value.

Domestic fuelwood was considered to be all fuelwood cut by individuals for their own use. The relationship between commercial producers, domestic producers, and total fuelwood production can be shown as follows:

Totaf fuelwood production – Commercial production = Domestic production.

APPENDIX 5

LIST OF WOOD CONSUMERS

CONSTRUCTION COMPANIES

Arctic Transportation Ltd., Inuvik
Bat Construction Ltd., Inuvik
Berton Construction, Fort Smith
C & R Construction, Fort Smith
Finto Motor Inn, Inuvik
Fort Smith Construction, Fort Smith
Franks Construction, Yellowknife
Iglookpiuktit Ltd., Inuvik
J.K. Construction Ltd., Norman Wells
Nor-Build Construction, Fort Smith
P.C.L., Yellowknife
Ranger Homes Ltd., Yellowknife
Smith Ed Construction Co. Ltd., Inuvik

MINE COMPANIES

Canada Tungsten Mining Corp. Ltd., Watson Lake
Cominco Ltd., Yellowknife
Cominco Ltd., Pine Point
Echo Bay Mines Ltd., Yellowknife
Giant Yellowknife Mines Ltd., Yellowknife
Terra Mining Exploration Ltd., Hay River
Cadilac Mines, Nahanni Butte

OIL COMPANIES

Dome Petroleum, Inuvik
Esao Resources, Norman WeUs
Esao Resources, Inuvik
Roberts Rathole DriUing Ltd., Inuvik

GOVERNMENT AGENCIES

Territorial Government

NWT Housing Corporation: Fort Simpson
Hay River
Inuvik
Yellowknife

Departmentof Public Works: Aldavik
Arctic Red River
Fort Franklin
Fort McPherson
Fort Norman
Fort Simpson
Fort Smith
Inuvik
Norman WeUs
Tuktoyaktuk
Yellowknife

Federal Government

Department of Public Works: Fort Smith
Hay River
Inuvik
Yellowknife

Indian and Northern Affairs Fort Smith
Inuvik General Hospital Inuvik
Parks Canada Fort Smith

DISTRIBUTORS

(Building supply companies)

Chatham Steel Northern Ltd., Inuvik
Igloo Building Supplies Ltd., Fort Simpson
Igloo Building Supplies Ltd., Hay River
Johnson's Building Supplies Ltd., Yellowknife
Link Hardware - Evans Electric Co., Fort Smith
Manton Building Supplies Ltd., Fort Smith
Norms Building Supplies Ltd., Inuvik
Northern Rentals and Lumber, Yellowknife
Riverside Stores, Norman Wells
Suna-Likaa Ltd., Inuvik

APPENDIX 6

SELECTED METRIC (S1) UNITS AND CONVERSION FACTORS[a]

Imperial		Metric (S1)
1 inch	=	2.54 cm
1 mile	=	1.609 km
1 acre	=	0.405 ha
1 square mile	=	2.590 km^2
1 cu. ft.	=	0.028 m^3
1 cunit (100 cu. ft. solid wood)	=	2.832 m^3
1 ton (2000 lb.)	=	0.907 t
1 cord (stacked) per acre	=	8.956 m^3 (stacked) per ha
1000 board feet	=	4.29 m^3 (roundwood)
1 M foot board measure (fbm)	=	1.623 m^3 (lumber)
1 bone dry unit(BDU)wood chips (2400 lb.)	=	1090 kg

a **Source:** Environment Canada 1974. Selected metric (S1) units and conversion factors for Canadian forestry. Environ. Can. Ottawa, Ontario. Unnumbered.

Conversion Factors for Timber Products in NWT

These factors are approximate values and may vary depending upon tree size, manufacturing practice, species, etc.

Timber product		Equivalent value
1 cord	=	80 CU. ft.
1 cord (128 stacked cu. ft.)	=	3.645 m^3 (stacked)
1 m^3(stacked)	=	0.625 m^3 (solid)
1 cu. ft.	=	5.0 fbm
1 m^3	=	175 fbm
1 fbm (White spruce)	=	1.5 lb.
1 fbm (Douglas fir)	=	1.6 lb.
1 plywood Iift (spmce)	=	2800 lb.
1 plywood lift (fir)	=	3000 lb.
fbm	=	board feet (feet board measure)
M	=	thousand
M M	=	million