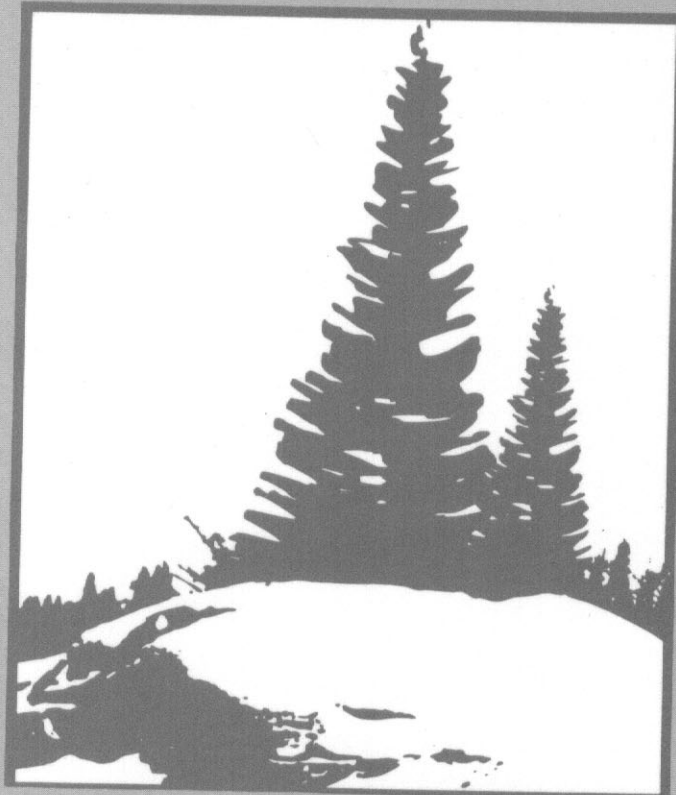


**THE SIGNIFICANCE OF THE
FOREST PRODUCTS INDUSTRY
IN THE
SWAN RIVER REGION OF MANITOBA**



**Canada-Manitoba
Partnership Agreement in Forestry**

The Canada Manitoba Partnership Agreement in Forestry is funded equally by the governments of Canada and Manitoba and will be in effect from April 1, 1990 to March 31, 1995.

The Agreement builds on achievements under the 1984-89 Forest Renewal Agreement and reflects the new realities in contributing to the economic strength and diversity of the forest sector, within the context of a sustainable development strategy.

The Agreement comprises three programs: Reforestation and wood supply enhancement, Applied research, marketing and technology transfer; and Public Information, education and agreement support. These programs are managed by an Agreement Management Committee and are implemented by Forestry Branch, Manitoba Natural Resources.

For more information please call or write:

Forestry Canada
Manitoba District Office
200 - 180 Main Street
Winnipeg, Manitoba
R3C 1A6

(204) 983-4817

Forestry Branch
Manitoba Natural Resources
300 - 530 Kenaston Blvd.
Winnipeg, Manitoba
R3N 1Z4

(204) 945-3191

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by

**R.D.C. Ruhr
Research Associate**

and

**Richard C. Rounds
Director**

**The Rural Development Institute
Brandon University**

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PREFACE

The Swan River Region of Manitoba lies at the interface between agriculturally dominated prairies to the south and west, and the forest dominated Canadian Shield to the north and forested lowlands to the east. The economy of the region, therefore, relies on a mixture of primary industries related to farming, ranching and forestry, and related secondary processing of primary products. The area is a complex of variation in the quality and quantity of natural resources, but overall is not prosperous. Any threat to the delicate balance of economic activities places hardship on the residents.

The economy of the area is marginally forest-dependent. Nonetheless, forestry products form an important component of the economy, and loss of the industry would result in loss of employment for hundreds of residents. Many people rely on seasonal or part-time employment in the forest industry to supplement family income derived from farming and other activities. This complex of economic activity, and resulting multiple-job lifestyles of many residents make the Swan River Region unique among forest-dependent communities.

The authors extend appreciation to local industry participants in the study area for suggesting this project, and for assisting our work in the field. Their knowledge of the local economy was extremely valuable in our work. Dave Rannard, Bob Lamont, Rick Morrison and Bill Middlebro of the Forestry Branch of Manitoba Natural Resources, and John McQueen, Ashwin Shingadia and Bill White of Forestry Canada assisted the project. Bernie Gloyn and Ron Wonneck of Statistics Canada (Winnipeg), and Jim Treller and Wayne Kramble of the Economic Services Branch of Employment and Immigration Canada provided information to the authors. Mark Bonneau of the Prairie Farm Rehabilitation Administration of Agriculture Canada assisted in use of an economic estimation model. Ian Kitch of Brandon University served as the project research assistant, and Patrick Cherneski provided cartographic services. Joan Rollheiser, Administrative Assistant at RDI, prepared the manuscript for publication. The Manitoba Departments of Rural Development and Education and Training assist in the operation of the Rural Development Institute.

Richard C. Rounds
Director
The Rural Development Institute

SUMMARY

The economic impact of the forest industry is reviewed for the Swan River region of Manitoba. Industry participants are identified and analyzed in terms of income and employment, demographic characteristics and the importance of forestry employment in their lives. Also, the nature and extent of the industry in the region is assessed in terms of the quantity and type of resources, existing businesses, harvest volumes and economic characteristics.

Harvest volumes are given for major materials, and total between 270,000 - 350,000 cubic metres per year in recent years. Major products are softwood sawtimber, softwood pulpwood, other softwood products, and hardwood sawtimber and products. Softwoods dominate the harvest.

Logging equipment inventory was classified into 12 categories, and had a total original value of \$9 million dollars, and a current value of \$6 million. Annual equipment operation added costs of nearly \$2 million, most of which is expended locally. Estimated current value of buildings is \$1.2 million.

Economic impact is assessed by labour income, total income, employment and value added measurements and estimates. Harvest volumes needed for economic estimates are reported for each of the last five years, and a five-year average is calculated. This allows use of not only the anomalously low productivity of 1991-92, but also the more representative average production in calculating impact. Expected future average harvest are estimated according to known and potential cutting volumes of the various products from the region.

Based on a survey of quota holders and contractors, logging wage estimates are \$1.7 million for 1991-92, and \$2 million for expected average harvest. Residual income estimates for the logging and milling sectors are \$2.6 million in 1991-92, and \$2.9 million for expected average harvest volumes. A total of 282 persons were employed in the industry in 1991-92. Average annual employment was 30.35 weeks per worker. Based on expected average harvest rates, 319 persons would be employed. Value-added calculations are \$8.2 million for 1991-92, and \$9.6 million for expected average harvest volumes.

Including multiplier effects, the total income attributable to forestry was estimated at \$8.1 million in 1991-92 and \$9.4 million based on expected average harvest volumes. These values represent 4.8 percent and 5.6 percent of total income in the study area. Labour income calculated in a similar manner is \$4.8 million and \$5.5 million and accounted for 4.8 percent and 5.6 percent of labour income in the area. Forestry employment accounted for 324 persons in 1991-92, and 367 based on expected average harvest, or 3.8 percent and 4.3 percent of total area employment, respectively.

The total value of output for the forest industry was estimated at \$10.8 million in 1991-92 and \$12.4 million based on expected average harvest volumes. Of those values, the timber harvest accounted for \$7.2 million and \$8.4 million, and lumber production for \$2.8 million and \$3.2 million (net of the value of sawlogs), respectively. The remaining amounts are accounted for by other products (mainly chips and sawmill bi-products).

A demographic survey of both labour and management employees allows definition of workers in the industry. Labourers are significantly younger than quota holders and contractors, but most industry participants are in their early and middle working years. Nearly all are males (97 percent), married (77 percent) and have less than grade 12 educations. Two-thirds have dependent children living at home. Most have spent their entire working years in the forest industry, and in the Swan River region. Most employees are equipment operators, work in sawmilling occupations, serve as general labourers, fellers, pulp cutters and truck drivers.

One-quarter of the employees work all year (>48 weeks). Others are distributed throughout work terms ranging from <10 weeks to >40 weeks. Approximately half work 30 weeks or more per year. Labourers have longer average work terms than do quota holders and contractors. Work is concentrated during fall and winter.

The impact resulting from the loss of the forest industry on the Swan River region would be proportionately greater than the impact of either of the last two recessions on the Canadian economy. Spin-off impacts would be particularly significant among local farmers who rely on seasonal forest industry income to supplement farm incomes.

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INTRODUCTION

Although many forestry-dependent communities are located well within the great boreal forests or west coast forests of Canada, some also occur in the forest-agriculture fringe areas. Here, forestry may be the dominant but not the sole industry in a more diversified economy. The importance of forestry, however, may be greater than anticipated because of the seasonal and financial interrelationships among employment opportunities. Income derived from forestry may be an integral part of the annual incomes necessary to maintain resident families.

Reasons for the Study

Although many who work in the forest sector have been aware of the significance of the forest industry for many years, little effort has been made to document the levels of community income and employment generated by the forest sector. Accordingly, the Mountain Quota Holders Association requested a study aimed at documenting the economic importance of the forest industry in the Swan River Valley area and at ascertaining the characteristics of persons involved in the forest sector in that area.

This study is the result of that initiative. There are three major objectives:

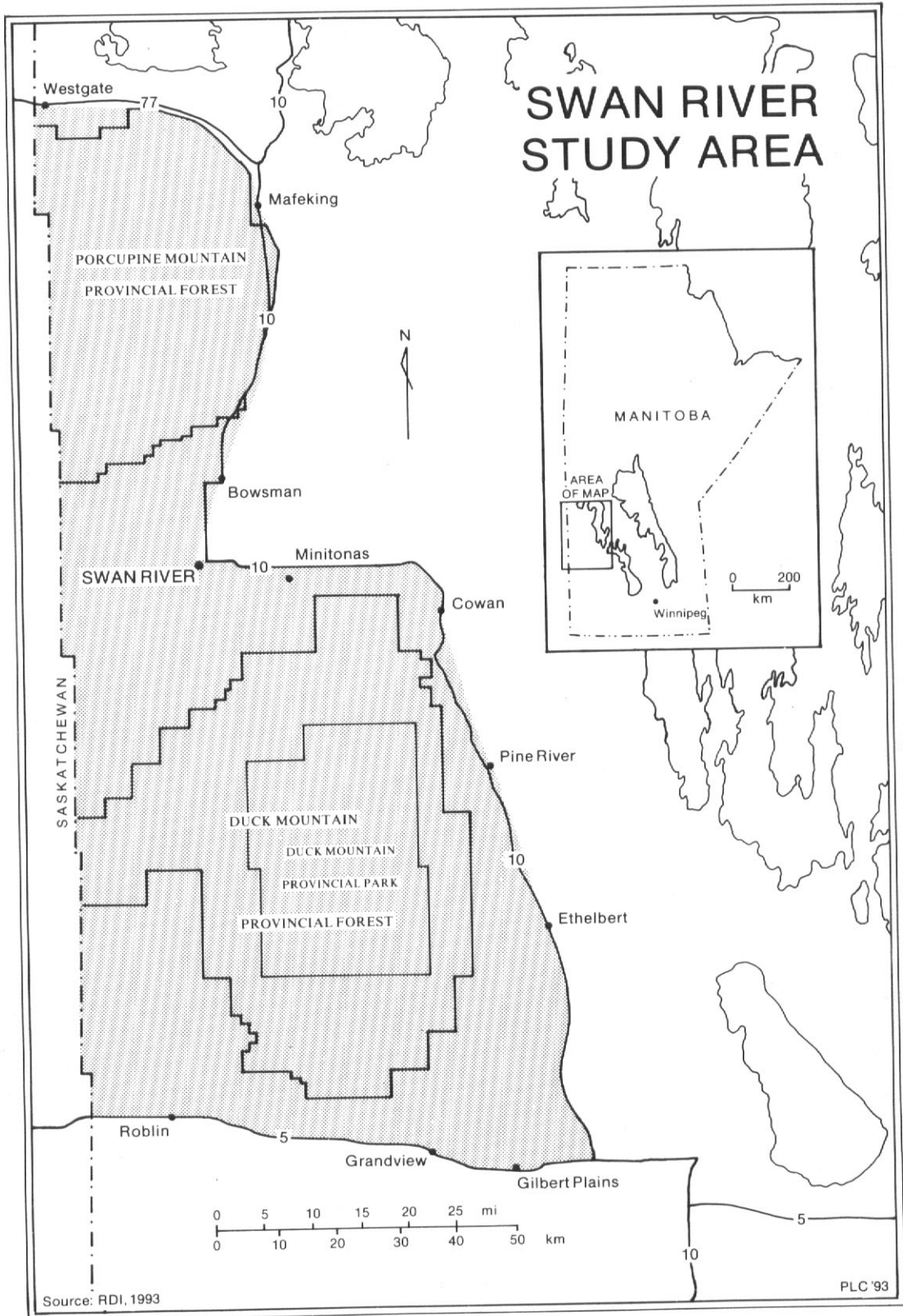
1. To determine the economic impact of the forest industry in the Swan River region of Manitoba, particularly in terms of income and employment.
2. To identify the participants in the industry and estimate their number.
3. To determine the characteristics of industry participants in terms of demographic variables and industry-related features such as annual weeks of employment and the importance of income derived from forestry.

Any restrictions that may be placed on forest harvest will reduce incomes and employment generated by the forest industry. Jobs and incomes from forestry are of obvious importance not only to those employed, but also to the proprietors and employees of businesses whose customers include the companies, contractors and employees in the forest industry. They are, in addition, important to the agricultural sector in that many of those who work in the forest industry rely on forest-generated incomes to partially maintain their farms.

The Study Area

The study area is bounded on the west by the Saskatchewan boundary, on the south by Highway 5, on the east by Highway 10 and on the north by Highway 77 (Figure 1). Towns and villages within the area include Swan River, Minitonas, Pine River, Garland, Ethelbert, Gilbert Plains, Grandview, Roblin, Mafeking and other small settlements. The total population of the included Rural Municipalities, towns and villages in 1991 was approximately 20,000, a decrease of 36 percent since 1961 (MacLean and Rounds 1991: Canada Census, 1991). The area is dominated by Duck Mountains Provincial Park, a major resource area for recreational tourism and primary forest and wildlife production. The quality of farmland varies greatly, with many marginal farms in the area.

Figure 1



The Manitoba Escarpment, which forms the Duck and Porcupine Mountains, is the most prominent topographical feature in the province. It rises steeply from 1,200 to 1,700 feet above the Manitoba lowlands to the east and north of the Duck and Porcupine Mountains. The highest point in the area is a hill known as Baldy Mountain, which is 2,727 feet above sea level. The lowest elevation is 1,014 feet at a point north of the Porcupine Mountains near Westgate. The tableland above the escarpment varies from gently undulating to hilly with a general elevation of 2,000-2,300 feet above sea level. Local hills and ridges rise to 2,700 feet in the Duck Mountains and 2,600 feet in the Porcupine Mountains. The high points are near the edge of the escarpment and the tableland slopes gradually to the southwest (Forest Service, 1956).

Elevation is a major factor influencing both the climate and vegetation of the area. The effect is an extension of the boreal forest southward and westward into what otherwise would be aspen parkland or grassland. The Duck Mountains have cooler summers and greater precipitation compared to the surrounding lands at lower elevations. Deciduous trees leaf out from 10 to 14 days later in the spring and shed their leaves that much earlier in the fall.

The well-drained soils support white spruce and aspen, with minor amounts of balsam fir and white birch. The stands vary from pure white spruce to pure poplar or birch, and balsam poplar may occur in wetter areas. Excessively drained areas are occupied by jack pine, sometimes mixed with aspen. Moving from south to north and from lower to higher altitudes, black spruce becomes more dominant. Bur oak reaches its northwesterly limit on the slopes of the escarpment near Mafeking, but occurs sparsely elsewhere in upland areas. Green ash, Manitoba maple and white elm are found at the foot of the escarpment.

History of the Forest Industry

The forest industry in the area began when railroads opened the country up to agricultural settlement, which created a demand for lumber and other forest products (Forest Service, 1956). Construction of the Canadian Pacific Railway across the province resulted in the building of sawmills on the Assiniboine River and its tributaries around 1880. The mills were fed by logs driven down the rivers from the Riding Mountains and the western edge of the Duck Mountains. Water power used in the early mills soon was replaced by steam power fuelled by sawdust, slabs and edgings.

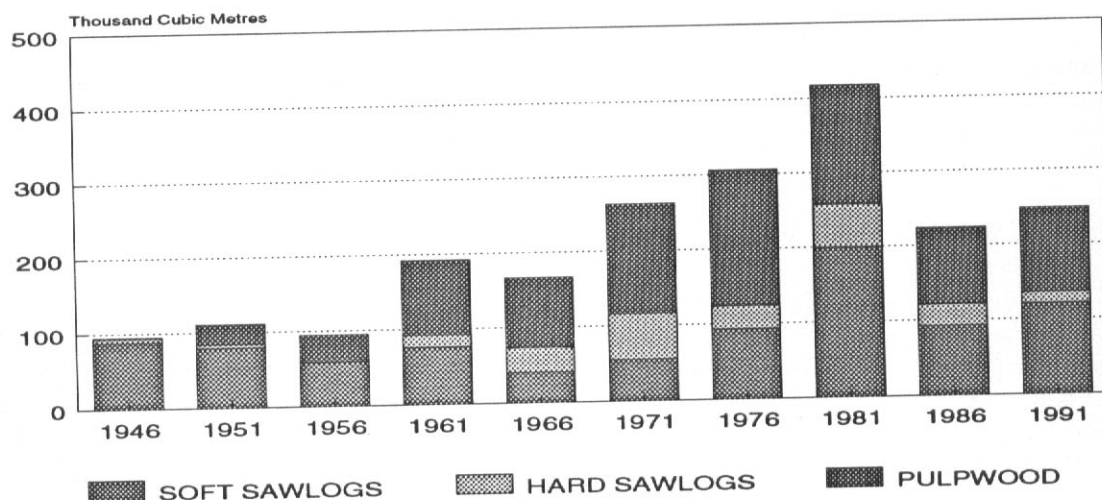
The Canadian Northern Railway was built from Gladstone to Dauphin in 1898 and to Erwood in 1899. Lines also were constructed westward from Dauphin to Grandview in 1900 and from Swan river to Benito in 1905. These lines opened up the country east of the Manitoba Escarpment to agricultural development, particularly the plains of the Dauphin-Grandview region and the Swan River valley. The resulting demand for lumber led to the construction of a number of sawmills. Most of the early mills were portable or semi-portable part-time businesses of which the operators farmed in summer and produced lumber in winter. There also were a few large stationary mills that shipped much of their production of spruce lumber outside of the region. One such mill produced up to 20 million board feet per year. The logs used in these larger mills generally were driven down rivers and streams or hauled over ice roads by steam haulers in winter.

The larger mills generally used sawlogs from licensed timber berths where there were large stands of mature and overmature white spruce timber. By the 1950's, portable and semi-portable sawmills operating under authority of timber sales or settlers permits became more plentiful. This resulted from the development of mechanical equipment for road building, snow clearing and timber hauling which enabled the Manitoba Forest Service to dispose of small stands of timber even in areas which had been inaccessible.

The Post-War Period

Annual harvest volumes of the major timber products were recorded at five-year intervals between fiscal 1946 and 1991 (Figure 2). Harvest levels were steady at approximately 100,000 cubic metres from 1946 to 1956, but increased from 1961 onward. This resulted from a combination of factors. First, a new forest inventory carried out in the late 1950's revealed the existence of more timber in the area than was realized previously. That led to an increase in the annual allowable harvest, which meant a long-term increase in the potential harvest in the area. Second, there was an increase in demand for pulpwood. Third, there were a series of large fires in the area in 1961, which led to an increased salvage harvest for several years.

Figure 2
Historical Harvest
of Sawtimber and Pulpwood



Another major long-term increase in the harvest is evident in 1971. This increase reflects the development of the Manfor mill at The Pas, which began operation in 1969 and led to a substantial increase in the demand for both pulpwood and sawtimber. Increased demand involved greater use of pine for both pulpwood and sawtimber.

The unusual increase in the harvest in 1981 resulted from a disastrous fire in the Porcupine Mountains in the summer of 1980. The fires led to an unusually large salvage harvest for a number of years. The effects of the salvage harvest have been both significant and long lasting, as quota holders were permitted to bank their annual quota volumes, and banked volumes have been fully utilized only recently. In 1986 and 1991, the pulpwood harvest levels were below those of the 1970's, in part because of softer markets, while sawtimber volumes were at about the same level.

One of the most significant developments of recent years was the sale of the Manfor assets to Repap by the Province. As part of the sale agreement, the area covered by the Forest Management License (FML) was extended to cover the study area. As a result, Repap now holds the harvesting rights in the area. However, the agreement requires that the company honour the existing entitlements of the area quota holders; the timber is, therefore, allocated to the quota holders by the company, which is required to prepare annual management plans.

The Forest Resource

Most of the timber in the study area is in the Duck Mountains and Porcupine Mountains Forest Reserves (Figure 1). Although there is a small amount on lands between the two reserves, no volume data are available. The Forest Inventory Section of the Manitoba Forestry Branch tabulated the merchantable volumes by species in the Duck and Porcupine Mountains Forest Reserves in 1991. Ninety-three percent of the softwood and 92 percent of the hardwood in the two reserves are in the Crown Land Open Zone with the remainder on private land and in the Crown Closed and Restricted Zones.

Data for all volumes (i.e., volumes on private land as well as on all Crown land) for the major commercial species indicate that white spruce and black spruce dominate the softwood reserves, while jack pine and balsam fir are common. Softwoods comprise about 43 percent of all tree volumes (Table 1). Trembling aspen (white poplar) comprises more than two-thirds of attendant hardwoods. Balsam poplar and white birch are common, while four other species are insignificant. In total, hardwoods account for 57 percent of merchantable timber volumes (Table 1).

Table 1. Merchantable volumes on all lands (cubic metres)

Species	Duck Mtn	Porcupine Mtn	Total
White Spruce	7,398,610	1,938,620	9,337,230
Black Spruce	6,631,090	5,291,760	11,922,850
Jack Pine	3,173,160	2,296,650	5,469,810
Balsam Fir	702,160	335,250	1,037,410
Tamarack Larch	104,210	79,530	183,740
Total Softwood	18,009,230	9,941,810	27,951,040
Trembling Aspen	19,330,330	6,406,600	25,736,930
Balsam Poplar	4,355,480	1,774,660	6,130,140
White Birch	1,656,640	725,310	2,381,950
Manitoba Maple	34,430	39,450	73,880
Ash	1,990	1,230	3,220
Elm	13,920	10,810	24,730
Bur Oak	20	--	20
Total Hardwood	25,392,810	8,958,060	34,350,870
TOTAL	43,402,040	18,899,870	62,301,910

Approximately three-fourths of all merchantable volume occurs on Crown Open Lands (Table 2). Of this, one-third is softwood and two-thirds is hardwood. The distribution of species is consistent with forests on all lands except that hardwoods are more dominant on Crown Open Lands.

Table 2. Merchantable volumes in the Crown Open Zone (cubic metres)

Species	Duck Mtn	Porcupine	Total
White Spruce	6,559,910	1,930,250	8,490,160
Black Spruce	5,849,890	5,286,720	11,136,610
Jack Pine	2,844,970	2,292,320	5,137,290
Balsam Fir	640,170	334,200	974,370
Tamarack Larch	93,690	78,980	172,670
Total Softwood	15,988,630	9,922,470	15,988,630
Trembling Aspen	17,167,940	6,363,430	23,531,370
Balsam Poplar	3,887,160	1,743,590	5,630,750
White Birch	1,497,940	720,460	2,218,400
Manitoba Maple	33,630	38,960	72,590
Ash	1,870	1,100	2,970
Elm	13,520	10,630	24,150
Bur Oak	20	--	20
Total Hardwood	22,602,080	8,878,170	31,480,250
TOTAL	38,590,710	18,800,640	47,468,880

White spruce is the second most abundant of the commercial softwood species in the total for both all and Crown Open Lands (Figure 3). This species accounts for most of the sawtimber harvested in the study area. The largest merchantable volume of softwood is accounted for by black spruce, which is the source of most of the pulpwood harvest. Jack pine, the third most plentiful softwood species, accounts for a substantial portion of the sawtimber harvest and a smaller but significant portion of the pulpwood harvest. Jack pine also provides most of the post material for industry. Among the hardwoods, trembling aspen is by far the most abundant species. It accounts for most of the hardwood sawtimber in the area and the largest portion of the fuelwood harvest.

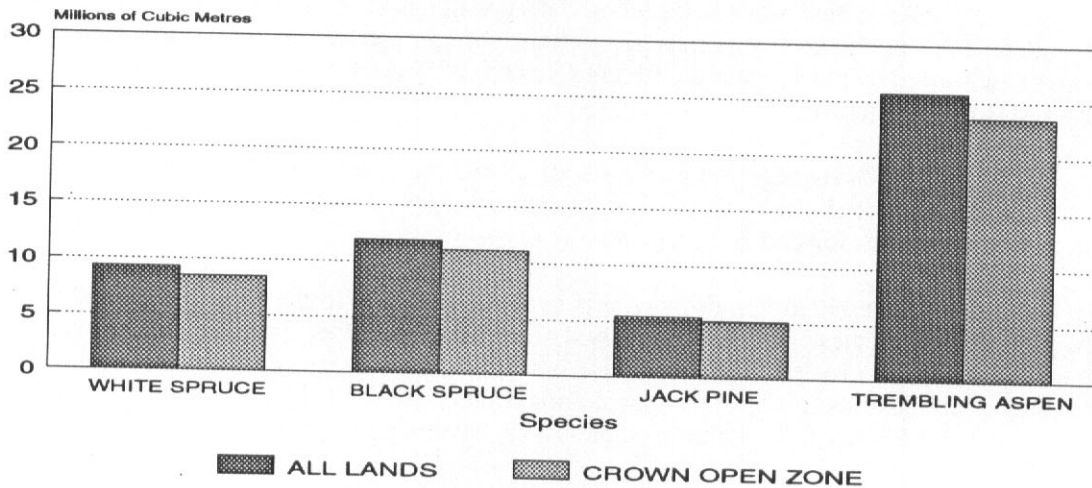
The Forest Industry

As indicated above, the harvesting rights to timber in the area were acquired by Repap Manitoba in 1989 as part of the agreement governing the sale of Manfor by the Province. However, the company was required to honour the harvesting entitlements of existing quota holders. Repap prepares an annual operating plan and determines where each quota holder will cut.

Subject to the important role of Repap, the quota holders in effect control the harvest in the area. They decide how much of their quota entitlements will be utilized, and employ contractors to harvest and haul the timber. Generally they enter into contract for the sale of their timber with a small number of purchasers. The number of quota holders changes frequently. Forty-seven were identified when this study was initiated in 1992.

Figure 3

Merchantable Volumes of Major Commercial Species



The actual harvesting and hauling of timber is performed by contractors. Their number undoubtedly changes even more frequently than that of the quota holders. Fifty-three contractors were identified in 1992, ten of which also held quotas.

Most of the harvest is purchased by a small number of large companies. The largest purchaser of pulpwood is Repap, with Abitibi being another major buyer. Repap also purchases a significant portion of the sawtimber harvested in the study area.

Two other significant users of sawtimber are Spruce Products, located in Swan River, and Roblin Forest Products in Roblin, Manitoba (Figure 1). Both companies also are large quota holders. Spruce Products is the largest forest products employer in the area with 43 employees in 1992, including management and office staff, on a nearly year-around basis. The company produces an average of 15 million board feet of lumber annually. It also operates a mobile chipper which produces substantial volumes of chips which are sold to Repap. The company anticipates that annual chip production and sales to Repap will amount to 80,000 cubic metres. The chipping operation has had a significant impact on the area in that it has created a market for small-diameter wood and has resulted in additional employment opportunities in both logging and trucking.

The other major sawmill, operated by Roblin Forest Products, produces 3.7 million board feet of lumber annually, as well as some lath. The company also operates a wood treating facility which produces treated posts, poles and lumber. Roblin normally employs about 40 workers on a seasonal basis.

A third company in the area is Prendeville Wood Preservers which operates a post cutting and peeling facility at Birch River (15 employees). The posts are hauled to Neepawa (19 employees), outside of the study area, where they are treated with preservatives. The company also operates a small sawmill which produces about 10,000 board feet annually at Birch River. A total of 13 other small sawmills were identified in the area. Most operate sporadically and provide occasional employment to the owners and a few employees.

Forest Administration

Over 90 percent of the forest resource in the study area is on Crown lands. That resource is administered by the Department of Natural Resources. Forest administration is guided by the Regional Forester located in the department's sub-regional office in Dauphin. This position is supported by a technical officer and two summer students in Dauphin, and by a forester, a technical officer and two summer students in Swan River. There are, in addition, Natural Resource Officers (NRO's) in district offices in Swan River, Grandview, Mafeking and Roblin (Figure 1).

The primary functions of the regional forestry staff are planning, management and forest renewal. The NRO functions are integrated with those of the regional forestry personnel, and NRO's perform a variety of duties including administration and enforcement.

Repap holds the uncommitted harvesting rights to all Crown land in the area, and prepares an annual operating plan which indicates where harvesting will occur. The plan is reviewed by the Integrated Resource Management Team in the region. That team is comprised of the Regional Forester, Regional Wildlife Biologist, Regional Fisheries Biologist, Regional Park Planner, Regional Lands Manager and the Regional Manager of Regional Services. In addition, submissions have been received from the public on the 1993 plan.

Cutting Guidelines

Three sets of cutting guidelines were developed to provide protection to fish and wildlife. They include a set of wildlife guidelines, a set of fisheries guidelines for stream crossings and a set of fisheries guidelines providing for buffers. All of these guidelines are being consolidated into a single set of forest management guidelines which have been reviewed with quota holders. The new guidelines are expected to be completed shortly. The guidelines are not enforceable because they are not embodied in legislation. However, they are incorporated into the operating and work permits issued pursuant to the cutting plan, and these permits are enforceable.

Reforestation

Repap pays a reforestation charge into a trust fund for all wood purchased by the company in the area. It draws on those funds annually to reforest an area equivalent to that which was cut to provide the wood which the company purchased. Other areas are reforested by the Province. In 1991-92, the Province planted 2,372,000 seedlings on 976.5 hectares and did site preparation for 1992-93 on 989 hectares, of which 703 were mechanically prepared and 286 were subject to chemical preparation. In addition, 584 hectares were scarified for natural regeneration. The total cost of Provincial reforestation activities in the area are estimated at approximately \$1,026,000. In addition to Provincial reforestation effort, Repap did site preparation on 334 hectares for planting the following year.

Fire Control

The Department of Natural Resources' province-wide fire control program is administered from the head office in Winnipeg. In the Western Region, the fire control centre and the fire control officer are located in Swan River. The main fire control effort in the study area is comprised of three firetac crews. Each of these initial attack crews consists of five persons equipped with two Wajax fire pumps, 2,500 feet of hose and an assortment of hand tools. The crews use surface transportation. In general, extra resources are brought into

the area only to fight project fires. Private operators sometimes move light helicopters into the area on their own initiative during periods of high fire danger.

Unlike most areas in the province, primary fire detection consists of ten lookout towers operated on a seasonal basis by fire rangers. During periods of high fire danger, tower detection is supplemented by fixed-wing detection aircraft retained on a casual charter basis. The area also is somewhat unusual in that 98 percent of forest fires are man-caused rather than lightning-caused. The area is subject to periods of severe fire risk and a number of large fires have occurred in recent years. The most recent and notable fire occurred in 1980 in the Porcupine Mountains. The Cowan-Kettle Hills fire in 1989 occurred largely outside the study area.

SURVEY OF QUOTA HOLDERS, CONTRACTORS AND SAWMILL OPERATORS

Methods

A questionnaire was distributed to quota holders and contractors during the summer of 1992 (see Appendix 1). The intent was to ascertain levels of investment, production, employment and expenditure by quota holders and contractors within the study area in order to estimate the relative economic contribution of the forest sector in the region.

Most of the questions requested data for the quota-holder's year 1991-92 (May 1 - April 31). Some also pertained to 1990-91. However, we believe that some responses were based on the calendar year or, on a fiscal year basis, since respondents' data sometimes were more readily available on those bases. For the purposes of this report, the differences resulting from differing year definitions are not deemed important.

The questionnaire for quota holders and contractors was distributed in June 1992. A number of operators who did not return questionnaires were contacted personally and an abbreviated form of the questionnaire was administered by telephone.

SURVEY RESULTS

Forty-seven quota holders were identified. Twenty-nine responded directly to the survey, and estimates were possible for one more. No estimates were made for 17 operations. Among the non-respondents, one could not be contacted, three were out of business, three refused to respond, and ten failed to respond. Seven of the 14 non-respondents who are still in business, are small to medium in size, while the volumes of the other seven are negligible. It is unlikely that the total harvest of the non-respondents amounted to more than a small percentage of the total harvest in the area.

Harvest Volumes

Harvest volumes are reported by respondents for the quota-holder's years 1991-92 and 1990-91 along with the volumes appearing in the Forestry Branch Annual Report for the corresponding fiscal years (April 1 to March 31) (Table 3). In most categories the survey results for 1991-92 record lower volumes than those reported in the Forestry Branch Annual Report. The major exception is chipperwood which is classified as pulpwood by the Department of Natural Resources.

Table 3. Harvest volumes¹ listed by quota holders and in Annual Reports of the Forestry Branch

Materials harvested	1991-92		1990-91	
	Survey results	Annual report	Survey results	Annual report
Softwood sawtimber	141,358	150,678	101,840	120,868
Hardwood sawtimber	14,775	11,293	625	15,005
Softwood pulpwood	61,088	74,482	54,528	112,307
Hardwood pulpwood	38	258	45	274
Chipperwood	73,278	--	27,515	--
Other softwood	3,750	21,223	750	15,827
Other hardwood	--	10,812	38	14,486
Total	294,287	268,746	185,341	278,767

¹ All volumes are reported in cubic metres.

The survey total for 1991-92 exceeds the Annual Report total by approximately 25,000 cubic metres. The difference is caused by the fact that a large volume of chipperwood had not been entered in the records of the Department by the end of the fiscal year. Had those volumes been included in the Annual Report, the Departmental figure would have exceeded the survey total by 16 percent. For the 1990-91 fiscal year, the difference is even greater, amounting to approximately 50 percent. The results for 1991-92 are clearly better than those for the previous year. The harvest volumes reported in the survey are not required for purposes of measuring the economic impact of the forest industry in the study area, because of the availability of data in the Annual Report.

Inventory and Operation Of Logging And Other Equipment

Responses to questions concerning logging and related equipment in the survey are summarized in Table 4. The number of machines of each type is reported accurately, but actual ages are not known for all machines. Percentages, therefore, are not necessarily reflective for all equipment. Average current value is reported for most machines. Total current values are derived by multiplying the number of each type of machine by the average current value for that type. Average and total original costs are derived in a similar manner.

Averages are not calculated for the miscellaneous equipment category because it is comprised of a number of types of equipment and an average value would be meaningless. The miscellaneous category includes log trailers, renovated school buses, road graders, fork lifts, bunkhouses, flails, mobile work shops, camp trailers and an excavator. The total value and total original cost of the equipment in that category are derived by summing the figures reported. No values were indicated for many miscellaneous items, so the totals are under-reported substantially.

Table 4. Logging equipment inventory of quota holders in the Swan River region

Machine type	No.	\bar{X} age	\bar{X} current value (\$000's)	Total current value (\$000's)	\bar{X} original cost (\$000's)	Total original cost (\$000's)
Skidder	53	15	\$22.3	\$ 1,181.9	\$36.9	\$1,955.7
Tractor	33	27	10.8	356.4	13.5	445.5
Truck	24	9	32.2	772.8	59.0	1,416.0
Loader	22	16	44.4	976.8	53.0	1,166.0
Feller-buncher	13	10	48.7	633.1	81.0	1,053.0
Logging truck	13	11	25.1	276.1	56.4	733.2
Half-ton	13	7	11.8	153.4	16.4	213.2
Slasher	10	10	43.0	430.0	68.2	682.0
Picker	10	12	14.3	143.0	21.8	218.0
Snipper	5	12	19.0	95.0	25.8	129.0
Delimber	3	4	15.7	47.1	26.7	80.1
Miscellaneous	39	-	-	947.9	-	862.2
Total	238			\$6,013.5		\$8,953.9

The total current value of equipment, as estimated from the survey returns, is \$6,013,500. The original cost of that equipment, which was purchased over a number of years, is estimated at \$8,953,900. Among 203 machines for which information is available, 69 (34 percent) were purchased new, and 134 (66 percent) were purchased used. The original cost of new equipment is estimated at \$4,865,000. Of the 69 machines purchased new, 23 (33 percent), were purchased locally at an estimated value of \$727,000 to local dealers. Of the 134 used machines purchased by survey respondents, 43 (32 percent) were purchased from dealers at a total cost of \$1,018,000. Of these, 11 (26 percent) were purchased locally at a total cost of \$203,000.

Table 5 summarizes the survey responses with respect to expenditure on the operation of equipment. The most important observation is the fact that all but a minor portion of expenditure is made locally. Non-local expenditure involves repairs and parts. Comments by respondents suggest that the non-local expenditure made on these items results because of the non-availability of certain repair capabilities or parts in the study area. Local expenditures total more than \$1.7 million, the majority of which is fuel and oil purchases.

Table 5. Equipment operating expenditure

Expenditures	Local	Non-local	Total	No. of respondents
Fuel, oil and related	\$1,258,000	--	\$1,258,000	47
Repairs	396,000	53,000	449,000	37
Parts	81,000	92,000	173,000	19
Total	\$1,735,000	\$145,000	\$1,880,000	

Building Inventory and Expenditures

Buildings owned by quota holders and contractors constitute major assets. A total of 73 buildings are reported in the survey. Fifty-two respondents indicate that the area of their structures totalled 72,793 square feet. Thirty-two respondents report that the original cost of their buildings amounted to a total of \$498,000, and 55 operators estimate that their buildings have a total current value of \$1,252,000. Replacement cost of buildings is estimated at a total of \$861,000 by 35 respondents.

The only building-related outlays reported by forest-industry participants are for heating fuel. Five respondents indicate a total fuel expenditure of \$106,000, of which only \$2,200 is spent locally. Non-local expenditure (mostly for electricity) was \$103,800.

Other Expenditures

Insurance, accounting fees, property taxes and a variety of other expenditures are reported. Insurance costs reported by 30 respondents indicate that local agencies are paid a total of \$60,000, while non-local agents receive \$53,000. The total of local and non-local outlays is \$113,000. Twenty-seven respondents report accounting expenditures totalling \$38,000, of which \$24,000 went to local accountants and \$14,000 went to firms located outside the study area. Six respondents report property taxes amounting to a total of \$36,000. Eighteen respondents report total expenditures of \$185,000 on "other" items. Of that amount, \$36,000 is spent locally and \$149,000 is expended outside the study area.

Contractor Survey and Results

Fifty-three contractors were identified in the Swan River region (ten of which also were quota holders). Thirty-six responded to the survey and estimates were possible for two others. Among the 15 non-respondents, two refused and 13 simply failed to respond. Six non-respondents are haulers. Four others are negligible in size, one is of significant size, and two are of unknown significance. It is unlikely that information for the non-respondents would have a marked effect on the overall results except with respect to hauling, where the results can be supplemented by estimates.

Those who responded indicate that they employed a total of 74 contractors during 1991-92. Several of the respondents listed as contractors are, for the purposes of this study, considered to be quota holders rather than contractors. For example, Abitibi lists Manican as a contractor because Abitibi purchases pulpwood from Manican under a contractual arrangement. However, Manican is classified in this study as a quota holder, rather than as a contractor. Manican, as a quota holder, engages a number of contractors to harvest the timber which it then sells to Abitibi. The operators who actually harvest and haul the timber are classified as contractors in this study. A number of operators are classified as both quota holders and contractors, because they do hold quotas and conduct harvesting operations.

Operators reported as contractors are categorized by the type of work performed (Table 6). The greatest number (30) are in the category titled "all operations," and perform all harvesting and hauling operations; in other words, they deliver roundwood to a specified location. Most of the quota holders listed by respondents as contractors are in this category. Those who haul wood form the second largest group overall.

Table 6. Types of contractors reported in the Swan River region

Type of work performed	Number
All operations (delivering roundwood)	30
Hauling	14
Cutting and skidding	7
Miscellaneous	7
Skidding	5
Cutting	4
Slashing	4
Cutting, skidding and slashing	2
Slashing and hauling	1
Total	74

Payroll and Employee Data

Thirty-five respondents reported payrolls totalling \$2,726,000 for 1991-92. Deductions were reported by 16 respondents and totalled \$430,000. Subtracting reported deductions from the reported payroll total of \$2,726,000, results in a take-home pay total of \$2,296,000.

In 1990-91, 17 respondents indicated payrolls totalling \$1,919,000. Deductions of \$382,000 were reported by 21 respondents. Subtracting that amount from the \$1,919,000 payroll total yields a take-home total of \$1,537,000.

Respondents indicated that they employed 207 workers during 1991-92. Data for 195 workers indicate that these persons were employed for a total of 5,919 weeks. This results in an average of 30.35 work weeks per employee in 1991-92. The number of weeks were not indicated for the remaining 12 workers. If these workers were employed for the average of 30.35 weeks, they would have accounted for 364 work weeks. Adding 364 to the total of 5,919 weeks for the 195 workers yields an estimated total of 6,282 weeks of employment for 1991-92.

The number of weeks of employment were reported for 195 employees. The most common length of employment is constituted by year-around employees (persons employed for 48-52) weeks (Table 7). The shortest work period reported was less than 10 weeks. Numbers of employees are distributed throughout the ten-hour time blocks. Both full-time and a range of part-time or seasonal employment, therefore, is offered by the forest industry in the Swan River region.

Table 7. Duration of employment of individuals working for contractors and quota holders in the Swan River region

Number of weeks	Number of employees	Percentage of employees
48-52	52	27
40-47	20	10
30-39	26	13
20-29	33	17
10-19	43	22
0-09	21	11
Total	195	100

Respondents reported payrolls totalling \$2,726,000. Dividing that amount by the estimated 6,282 weeks of employment, yields an average wage of \$434 per week, or \$22,568 per year. Employee remuneration takes the form of either wage/salary or piece-work payments. The type of remuneration was reported by respondents for 191 employees. Of those, 173 (91 percent) receive wages/salaries, and the remaining 18 (9 percent) are employed on a piece-work basis.

Alternate employment was indicated for only 18 workers. Farming is the alternate employment of 13, or 72 percent of the employees. Two employees also were involved in trucking, and one each reported hotel work, mining, and logging.

Equipment operators constitute the largest group by occupation among 129 employees for whom jobs were listed (Table 8). Sawmilling, general labour, fellers/pulp cutters and truck drivers all constitute between 10 and 20 percent of the occupations.

Table 8. Employee occupations in the quota holder-contractor system in forest industries in the Swan River region

Occupation	Number	Percentage
Equipment operators	39	30
Sawmilling occupations	23	18
Labourers	23	18
Feller/Pulp cutter	19	15
Truck driver	14	11
Slasher	2	2
Treater	2	2
Miscellaneous	7	5
Total	129	100

Sawmill Production

A separate set of questions was distributed to operators of sawmills. Responses were received from 12 of 14 operators. Production volumes were estimated for one of the two non-respondents; the other is either very small or does not operate the mill. Rough softwood accounts for most production, and dressed softwood for most of the rest. In total, softwood production comprises 93 percent of all products (Table 9).

Table 9. Lumber production (000's of board feet) by sawmills in the Swan River region

Product	Volume (Mbfm)	%
Softwood rough	5,953	23
Softwood dressed	18,347	70
Hardwood rough	1,919	7
Total	26,219	100

ECONOMIC IMPACT OF THE FOREST INDUSTRY

The Meaning of "Economic Impact"

The economic impact of an existing industry on a region represents the economic contribution of the industry to the region. While that contribution can be measured in a number of ways, the ones generally of most interest are the number of jobs and the dollar-value of incomes generated by the industry. In effect, the economic impact of an existing industry indicates what would be lost if, for some reason, the industry ceased to operate. Some direct effects are obvious. For example, a number of workers in the region would no longer have jobs or incomes.

Other effects are less obvious. The workers and business owners whose incomes have disappeared would have less to spend. Therefore, other businesses in the region such as retail stores, barber shops, garages and service stations, would have decreased sales. Some of these establishments may have to lay off employees. In addition, business firms who supplied the defunct industry, such as fuel dealers and garages, would find that their sales have declined and may have to reduce staff. These less obvious secondary effects, which are sometimes known as "indirect and induced effects" are measured by employment and income multipliers. In a small area such as our study area, they generally are not very large, since many of the goods and services purchased in a small area originate elsewhere. A much larger portion of the total multiplier effects are experienced in the entire province. Nevertheless, the secondary effects in a small local area can be significant. We are able to estimate and present the value of the multiplier effects for some of the economic impact measures.

Economic impact is usually measured in five ways. First, labour income measures the wages and salaries of those employed in an industry. While there are other types of income, labour income is the largest component of income in most industries.

Second, in addition to labour income, total income includes the profits of business firms operating in the industry. In the case of the forest industry, those firms include the contractors as well as the large firms operating in the region.

Third, employment is the number of employees working at all levels in the industry. These include management as well as those who are self-employed (i.e. contractors). Some self-employed operators work alone while others employ workers. Quota holders also are included among the self-employed.

Value added is a fourth way of measuring the value of production in an industry. It is a measure of the value which the industry adds to the materials, goods and services which it uses to produce its products. Value added is equivalent to Gross Domestic Product at Factor Cost, which is one of the ways in which the value of total output is measured in an economy.

Finally, the value of final output measures the value of production in an economy or industry. Most products of the forest industry in the study area are not final products. They are intermediate products which are used to make other products. This measure is, therefore, less useful for purposes of this study than the other measures. Nevertheless, estimates of the value of output will be presented with the other measures of economic impact of the forest industry.

Here we estimate labour income, total income, employment and value added. Multiplier effects are presented for labour income, total income and employment. In addition, estimates are made of total income and employment in the study area along with the percentages of these variables accounted for by the forest sector.

Production Volumes

The estimates of income, employment and the other measures of economic impact are calculated, in part, on the basis of data derived from the survey of quota holders and contractors. Since that data is based on operations for 1991-92, the initial estimates of the impact variables are made for that year. The production volumes for 1991-92 were obtained from the Forestry Branch Annual Report.

Forest industry output commonly fluctuates in many regions in response to changing product demands resulting from business cycles. In addition, there is some variation in the amount of wood demanded from the area by major purchasers over the years in response to wood supplies in other parts of the province. The 1991-92 time period had unusually low timber production in the study area (Table 10). The decline in production below the average levels of recent years was due in large part to the decline in the availability of salvage timber which increased the annual harvest throughout the 1980's.

However, production volumes can be expected to exceed 1991-92 levels as early as 1993-94. There is a significant volume of annual allowable cut in the area which Repap currently is not harvesting; quota holders have requested that they be allocated some of those unutilized volumes. It is probable that additional timber -- over and above existing quota volumes -- will be harvested as early as 1993-94 either by Repap or by the quota holders.

It is difficult to predict the volume of the additional harvest. Consultations with a knowledgeable industry source resulted in the reasonable assumption that all timber production except hardwood sawtimber will be equal to 5-year average harvest levels. Hardwood sawtimber will be 20,000 cubic metres above the 5-year average. There is no 5-year average for chipperwood; however, it appears that chipperwood volumes will amount to about 80,000 cubic metres annually.

To obtain a more typical harvest level, an average was calculated for each forest product group for the 5-year period ending in 1991-92 (Table 10.)

Table 10. Harvest volumes (cubic metres) in the Swan River region, 1987-88 to 1991-92

Material	5-year period				1987-88	Average
	1991-92	1990-91	1989-90	1988-89		
Softwood sawtimber	150,678	120,868	170,660	158,059	162,086	152,470
Hardwood sawtimber	11,293	15,005	9,761	17,322	22,357	15,148
Pulpwood	74,740	112,581	107,293	153,508	124,124	114,449
Other softwood	22,835	18,487	20,697	7,262	8,521	15,560
Other hardwood	10,812	14,486	11,440	12,162	9,974	11,775
Total	270,358	281,427	319,851	348,313	327,062	309,402

Chipperwood is a special harvest component. The 1991-92 Forestry Branch Annual Report includes no chipperwood (because the product will be included as pulpwood). In 1991-92, approximately 73,000 cubic metres of chipperwood were harvested. This volume will be reflected in the Annual Report volumes for 1992-93.

Table 11 contains the 5-year average harvest volumes along with the expected average harvest volumes for the area.

Table 11. Past and expected average annual harvest volumes (cubic metres) in the Swan River region

Product	5-year average harvest	Expected average harvest
Softwood sawtimber	152,470	152,470
Hardwood sawtimber	15,148	35,148
Pulpwood	114,449	114,449
Chipperwood	--	80,000
Other softwood	15,560	15,560
Other hardwood	11,775	11,775
Total	309,402	409,402

The expected average harvest figures exceed the 5-year averages by 100,000 cubic metres. Of that amount, 80,000 consists of chipperwood while the remaining 20,000 is hardwood.

Data Sources for Income, Employment and Value Added Estimates

Two data sources are employed in estimating income, employment and value added. First, the results of the survey of quota holders and contractors provides the sole source of data for the milling segment of the industry. Second, estimates of labour and other production costs were obtained from a knowledgeable industry source for the logging segment of the forest sector. These were corroborated by other sources and are used as a check on the data derived from the survey. In general, when the two sources of data did not agree, the higher of the two estimates is employed. Estimates were made of labour income, residual income and total income in the forest industry.

Based on survey returns from quota holders and contractors, logging wages for 1991-92 amounted to \$913,000. The theoretical calculations for the 1991-92 harvest volumes result in a wage estimate of \$1,651,000. The figure yielded by the theoretical calculations was employed in the income calculation. The wage estimate for the expected average volumes, based on the theoretical calculation, is \$1,977,400 (Table 12).

Table 12. Income generated in the forest industry

Income category	1991-92 harvest volumes	Expected average harvest volumes
Labour income, logging	\$1,651,900	\$1,977,400
Labour income, milling	2,053,000	2,317,600
Labour income, hauling	578,000	697,000
Residual income, logging	2,559,900	2,900,500
Residual income, hauling	578,000	697,000
Total	\$7,420,800	\$8,589,500

Salaries and wages are estimated for employees in the sawmilling sector. Wages were obtained from the quota holders and contractors survey while the salaries of management personnel are estimated. Because it is estimated that the lumber production volumes corresponding to the expected average harvest volumes would be 23 percent greater than lumber production in 1991-92, we assume that wages and salaries would increase by the same percentage.

The labour and residual income from hauling (Table 12) does not apply to log hauling within the study area. Rather, it reflects hauling of products to destinations outside of the study area. Costs were estimated by industry sources. The products include sawmill chips, hog fuel, whole-tree chips and pulpwood. It was estimated that half of the trucking costs represents a combination of wages and residual income (profit), which themselves are equally divided.

Residual Income in the Logging and Milling Sectors

In addition to wages and salaries, incomes are earned in the form of profits by quota holders and contractors. The return realized by contractors actually consists of two elements: the return to the labour of the contractor and the return to ownership, which consists of profits. The same applies to quota holders, although a larger portion of the return likely consists of profits.

Returns to quota holders and contractors is referred to as "residual income". It is calculated by first tabulating the gross revenues generated by the sale of the products of the 1991-92 harvest and the expected average harvest. The costs of logging operators and the stumpage payments of quota holders then are calculated and subtracted from the gross revenues to derive the residual income estimates. Residual incomes from logging are estimated at \$2,559,900 based on 1991-92 harvest volumes and \$2,900,500 based on the expected average harvest volumes (Table 13). The derivation of the cost items and stumpage payments is provided in Appendices 2 and 3.

Table 13. Residual income for logging in the Swan River region

Category	1991-92 harvest volumes	Expected average harvest volumes
Gross Revenue	\$7,170,700	\$ 8,371,200
Less:		
Wages	1,651,900	1,977,400
Equipment operators	1,486,100	1,779,000
Interest	148,000	176,000
Depreciation	550,800	655,500
Other	155,200	184,700
Stumpage	618,800	698,100
	4,610,800	5,470,700
Residual Income	2,559,900	2,900,500

A similar approach is employed to estimate the residual incomes of the sawmilling sector. When costs are subtracted from lumber revenues, however, a negative amount results. The reason is that no revenues were included for sawmill chips, hog fuel and whole-tree chips since those revenues are confidential. It was not possible to derive sufficiently accurate estimates upon which to base a calculation of residual income.

Another point worth noting is that since the ownership of the two dominant firms resides outside of the study area, the firms' profits which are not reinvested locally flow out of the region and are not part of the incomes of the residents of the study area.

Employment in the Forest Sector

The survey of quota holders and contractors indicates that there were a total of 207 employees in the industry in 1991-92. They were employed for an average of 30.35 weeks per worker and a total of 6,282 weeks, which is equivalent to 121 person-years. Not listed in the survey are nine employees who worked for an estimated 450 weeks, bringing the total to 216, and the person-years of employment to 130. The total number of employees does not include a number who reside outside of the study area, but it does include a number of management employees. In addition to the employees, there were 66 quota holders, contractors and sawmillers who operated in the industry and who are resident in the study area. This results in a total of 282 persons. Quota holders with negligible harvest volumes are not included in the total.

The total expected average harvest volumes in the industry are 19 percent higher than the 1991-92 volumes. To harvest the higher volumes, the contractors likely will employ additional labour. Since the length of the harvest season is dictated by the climate, it is likely that most of the increased labour time would be provided by additional workers, rather than by additional hours by existing employees. In many cases, current employees already work fairly long hours during the cutting season. Therefore, employment by contractors for the expected average harvest volumes probably would increase in proportion to the increase in harvest volumes over 1991-92. Applying the 19 percent anticipated increase to contractor employment results in an increase of 21 employees.

Sawmilling production was estimated to increase by 16 percent over 1991-92 volumes with the increase in harvest volumes to expected average harvest levels. It is assumed that over time sawmilling employment will increase by the same proportion, although the actual increase may be somewhat less. A 16 percent increase in sawmill employees would mean an increase of 16 employees. As a result of all employment increases, forestry employment will rise to a total of 319 persons.

Value Added

The easiest and most reliable way of estimating value added for the forest industry is to sum the total income and depreciation estimated for the industry. The total income was estimated above. The derivation of depreciation for the industry is detailed in Appendix 4. The value added calculated on the basis of the 1991-92 harvest and the expected future volumes amounts to \$8,241,700 and \$9,633,500 respectively (Table 14).

Table 14. Value added calculations for the forest industry in the Swan River region

Category	1991-92 harvest volumes	Expected average harvest volumes
Total income	\$7,420,800	\$8,589,500
Total depreciation	820,900	1,044,000
Value added	8,241,700	9,633,500

Value of Output

Most of the output of the forest industry in the study area is comprised of three product groups: timber, lumber and "others". The values of timber (Table 15) and lumber (Table 16) are calculated. Most prices on which value estimates are based represent market prices of the products for 1991-92. The "other" category includes a variety of products such as chips and hog fuel. Five products comprise the value of the timber harvest in the Swan River region (Table 15). Softwood sawtimber (46 percent) and pulpwood (29 percent) are the major products, but chipperwood (14 percent) also is important. The value of the 1991-92 harvest was estimated at \$7.2 million and the expected average harvest at \$8.4 million.

Table 15. Value of timber harvest in the Swan River region

Product	1991-92 product price (\$/cu m)	1991-92 harvest volumes (cu m)	1991-92 product value	Expected average harvest volumes (cu m)	Value of expected average harvest
Softwood sawtimber	24	150,678	\$ 3,316,300	152,470	\$3,659,300
Hardwood sawtimber	18	11,293	203,300	35,148	632,700
Pulpwood	20	74,700	1,494,800	114,449	2,289,000
Chipperwood	14	73,278	1,025,900	80,000	1,120,000
Other softwood and hardwood	various	33,647	830,400	27,335	670,200
Total		343,636	\$7,170,700	409,402	\$8,371,200

The net value of lumber production is estimated at \$2.8 million in 1991-92, and \$3.1 with expected average harvest volumes (Table 16).

Table 16. Value of lumber production in the Swan River region

Product	Price \$/Mfbm	1991-92 volume Mfbm	1991-92 product value	Expected average volume Mfbm	Expected average product value
Softwood rough	\$225	5,953	\$ 1,339,400	6,024	\$ 1,335,400
Softwood dressed	250	18,347	4,586,800	18,567	4,641,800
Hardwood rough	190	1,919	364,600	5,968	1,133,900
Total gross lumber value		26,219	6,290,800	30,559	7,111,100
Less: Value of sawlogs			3,496,500		3,948,400
Net value of lumber			\$2,794,300		\$3,162,700

Note: Mfbm represents 1,000 board feet

The total value of output in the forest industry in the Swan River region is estimated at \$10,764,300 based on the 1991-92 prices and harvest volumes and lumber and chip production (Table 17). The value based on expected average volumes (and 1991-92 product prices) is estimated at \$12,429,900. These totals include estimated values for "other" products of \$800,000 based on 1991-92 volumes, and \$896,000 based on expected average volumes.

Table 17. Forest product value estimates

Category	Basis for estimate	
	1991-92 harvest volumes	Expected average harvest volumes
Value of timber	\$ 7,170,000	\$ 8,371,200
Net value of lumber	2,794,300	3,162,700
Estimated net value of "other" products	800,000	896,000
Total	\$10,764,300	\$12,429,900

No estimates are made of the residual incomes resulting from wood treating or of the value of treated products. That is partly because of inadequate data. Industry sources indicate that the margins on treated products are low, so that the contribution to residual incomes is probably limited. The employment and labour income attributable to treating is included in the estimates of forest industry employment and income in the study area.

Total Income, Employment and Multiplier Values in the Study Area

In order to estimate the portion of the total economy accounted for by the forest industry in the study area, it is necessary to obtain an estimate of the total economy of the area. It is possible to derive such estimates for three of the measures of economic impact: labour income (wages and salaries), total income and total employment (Table 18).

According to estimates, wages and salaries totalled \$99.6 million in 1991, while total income was estimated at \$205 million. Total employment in the study area was 8,565 persons in 1991. Estimates of total wages and salaries and total income in the study area are detailed in Appendix 5. Employment estimates are contained in Appendix 6.

Multiplier values for income and employment were obtained from the Prairie Farm Rehabilitation Administration (PFRA). PFRA has a computerized input-output model based on transactions data from 1979 for a number of regions in the prairie provinces. The region in which the study area is located is Manitoba Parklands. While that region is substantially larger than the study area, the multipliers for both areas should be similar since the leakages (the expenditure flows out of the region) are similar in that most of what is purchased in both areas comes from other regions [mostly Winnipeg]. Little of what is purchased in the study area comes from elsewhere in the Parklands Region.

Multipliers are calculated only for labour income, total income and employment. The multiplier for labour income is 1.13 and the total income multiplier is estimated at 1.11. The income multipliers are applied to the appropriate income totals less the income from out-of-region hauling. The employment multiplier is estimated at 1.15. Derivation and application of the multipliers is presented in Appendix 7.

Table 18. Multiplier magnitudes applied to labour income, total income, employment and value-added aspects of the forest industry in the Swan River region

Category	Without multiplier effects	With multiplier effects
Labour income		
Basis: 1991-92 harvest volumes	\$4,282,900	\$4,764,500
Basis: Expected average volumes	\$4,992,000	\$5,550,400
Total income		
Basis: 1991-92 harvest volumes	\$7,420,800	\$8,109,900
Basis: expected average volumes	\$8,589,500	\$9,381,000
Employment		
Basis: 1991-92 harvest volumes	282	324
Basis: expected average volumes	319	367

The Proportional Significance of the Forest Industry

The significance of the forest industry can be determined by calculating the percentage of total income and employment in the study area accounted for by forestry. These calculations are made both with and without multiplier effects for labour income, total income and employment. It is not possible to derive an estimate of total value added for the study area (Table 19). The relevant percentages are those which reflect the multiplier effects because if the industry did not exist, neither would the secondary or multiplier effects. The economy would be diminished by both the direct and the indirect (induced) effects.

Table 19. Proportional significance of the forest industry

Category	Without multiplier effects (%)	With multiplier effects (%)
Labour income		
Basis: 1991-92 volumes	4.3	4.8
Basis: expected average volumes	5.0	5.6
Total income		
Basis: 1991-92 volumes	3.6	4.0
Basis: expected average volumes	4.2	4.6
Employment		
Basis: 1991-92 volumes	3.3	3.8
Basis: expected average volumes	3.7	4.3

In order to gain some appreciation of the magnitude of the percentages of the study area economy accounted for by the forest industry, it is instructive to note the declines in the Canadian economy in the last two recessions. The recession of the early 1980's is widely regarded as the most severe since the Great Depression. The most recent recession, while not as severe, is viewed as a serious economic event. In the earlier recession, Real Gross Domestic Product declined by 3.22 percent between 1981 and 1982, while the decline between 1990 and 1991 was 1.4 percent. Conceptually, the closest economic impact magnitude calculated as a percentage of the study area total, is Total Income. Forestry accounts for approximately 5 percent of total area income indicating that if it were not for forestry, Total Income in the study area would be lower by that amount. A decline of that magnitude is larger than the decline in the Canadian Real Gross Domestic Product in either of the last two recessions.

The other comparison that can be made relates to employment. Total employment in Canada declined by 3.5 percent between 1981 and 1982 and by 2.6 percent between 1990 and 1992. Forest industry employment accounts for 4.3 percent of study-area employment based on expected average harvest volumes and with multiplier effects included. The percentage contribution of the forest industry to incomes and employment in the study area, therefore, are larger than the percentage decline in the national economy in either of the last two recessions.

Results of Special Tabulations from the 1986 Census

A number of questions could not be answered by the surveys of forest industry employees and quota holders and contractors. Special tabulations of 1986 Census data were obtained from Statistics Canada (to shed light on those questions). Data consists of responses to the long questionnaire, which is submitted to 20 percent of the population. When the number of respondents is relatively small, as is the case for the forest industry responses in the census subdivisions in the study area, the survey results are subject to a wide margin of error. For that reason, and because some of the results of the special tabulation appear to be questionable, it is wise to interpret them with caution. It also should be noted that some Census data applies to 1985 and some to 1986.

Special tabulations were ordered to obtain estimates of the following:

1. The number of persons working in the forest industry (including employees and self-employed individuals) who operate farms.
2. The amount of income which those people derive from the forest industry and the amount which they earn from farming.
3. The number of persons in the study area who operate farms and the amount of income they derive from farming.
4. The amount of income earned in the forest industry as compared to the amount earned from farming.

Analysis of the special tabulations yields three major results. First, 185 persons in the forest industry had wages and salaries at \$1,681,000 in 1985, and 45 had self-employment incomes of \$524,000. Therefore, a total of 230 persons earned \$2,205,000.

Second, of the 185 wage and salary earners, 25 (14 percent) operated farms. Their wage/salary income totalled \$238,000 and their farm income was \$416,000. Of the 45 self-employed persons in the forest industry, 10 (22 percent) had farm incomes totalling \$156,000 and forest incomes that were low enough to be eliminated in rounding. Of the 185 persons employed in the forest industry, 35 (19 percent) operated

farms. Those 35 individuals earned forestry incomes of more than \$238,000 (the exact total is undetermined) and farm incomes of \$572,000.

Third, there were 10,315 persons operating farms in the study area in 1986. Annual farm income was \$19,869,000 in 1985. By comparison, there were 230 persons in the forest industry who earned \$2,205,000. These figures indicate that forestry employment was 1.8 percent of farm employment, while forestry-generated incomes comprised 11.1 percent of the value of farm incomes in the study area. Average forestry-derived incomes are much higher than average farm incomes.

DEMOGRAPHIC SURVEYS

Demographic surveys were distributed to two groups: 1) employees of contractors and sawmilling companies, and 2) quota holders and contractors. The objective of the surveys was to obtain information relating to age, sex, education and other characteristics of the two groups. The two survey questionnaires are identical except that the employee survey contained two additional questions. One question requested the percentage of income derived from forestry employment, and the other requested a listing of alternative income opportunities (if any). A copy of the survey is contained in Appendix 8.

The survey of quota holders and contractors was distributed by hand and returned by mail; 43 questionnaires (65 percent) were returned from a total of 66 distributed. The survey of employees was completed entirely by mail. Sixty responses (55 percent) were returned from the 110 mailed out.

Responses for each of the two groups are tabulated separately. Many of the questions contained response categories (e.g. age categories). Percentages are calculated for the various categories and are used to calculate the total number of individuals (e.g. employees) in each category. The estimated total number of employees in each category and the number of quota holders and contractors in that category are added to obtain an estimated total for the category. According to the surveys, there are 207 employees and 66 quota holders/contractors in the industry, for a total population of 273.

For several of the questions on the employee survey results presented are those obtained from the non-demographic portion of the survey of quota holders/contractors. The reason is that the return from the contractor survey was more complete than the return from the employee survey. For example, data relating to weeks of employment was provided for 129 employees in the survey of quota holders/contractors, whereas the employee survey resulted in 60 responses.

It is difficult to estimate the effects of non-response bias, particularly for the employee survey, because respondents were not identified. However, experience with the survey of quota holders/contractors suggests that responses are less likely to be received from persons with limited amounts of formal education. Therefore, the results of the demographic survey, both of employees and of quota holder/contractors, probably overstate the education levels of those involved in the industry.

Personal Characteristics of Forest Industry Personnel

Employees are significantly younger than quota holders/contractors (Table 20 and Figure 4). The mean age of employees is 39.5 years, that of quota holders/contractors is 48.5 years and for all industry participants 41.7 years. In addition, 64 percent of employees but only 44 percent of quota holders/contractors are less than 45 years of age. Eighty-seven percent of employees are less than 55 years, but only 60 percent of quota holders/contractors. For all industry participants, 59 percent are less than 45 years and 81 percent are less than 55 years. Data indicate, therefore, that most industry participants are in their early and middle working years.

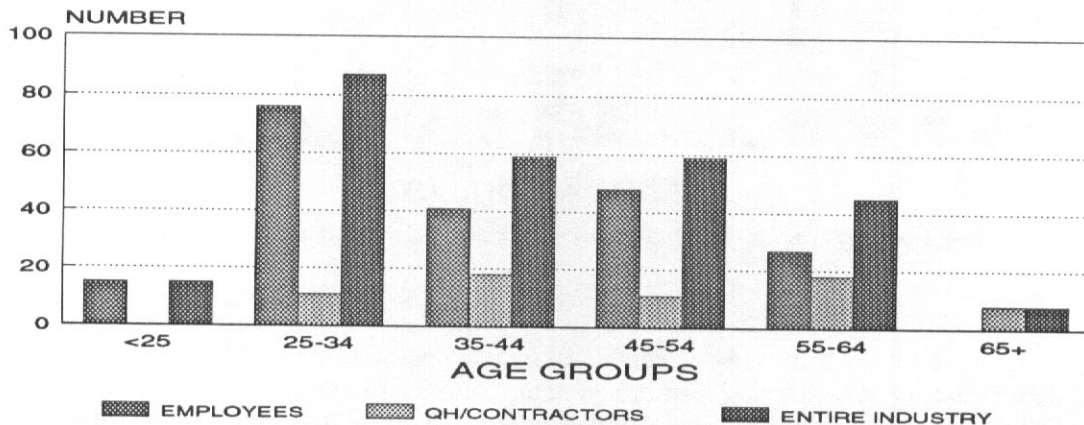
Table 20. Age distribution of persons involved in the forest industry of the Swan River region

Age Group	Employees		Quota holders and contractors		All industry participants	
	Percentage	Estimated number	Percentage	Estimated number	Percentage	Estimated number
<25	7	15	0	0	5	15
25-34	37	76	16	11	32	87
35-44	20	41	28	18	22	59
45-54	23	48	16	11	22	59
55-64	13	27	28	18	16	45
65+	0	0	12	8	3	8
Total	100	207	100	66	100	273

Ninety-seven percent of all industry participants are male, and male dominance occurs among both employees and quota holders/contractors. The high proportion of males likely relates to the nature of the work, which is physically demanding, sometimes dangerous and often performed under uncomfortable working conditions. Seventy-three percent of employees are married, as are 88 percent of quota holders/contractors. Among all industry participants, 77 percent are married.

Figure 4

AGE DISTRIBUTION OF FOREST INDUSTRY PERSONNEL

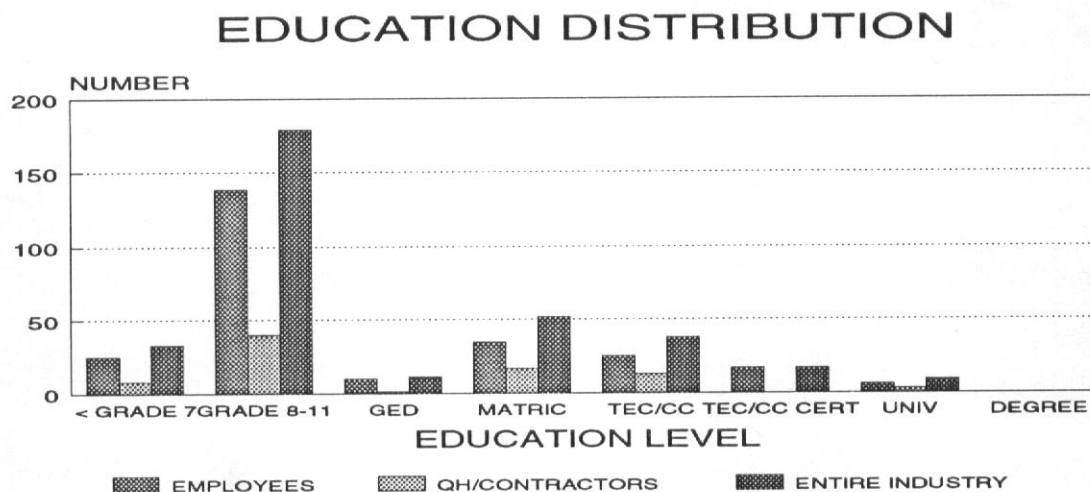


The most significant aspect of the personal profiles is that 78 percent of all industry participants did not complete high school (Table 21 and Figure 5). That fact has important implications for the possibility of qualifying for alternative employment or for training or retraining programs. In addition, only 14 percent (38 people) attended technical school or community college and 6 percent of industry participants (17 individuals) obtained a diploma or certificate. Only 3 percent of industry participants, an estimated 9 persons, attended university, and none obtained a degree.

Table 21. Education background of forest industry personnel in the Swan River region

Education level	Employees		Quota holders and contractors		All industry participants	
	Percent	Est. no.	Percent	Est. no.	Percent	Est. no.
Gr 7 or less	12	25	12	8	12	33
Gr 8 to 11	67	139	60	40	66	179
GED	5	10	2	1	4	11
Matric	17	35	26	17	19	52
Attended Tec/CC	12	25	19	13	14	38
Tec/CC Dip/Cert	8	17	0	0	6	17
Some Univ	3	6	5	3	3	9
Univ Degree	0	0	0	0	0	0

Figure 5



According to the survey results, 64 percent of all industry participants (174 individuals), have a total of 348 children living at home. The age distribution of the children is indicated in Table 22. Perhaps the most notable feature of the data is that 60 percent of dependent children are less than 13 years of age.

Table 22. Age distribution of children at home for employees and quota holders and contractors

Age group	Employees		Quota holders and contractors		All industry participants	
	Percent	Est. no.	Percent	Est. no.	Percent	Est. no.
Under 6	34	90	14	12	29	102
6-12	30	79	36	30	31	109
13-18	28	74	41	34	31	108
Over 18	8	9	21	8	8	29
Total		264		84		348

An estimated 44 percent of all industry participants (120 people), have a total of 131 other dependents (i.e. dependents other than children). When children and other dependents are added together, the 273 industry participants support a total of 483 dependents. Therefore, an estimated 756 persons in the study area are to some extent directly dependent on the forest industry.

Work-related Characteristics of Forest Industry Personnel in the Swan River Region

This section contains information on the number of years worked, current occupations, duration of employment and seasonal distribution of employment. Each of these factors indicates the importance of forest employment in the lives of local people. Both the stability and role of forest employment in the local economy are affected by these parameters.

The average number of years worked in "this area" and "elsewhere" are indicated for employees and quota holders/contractors (Table 23). The average number of years in the industry is substantially higher for quota holders/contractors than for employees. This is not surprising in view of the higher average age of the former group. Of greater significance is the fact that the average number of years in the industry is high for both employees and quota holders/contractors, which indicates a high degree of attachment to or dependency on the forest industry in the study area. The degree of attachment is supported further by the fact that the average industry participant is 42 years of age and has been in the industry for 19 years. It is obvious that participants have spent a large portion of their working lives in the industry and in the study area.

Table 23. Average number of years worked in the forest industry

Locations	Employees	Quota holders and contractors	All industry participants
This area	14.7	21.2	16.3
Other areas	2.7	2.7	2.7
All areas	17.4	23.9	19.0

Data relating to the number of employees in various employment categories were obtained from the survey of employees. However, because of the superior coverage provided by the non-demographic portion of the survey of quota holders/contractors data from that survey are considered more reliable (Table 24).

Table 24. Employee occupations as reported in quota holders and contractor surveys

Occupation	Contractor/Quota holder survey	
	Number	Percent
Equipment operators	39	30
Sawmilling occupations	23	18
Labourers	23	18
Feller/Pulp cutter	19	15
Truck driver	14	11
Slasher	2	2
Treater	2	2
Miscellaneous	7	5
Total	129	100

The section dealing with the survey of quota holders, contractors and sawmill operators indicated that 47 quota holders, 53 contractors and 14 sawmill operators were identified. It should be noted that a number of operators are quota holders as well as contractors and some sawmill operators are quota holders and/or contractors. The data relating to the types of contracting work was too incomplete to warrant inclusion in this report. It may be noted that it is difficult to categorize some contractors since they perform different operations at different times. In addition, some contractors employ other contractors to perform certain operations so that the category of contractors includes sub-contractors as well as principal contractors. Some contractors no doubt operate as sub-contractors during certain times, and as principal contractors at other times.

As in the case of occupations, the duration of employment data from the non-demographic section of the survey of quota holders/contractors is presented here since it is more complete than that obtained from the employee survey. Data from the two surveys, however, were similar. The data for quota holders/contractors were obtained from the demographic portion of the survey of quota holders/contractors. The 1991-92 data for the two groups of industry participants are summarized in Table 25 and Figure 6.

Data indicate that approximately one-quarter of employees and of all industry participants work on a full-time basis, while 17 percent of quota holders/contractors are so employed. One half of employees and of all industry participants are employed for 30 weeks or more, as compared to 45 percent of quota holders/contractors. The lower number of weeks for quota holders/contractors probably reflects the more seasonal nature of timber harvesting activity. Because of the heterogeneous nature of the population of quota holders/contractors, the application of percentage data from respondents to the entire population is of limited reliability with respect to certain types of data (e.g. annual weeks of employment).

Figure 6

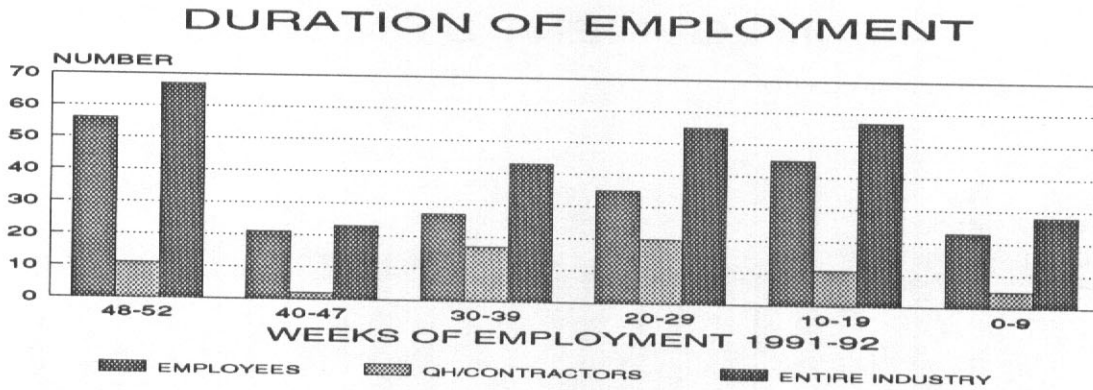


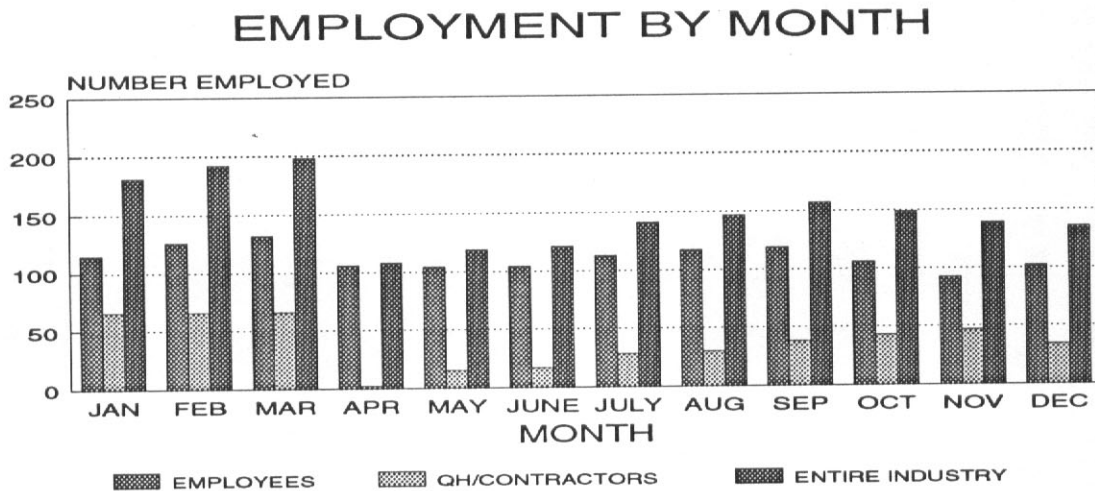
Table 25. Duration of employment for workers in the forest industry

Number of weeks	Employees		Quota holders and contractors		All industry participants	
	Percent	Est. no.	Percent	Est. no.	Percent	Est. no.
48-52	27	56	17	11	25	67
40-47	10	21	3	2	8	23
30-39	13	27	25	17	16	43
20-29	17	35	31	20	20	55
10-19	22	45	17	11	21	57
0-9	11	23	8	5	10	28
Total		207		66		273

Data from the non-demographic portion of the survey of quota holders/contractors were used to estimate the number of employees who worked during each month. Similar estimates were made for quota holders/contractors on the basis of information obtained from the demographic section of the survey of quota holders/contractors.

Employees experience far less month-to-month employment fluctuation than do quota holder/contractors (Figure 7). That is no doubt because the large sawmills, which account for a substantial portion of total employment in the industry tend to operate on a year-around basis. Quota holders/contractors, on the other hand, are most active during the winter and late fall. The monthly pattern of employment for all industry participants was derived by summing the data for the two groups. Since employees outnumber quota holders/contractors, the pattern of employment for all participants resembles the pattern for employees. The pattern of employment for quota holders/contractors (and for their employees) is well-suited to complement farming, which extends from spring to late summer and early fall.

Figure 7



The Importance of Forestry Income to Farming

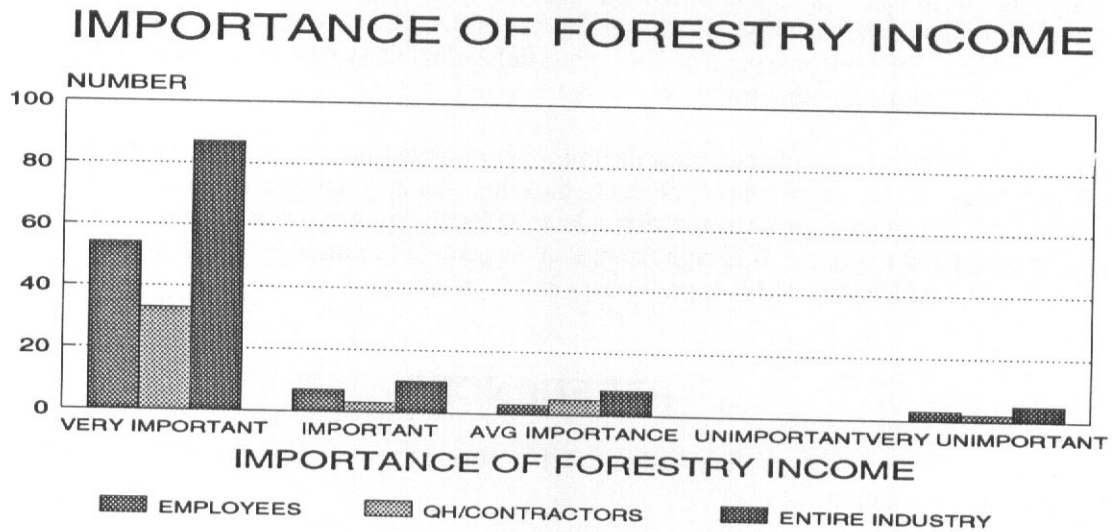
One-third of those who responded to the employee survey indicated that they operate a farm; that portion implies a total of 68 employees. In addition, 63 percent of those who responded to the demographic portion of the survey of quota holders/contractors, operate farms. That percentage implies that 42 individuals engage in farming. Adding the two groups results in an estimated 110 farms operated by industry participants.

Both employees and quota holders/contractors who operate farms were asked to indicate how they rate the importance of off-farm forestry income to their farming enterprise. Eighty percent of employees and 78 percent of quota holders and contractors state that the income derived from the forest industry is very important to the maintenance of their farms (Table 26 and Figure 8). Another 10 percent of each group rated the off-farm income as important. Only 5 percent of all respondents considered forest income as unimportant to their farm.

Table 26. Importance of forestry income to farms in the Swan River region

	Employees		Quota holders and contractors		All industry participants	
	Percent	Est. no.	Percent	Est. no.	Percent	Est. no.
Very important	80	54	78	33	79	87
Important	10	7	7	3	9	10
Average importance	5	3	11	5	7	8
Unimportant	0	0	0	0	0	0
Very unimportant	5	3	4	2	5	5
Total		67		43		110

Figure 8



On the employee survey, respondents were asked to indicate the approximate percentage of their annual income derived from forestry employment. There were 51 responses to this question (Table 27).

Table 27. Percentage of income derived from forestry employment

Percentage of income	Percentage of employees	Estimated number of employees
100	43	89
90	8	8
80	8	17
70	16	33
60	10	21
50	6	12
40	8	17
30	2	4
20	2	4
10	2	4
Total	100	209

According to the responses, 71 percent of employees derive at least 70 percent of their total incomes from forestry employment. This is a high portion considering the seasonal nature of timber harvesting. On the other hand, low farm incomes may contribute a relatively small portion of total income to those forestry employees who operate farms. Five of the income categories had between 6-10 percent response rates, suggesting a wide range in income percent from forest industries. Only 6 percent, however, earned less than 40 percent of their annual income from forest work.

Employees were asked to indicate what income opportunities they have as an alternative to forestry employment. Only 3 of 60 respondents (5 percent), indicated that they have alternative income opportunities of any kind. The opportunities listed by the respondents included farming, mechanic, welder, trucking, loader operator, or to expand the farm. It is significant that 95 percent of employees do not have alternatives to replace the income which they derive from forestry employment.

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APPENDIX 1

Questionnaire for Quota Holders and Contractors

Name _____ Address _____

Telephone _____

Respondent is a Quota holder _____

Contractor _____

Sawmill operator _____

1. QUOTA HOLDERS HARVEST VOLUMES (Cords or Cu Metres)

a. Sawtimber

	1991	1990
Softwood	_____	_____
Hardwood	_____	_____

b. Pulpwood (Cubic Metres)

	1991	1990
Softwood	_____	_____
Hardwood	_____	_____

c. Mobile Chipper Wood

	1991	1990
Softwood	_____	_____
Hardwood	_____	_____

d. Other (Specify): _____

	1991	1990
Softwood	_____	_____
Hardwood	_____	_____

2. INVENTORY OF LOGGING AND OTHER EQUIPMENT USED MAINLY IN THE FORESTRY OPERATION

Machine #1

Type _____

Make _____

Model _____

Year _____

Original cost _____

Est. current value _____

1991 hours _____ 1990 hours _____

Purchased new _____ or used _____

Purchased from dealer _____ or other operator _____

or other (specify) _____

Where purchased _____

When purchased _____

Machine #2

Type _____
Make _____
Model _____
Year _____
Original cost _____
Est. current value _____
1991 hours _____ 1990 hours _____
Purchased new ___ or used ___
Purchased from dealer ___ or other operator ___
or other (specify) _____
Where purchased _____
When purchased _____

Machine #3

Type _____
Make _____
Model _____
Year _____
Original cost _____
Est. current value _____
1991 hours _____ 1990 hours _____
Purchased new ___ or used ___
Purchased from dealer ___ or other operator ___
or other (specify) _____
Where purchased _____
When purchased _____

Machine #4

Type _____
Make _____
Model _____
Year _____
Original cost _____
Est. current value _____
1991 hours _____ 1990 hours _____
Purchased new ___ or used ___
Purchased from dealer ___ or other operator ___
or other (specify) _____
Where purchased _____
When purchased _____

Machine #5

Type _____
Make _____
Model _____
Year _____
Original cost _____
Est. current value _____
1991 hours _____ 1990 hours _____
Purchased new ___ or used ___
Purchased from dealer ___ or other operator ___
or other (specify) _____
Where purchased _____
When purchased _____

Machine #6

Type _____
 Make _____
 Model _____
 Year _____
 Original cost _____
 Est. current value _____
 1991 hours _____ 1990 hours _____
 Purchased new ___ or used ___
 Purchased from dealer ___ or other operator ___
 or other (specify) _____
 Where purchased _____
 When purchased _____

3. EQUIPMENT OPERATING EXPENDITURE

	Value in 1991	Where Purchased
Fuel	_____	_____
Oil and other	_____	_____
Repair work done by others	1. _____ 2. _____ 3. _____	_____ _____ _____
Parts (if repairs done in-house)	1. _____ 2. _____ 3. _____	_____ _____ _____

4. BUILDING INVENTORY

	Building #1	Building #2
Use	_____	_____
Size (in sq ft)	_____	_____
Type of construction	_____	_____
When built	_____	_____
Original cost	_____	_____
Estimated current value	_____	_____
Estimated replacement cost	_____	_____

5. BUILDING EXPENDITURE

	Value in 1991	Where Purchased
New building construction	_____	_____
Heating fuel	_____	_____
Renovation/repairs (if done by others)	_____	_____
Renov/repair materials (if done in-house)	_____	_____
Property taxes	_____	_____

6. OTHER EXPENSES INCURRED IN 1991

	Value	Where Purchased
Insurance	_____	_____
Accounting	_____	_____
Other (specify)	_____ _____	_____ _____

7. CONTRACTOR DATA

a. Do you employ contractors for any harvesting operations? Yes ___ No ___. If the answer is yes, indicate which operations:

Cutting ___ Skidding ___ Slashing ___ Lowbedding ___ Loading ___ Trucking ___ Other (specify) ___

b. Provide, for each contractor, the following information:

Contractor #1

Name _____
 Address _____
 Telephone _____
 Type of work contracted for _____
 Volume of contract: _____ cords or _____ cu metres
 Value of contract: \$ _____

Contractor #2

Name _____
 Address _____
 Telephone _____
 Type of work contracted for _____
 Volume of contract: _____ cords or _____ cu metres
 Value of contract: \$ _____

Contractor #3

Name _____
 Address _____
 Telephone _____
 Type of work contracted for _____
 Volume of contract: _____ cords or _____ cu metres
 Value of contract: \$ _____

Contractor #4

Name _____
 Address _____
 Telephone _____
 Type of work contracted for _____
 Volume of contract: _____ cords or _____ cu metres
 Value of contract: \$ _____

8. PAYROLL DATA

	1991	1990
Gross payroll	_____	_____
Deductions	_____	_____
Total take-home	_____	_____
Value of benefits	_____	_____
Federal income tax	_____	_____
Provincial income tax	_____	_____

9. EMPLOYEE DATA FOR 1991

	Employee #1	Employee #2	Employee #3
Name	_____	_____	_____
Address	_____	_____	_____
Job title	_____	_____	_____
Weeks of work	_____	_____	_____
Which months?	_____	_____	_____
Piecework payment or salary?	_____	_____	_____
Alternate employment	a. _____ b. _____	a. _____ b. _____	a. _____ b. _____
	Employee #4	Employee #5	Employee #6
Name	_____	_____	_____
Address	_____	_____	_____
Job title	_____	_____	_____
Weeks of work	_____	_____	_____
Which months?	_____	_____	_____
Piecework payment or salary?	_____	_____	_____
Alternate employment	a. _____ b. _____	a. _____ b. _____	a. _____ b. _____

DEMOGRAPHIC INFORMATION

1. What is your age?

a) Under 25 _____	d) 45 to 54 _____
b) 25 to 34 _____	e) 55 to 64 _____
c) 35 to 44 _____	f) 65 or more _____

2. What is your sex? a) male ___ b) female ___

3. What is your marital status? a) married ___ b) single ___

4. What is the highest level of education you have completed?

a) grade 7 or lower _____
b) grade 8 to 11 _____
c) grade 12 matriculation _____
d) G.E. D. (Grade Equivalency) _____
e) technical school/community college: please specify programs/courses: _____
f) some university _____
g) university graduate: specify degree(s) and/or diploma(s) _____

4. Do you have any children presently living at home?

No _____ Yes _____ if yes, how many are there in each age category?

- a) Number less than 6 years of age _____
- b) Number from 6 to 12 years of age _____
- c) Number from 13 to 18 years of age _____
- d) Number over 18 years of age _____

5. Number of other dependents: _____

6. For how many years have you worked in the forest industry

- a) In this area? _____
- b) In other areas? _____

7. What is your current job in the forest industry? _____

8. Please indicate the number of weeks of employment in the forest industry and the months during which you were employed:

- a) 1991: _____ weeks of employment during the months of _____
- b) 1990: _____ weeks of employment during the months of _____

9. a) Do you operate a farm? Yes _____ No _____

b) If yes, how important would you rate the financial contribution of your forestry employment to your farming enterprise?

Very important _____
Of average importance _____
Very unimportant _____

Important _____
Unimportant _____

APPENDIX 2

Logging Costs

Wages

The wage costs for logging are summarized as follows:

Table 28. Wage costs for logging

	1991-92 harvest volumes			Expected average harvest volumes		
	Labour cost volumes (Cu m)	Total per Cu m (\$)	Labour cost (\$)	Labour cost volumes (Cu m)	Total per Cu m (\$)	Labour cost (\$)
Chipperwood	73,278	3.80	278,500	80,000	\$3.80	304,000
Other	270,358	5.08	1,373,400	329,402	\$5.08	1,673,400
Total	343,636		1,651,900	409,402		1,977,400

The cost per cubic metre was estimated by knowledgeable industry sources for all components of the logging operation including road building, cutting, skidding, slashing and hauling. It is acknowledged that costs will vary among contractors. However, the estimates represent averages for each component activity. The cost for any contractor cannot significantly exceed these average costs, otherwise it would be difficult for the contractor to stay in business.

The labour cost was estimated at \$12.70 per cord or \$5.08 per cubic metre for all products except chipperwood, where the estimated cost was \$3.80 per cubic metre. The lower cost for chipperwood is due to the fact that there is no hauling cost for the unchipped wood, which is chipped at the cutting site.

Contractors' wage costs, tabulated from the survey of quota holders and contractors, amounted to \$913,000. The cost figure derived from the estimates were employed since they were felt to be more realistic.

Equipment Operating Costs

These costs include fuel, oil, repairs and parts. As in the case of wages, these costs were derived from estimates made available by knowledgeable industry sources. The estimates are summarized in Table 29.

Table 29. Estimates of equipment operating costs

	1991-92 harvest volumes			Expected average harvest volumes		
	Eqt op cost volumes (Cu m)	Total per Cu m (\$)	Ept op cost (\$)	Ept op cost volumes (Cu m)	Total per Cu m (\$)	Ept op cost (\$)
Chipperwood	73,278	3.42	250,600	80,000	3.42	273,600
Other	270,358	4.57	1,235,536	329,402	4.57	1,505,400
Total	343,636		1,486,100	402,402		1,779,000

The estimates of equipment operating cost per cubic metre amounted to \$3.42 and \$4.57 for chipperwood and other timber respectively. These estimates were about 8% less than the amount indicated in the survey.

Interest

The interest costs for contractors were estimated for the financing of equipment and working capital. The assumptions underlying the calculations were based on information obtained from a local banking source.

Interest on Equipment Loans

Equipment cost estimates were obtained from the survey of quota holders and contractors. The assumptions are as follows:

1. 50% of the logging equipment requires financing.
2. Only equipment purchased in the three-year period ending in 1991-92 was included in the calculations. (This assumption reflects the typical term of equipment loans.)
3. The average interest rate was 1.5% over prime. Since the average prime rate over the three-year period was 8.7%, as calculated from the Bank of Canada Review, the loan rate used in the interest calculation was 10.2%.

On the basis of the estimated equipment costs and the three assumptions, the interest on equipment loans is estimated at \$124,000.

Interest on Working Capital Loans

The assumptions are as follows:

1. 45% of logging production requires working capital financing.
2. The line of credit is 40% of the total annual outlays by contractors.
3. On average, 50% of the line of credit is drawn on by each contractor requiring working capital, during a period of nine months each year.

Based on these assumptions, the working capital loan interest amounted to \$24,000.

Total interest costs for 1991-92 amounted to \$148,000 (\$124,000 for equipment loans and \$24,000 for working capital loans). The total interest cost for expected average harvest volumes is estimated at \$176,000. That estimate is derived by increasing interest costs in proportion to the larger harvest volumes.

Depreciation

Depreciation is calculated for equipment and buildings. Total depreciation for the contractors for 1991-92 is estimated at \$550,800. Of that amount, \$530,900 is depreciation on equipment and \$19,900 is depreciation on buildings. Depreciation for the expected average harvest volumes is increased in proportion to the higher production volumes; it amounted to \$655,500 for buildings and equipment.

The depreciation estimates are based on the original cost of equipment and buildings as tabulated from the survey of quota holders and contractors.

Equipment

The methods for calculating depreciation on equipment may be summarized as follows:

1. A 10-year useful life is assumed. Therefore, depreciation is calculated on a straight-line basis, at 10% of the original cost. Depreciation is calculated only for machines purchased in the years 1982-91. Machines older than ten years are assumed to be fully depreciated.
2. There were a number of omissions in the responses to the survey questions relating to the cost and year of purchase of machines. For such omissions, averages are calculated for equipment for which responses are available.

Buildings

Building depreciation is calculated on the basis of a 20-year life. Depreciation is, therefore, calculated on a 5% straight-line basis. Omissions are treated as outlined above for equipment depreciation.

APPENDIX 3

Stumpage Payments

Stumpage Rates

The stumpage rates and forest renewal charges employed are those which were in effect for 1991-92. They are used in the calculation of stumpage rates and forest renewal charges for the 1991-92 harvest volumes and the expected average volumes. There are two sets of rates, the General rates and the Repap rates:

General Rates per Cubic Metre

Softwood:	Stumpage rate	\$2.15
	Forest renewal charge	<u>.65</u>
	Total	\$2.80
Hardwood:	Stumpage rate	.55
	Forest renewal charge	<u>.15</u>
	Total	\$0.70
Repap Rates:	Stumpage for softwood	\$0.65

According to the Manitoba Forestry Branch, the stumpage payments on all timber sold to Repap is calculated at the Repap rate. Stumpage and forest renewal charges on all other timber is calculated on the basis of the general rates. (In 1992-93 the forest renewal charges for softwood and hardwood are \$1.30 and \$0.30 respectively and in 1993-94 they will be \$1.90 and \$0.45).

Pulpwood

The total 1991-92 pulpwood harvest of 74,740 cubic metres was allocated between the two pulpwood purchasers, Abitibi-Price and Repap, on the basis of information provided in the survey of quota holders and contractors, and the appropriate stumpage and forest renewal charges are applied. A similar approach is applied to the expected average volumes. The resultant estimated stumpage payments are

Basis: 1991-92 harvest volumes	\$145,760
Basis: expected average harvest volumes	\$224,400

Softwood Sawtimber

Most of the sawtimber harvested in the region is either sawn locally or sold to Repap.

1991-92 Harvest Volumes

The amount sawn locally is derived from lumber production data provided in the survey of quota holders and contractors. The Repap volumes are derived by subtracting the locally-sawn volumes from the total sawtimber harvest. Stumpage and forest renewal charge payments are derived by applying the appropriate rates to the respective volumes.

Expected Average Harvest Volumes

The sawtimber which makes up the expected average volumes is allocated between local sawmills and Repap in the same proportion as in 1991-92.

The resultant stumpage and forest renewal charge payments are

Basis: 1991-92 harvest volumes	\$393,600
Basis: expected average harvest volumes	\$397,300

Hardwood Sawtimber

It is assumed that all hardwood sawtimber is sawn in the region. Therefore, it is all subject to a stumpage and forest renewal charge of \$0.70 per cubic metre. The 1991-92 harvest volume of hardwood sawtimber was obtained from the Forestry Branch Annual Report. The expected average harvest volumes are derived in the main body of the report. The stumpage payments are:

Basis: 1991-92 harvest volumes	\$ 7,900
Basis: expected average harvest volumes	\$24,600

Other Softwood and Hardwood

The 1991-92 harvest volumes of other softwood and hardwood were obtained from the Forestry Branch Annual Report. It is assumed that none of the harvest went to Repap. Therefore, the general rates are employed to calculate the stumpage payments. The estimated amounts are as follows:

Other Softwood

Basis: 1991-92 harvest volumes	\$63,900
Basis: expected average harvest volumes	\$43,600

Other Hardwood

Basis: 1991-92 harvest volumes	\$ 7,600
Basis: expected average harvest volumes	\$ 8,200

Based on either 1991-92 or expected average harvest volumes, softwood sawtimber and pulpwood account for about 80 percent of all stumpage payments (Table 30). The total values of \$618,800 and \$867,900 are significant and reflect the magnitude of the resource utilized in the industry.

Summary of Stumpage Payments

Table 30. Summary of stumpage payments for forest harvest in the Swan River region

Product	1991-92 harvest volumes	Expected average harvest volumes
Pulpwood	\$145,800	\$224,400
Softwood sawtimber	393,600	397,300
Hardwood sawtimber	7,900	24,600
Other softwood	63,900	43,600
Other hardwood	7,600	8,200
Total	\$618,800	\$698,100

APPENDIX 4

Total Depreciation

The methods underlying the calculation of depreciation on buildings and equipment employed in the logging sector of the industry is described in Appendix 2. An identical approach is employed to calculate depreciation for buildings and equipment employed in the milling sector, except for milling equipment, which is treated in the same way as buildings, where depreciation is calculated on a straight-line, 20-year basis. The estimate for milling equipment probably is understated since information is not available for all such equipment.

Unlike the logging sector, it is assumed that depreciation in the milling sector is the same for 1991-92 harvest volumes as for the expected average harvest volumes. The depreciation in the milling sector is estimated at \$270,000 (Table 31).

Table 31. Total depreciation for the logging and milling sectors in the Swan River region

Sector	1991-92 harvest volumes	Expected average harvest volumes
Logging sector	\$550,800	\$733,900
Milling sector	270,100	270,100
Total	\$820,900	\$1,044,000

APPENDIX 5

Wages And Salaries And Total Income In The Study Area

The estimates of total Swan River area wages and salaries and total income are based on a special tabulation of 1990 income tax data for 21 postal code areas (PCA's) in the study region. The database from which the tabulations are made is maintained by Statistics Canada.

No data were provided for three of the PCA's, probably because there are no taxfilers in the area or the number is too small to prevent the possibility of identifying individual taxfilers (all of those PCA's contained a very small number of households). For these three areas, estimates are made by calculating the per-household data for a number of other small PCA's and applying these estimates to the missing PCA's.

The income estimates are as follows:

Total Income	\$229.8 million
Wage and Salary Income	\$111.9 million
Self-employment Income	\$ 19.3 million

According to the Rural Householder Counts published by Canada Post, there are 9,002 residences in the PCA's in the study area. An examination of 1991 Census data reveals that there are only 8,011 residences in the study area. It would appear, therefore, that the PCA's include a larger geographical area than the Census Division/Subdivision area which is employed in this study. The income estimates calculated from the PCA tabulations are, therefore, reduced by 12.37 percent. The resulting income figures, which are employed in the study are:

Total Income	\$204.5 million
Wage and Salary Income	\$99.6 million
Self-employment Income	\$17.2 million

APPENDIX 6

Employment in the Study Area

The derivation of the estimate of study-area employment consists of the following steps:

1. In June of 1986, the unemployment rate in the study area was 7.2%, according to the 1986 Census. The employment rate was, therefore, 92.8%.
2. According to the 1991 Census, the population of the study area is 20,118.
3. A special tabulation of income tax data by Postal Code Area tabulated from the Statistics Canada data base, indicates that the number of persons reporting receipt of unemployment insurance payments rose by 2.44% in the five-year period between 1985 and 1990. A similar increase in the number of unemployed in the study area over the five-year period between 1986 and 1991, would have resulted in an unemployment rate of 7.4% and an employment rate of 92.6% in 1991 (compared to 1986 Census rates of 7.2% and 92.8% respectively).
4. Since changes in participation rates tend to be relatively gradual, it is assumed that the participation rate in 1991 was identical to the 1986 Census rate. Accordingly, the study-area labour force in June of 1991 is estimated at 9,250.
5. Application of the estimated 1991 employment rate of 92.6% (as derived above) to the estimated labour force of 9,250, yields an estimate of total employment of 8,565 in the study area in June, 1991. That is the estimate which is employed in this study.

APPENDIX 7

Calculation of the Multipliers

The PFRA office in Regina operates a computer model that may be used to calculate a number of multipliers for the prairie regions. The study area lies within the Parklands Region of Manitoba. As explained in the text, the multiplier for the study area should be similar to that for the Parklands Region - although that region is larger than the study area - since the leakages (the expenditure flows out of the region) are expected to be similar in that most of what is purchased in both areas comes from other regions (mostly Winnipeg). Little of what is purchased in the study area comes from elsewhere in the Parklands Region.

The Income Multipliers

The income multiplier calculated from the PFRA model is 1.26. That multiplier applies to "Personal Income" (Kulshreshtha 1985). It is, therefore, applicable to the Total Income for logging and milling calculated for the forest industry in the study area and to Labour Income for logging and milling. The multiplier calculated is Type II, Ratio Form. This type of multiplier includes the indirect and induced income resulting from the direct income accounted for by a project or, in this case, an industry.

The Labour Income and the Total Income for logging and milling calculated for the forest sector includes income attributable to log hauling, which, according to the Statistics Canada definitions, is not included in the forest industry, but is regarded as a transportation input for that industry. The income attributable to log hauling is part of the indirect income generated by the forest sector and it must, therefore, be deducted from the forest income magnitudes already calculated prior to application of the PFRA income multiplier. That process is followed in calculating the multipliers for Labour Income and Total Income from logging and milling.

The Multiplier for Labour Income from Logging and Milling

The portion of Labour Income attributable to log hauling amounted to 10% of total Labour Income. Deducting that percentage leaves 90% of labour income. Applying the income multiplier of 1.26 to 90% of Labour Income results in a multiplier of 1.13.

The Multiplier for Total Income from Logging and Milling

For Total Income, residual logging incomes had to be adjusted as well as labour income. The adjustment to Labour Income is outlined above. The adjustment to residual income is rather complex and somewhat less reliable. The outcome of the calculation indicates that 12% of total forest sector income is attributable to log hauling. Deduction of 12% from the Total Income estimate leaves 88%. Application of the multiplier of 1.26 results in a total income multiplier of 1.11.

Income from Out-of-Region Hauling

The income multiplier is applied to labour income and total income from logging and milling but not to the income derived from out-of-region hauling. That is because the multiplier effects for logging and milling, adjusted for log hauling, amount to substantially less than the income derived from out-of-region hauling.

This may result because a portion of that hauling was not completed when the multipliers were being calculated, or perhaps because the out-of-region hauling was not picked up in the research upon which the multipliers are based. (Forest-related hauling is an activity which results in indirect income attributable to the forest industry and the multipliers which are employed in this study are supposed to include both the indirect and induced effects resulting from the direct effects of forest activity.) It was decided that the best way to handle this problem is to add the income resulting from out-of-region hauling to the labour income and total income from logging and milling after the multiplier effects are added.

The Employment Multiplier

The PFRA model did not result in a useful employment multiplier. It was, therefore, necessary to employ an alternative approach outlined by H. Craig Davis (1990). The technique is a method for deriving an employment multiplier from the induced expenditure resulting from the direct and indirect income generated by a project. The equation used to calculate the employment is as follows:

$$Me = (Mi-1) \frac{\text{(Average wage in project sector)}}{\text{(Average wage in service sector)}} + 1$$

where Me = Employment Multiplier and Mi = Income Multiplier

The annualized average wage in the forest industry is estimated at \$22,600. It is calculated from the survey of quota holders and contractors. Due to data limitations, it is not possible to calculate the average wage for the service sector in the study area. Therefore, the average wage/salary for all study-area workers is employed. The average wage/salary for all workers was derived from the special tabulation of income tax data for 1990 by Postal Code Area. The average wage for that year amounts to \$15,400. That figure must be calculated on an annual basis. To do that, it is necessary to estimate the number of person-years not worked in 1990, from the UIC benefits which are included in the tabulation of income tax data. The estimate also is adjusted to reflect inflation between 1990 and 1991. After those adjustments, the annualized average wage for the study area is estimated at \$16,400. Using the two annualized average wage estimates, the employment multiplier is calculated at 1.15.

APPENDIX 8

Questionnaire for Persons Working in the Forest Sector

This will tell us the characteristics of those who would be affected by changes in forest regulations. All responses are confidential -- we guarantee it! We need every return possible to make our case for the Swan River Valley.

1. What is your age?
 - a) Under 25 _____
 - b) 25 to 34 _____
 - c) 35 to 44 _____
 - d) 45 to 54 _____
 - e) 55 to 64 _____
 - f) 65 or more _____
2. What is your sex? a) male _____ b) female _____
3. What is your marital status? a) married _____ b) single _____
4. What is the highest level of education you have completed?
 - a) grade 7 or lower _____
 - b) grade 8 to 11 _____
 - c) grade 12 matriculation _____
 - d) G.E. D. (High school equivalency) _____
 - e) technical school/community college: please specify programs/courses: _____
 - f) technical school/community college diplomas or certificates obtained: _____
 - g) some university _____
 - h) university graduate: specify degree(s) and/or diploma(s): _____
4. Do you have any children presently living at home?

No _____ Yes _____ If yes, how many are there in each age category?

 - a) Number less than 6 years of age _____
 - b) Number from 6 to 12 years of age _____
 - c) Number from 13 to 18 years of age _____
 - d) Number over 18 years of age _____
5. Number of other dependents _____
6. For how many years have you worked in the forest industry
 - a) In this area? _____
 - b) In other areas? _____
7. What is your current job in the forest industry? _____
8. Please indicate the number of weeks of employment in the forest industry and the months during which you were employed in the fiscal years 1991-92 (April 1/91 to March 31/92) and 1990-91 (April 1/90 to March 31/91):
 - a) 1991-92: _____ weeks of employment during the months of _____
 - b) 1990-91: _____ weeks of employment during the months of _____

9. a) Do you operate a farm? Yes _____ No _____

b) If YES, how important would you rate the off-farm income from your forestry employment to your farming enterprise?

Very important _____
Unimportant _____

Important _____
Very unimportant _____

Of average importance _____

c) Approximately what percentage of your annual income is derived from forestry employment? (Circle one)

10 20 30 40 50 60 70 80 90 100

10. Are there any income-earning opportunities open to you which could replace the income which you earn in the forest industry?
Yes _____ No _____

If the answer is YES, please list those opportunities (types of jobs not specific employers)

a) _____

b) _____

c) _____