FAIR MARKET PRICES FOR PULPWOOD IN NEW BRUNSWICK

by

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ABSTRACT

This paper reviews the concept of fair market prices for softwood pulpwood in New Brunswick and examines different methods for determining those prices. It includes pulpwood price trends and comparison with costs of production and end product prices. In addition, there is an evaluation of pricing policies and implications for wood suppy and rural development.

Pulpwood prices in New Brunswick remained relatively stable from 1950 to the early 1960's. Since that time, they have risen steadily. Over the period 1950-1981, the average annual price increase has been about 8%. From 1960 to 1981, however, the annual increase has been over 13%. Over the past 10 years, pulpwood prices have more than kept pace with the consumer price index.

Pulp and paper prices from 1950 to 1981 have risen faster than those for pulpwood (10 and 15%), but this has come mainly in the past 10 years and is due in part to devaluation of the Canadian dollar. Pulp and paper manufacturing costs have increased, particularly for energy inputs. Average weekly earnings of the pulp and paper mill employees have increased more rapidly in the past 10 years than pulpwood prices, but less than end product prices.

Available information shows that pulpwood prices are not sufficient to cover costs and that on an investment basis, stumpage production is uneconomic. Prices are adequate to meet short-run quantity requirements, but do not provide sufficient incentive to encourage more intensive management. In the long run and in the absence of governmental (or industry) assistance, small freehold resources will continue to deteriorate. Despite fragmentation of holdings and the seasonal nature of work, small woodlots provide an important base for rural employment and income.

RESUME

Le présent article examine la question des justes prix du marché pour le bois de pâte de résineux au Nouveau-Brunswick ainsi que différentes méthodes servant à les déterminer. Il donne les tendances des prix du bois de pâte et compare les coûts de production et les prix des produits finis. En outre, il comprend une évaluation des principes de fixation des prix et de leurs implications pour l'approvisionnement en bois et le développement rural.

Les prix du bois de pâte sont demeurés relativement stables de 1950 jusqu'au début des années 60, mais ils ont augmenté regulièrement depuis. En moyenne, de 1950 à 1981, ils ont augmenté d'environ 8% par année. Cependant, de 1960 à 1981, l'augmentation annuelle a été supérieure à 13%. Au cours de la dernière décennie, les prix du bois de pâte ont été supérieurs à l'indice des prix à la consommation.

De 1950 à 1981, les prix des pâtes et papiers ont monté plus vite que ceux du bois de pâte (10 et 15%), mais l'accroissement s'est produit surtout les 10 dernières années et est due en partie à la dévaluation du dollar canadien. Les coûts de fabrication des pâtes et papiers ont augmenté, en particulier ceux de l'énergie utilisée. Les revenus hebdomadaires moyens des employés des usines de pâtes et papiers ont augmenté plus rapidement, ces dix dernières années, que les prix du bois de pâte, mais moins que ceux des produits finis.

D'après l'information disponible, les prix du bois de pâte ne suffisent pas à couvrir les coûts et, en regard des investissements, la production de bois sur pied n'est pas rentable. Les prix sont adaptés à la demande à court terme, mais ils ne sont pas suffisants pour inciter à un aménagement plus intensif. A long terme, et en l'absence d'aide du gouvernement (ou de l'industrie), les ressources des petites propriétés continueront à péricliter. Malgré la parcellisation et la nature saisonnière du travail, les petits boisés constituent une source importante d'emploi et de revenu dans les régions rurales.

CONTENTS

INTRODUCTION

This paper is in response to a request by the Private Woodlot Resource Study group to provide an independent view of

1) the fair market price for a cord[1] of spruce-fir pulpwood in New Brunswick, and
2) the cost of producing a cord of spruce-fir pulpwood from small woodlots.

At the outset, it should be emphasized that there are many definitions and opinions about what is a fair price for pulpwood, or any other goods or service. Buyers' opinions differ from sellers'. Even among buyers or sellers there is seldom agreement. Despite these differences, however, there are some generally accepted definitions and methods for determining fair market prices. Also, costs of producing pulpwood vary, due to land productivity, costs of inputs such as fuel and electricity, labor efficiency, and so on.

The purpose of this paper is to discuss the concept of fair market price and identify methods for determination; to examine trends in pulpwood production from small freehold lands and price trends; to identify production costs; to analyze trends in end product prices and manufacturing costs, and to look at some of the implications of prices on pulpwood supply and rural development.

CONCEPT OF FAIR MARKET PRICE

Fair market price or value is generally defined as that price agreed to by a willing buyer and seller, each with full knowledge of all uses and purposes of the property or goods, and neither under any pressure or compulsion to deal. (Somberg and Stuart 1963, Juhasz 1976). These conditions describe what economists call a perfectly competitive market. The seller receives a price that covers his costs of production, including a return for profit and risk, and the buyer pays the amount that permits a return to cover other costs of production with an allowance for profit and risk. In a competitive market, efficient sellers and buyers are rewarded by higher profits - in fact, profits provide the incentive to operate efficiently. Inefficient buyers and sellers cannot compete over time and drop out of the market.

The competitive conditions above are often not met. There may be only a few sellers or in the case of pulpwood, only a few buyers. There may be a lack of knowledge as to the potential value of the product. Or, one group might be given unequal market advantage by governmental regulations or policy. It has long been argued that timber sales from Crown lands in New Brunswick provide an unfair advantage to mill owners, because timber is sold at rates below the cost of production. Under these conditions the question of fairness arises, and if enough pressure is brought to bear, government may try to achieve some balance. Concentration and collusion are restricted by antitrust regulations; market information is provided (price reporting, extension services); or legislation is passed to enable organization of marketing boards.

DETERMINATION OF FAIR MARKET PRICES

A. Identification of Product and Market

A prerequisite to any discussion of price is the specific identification of product and market. Concern here is with spruce-fir pulpwood. However, a cord, cunit, or cubic metre of pulpwood can vary considerably in quantity of solid wood and quality. For example, a cord of straight, smooth softwood in 4-ft bolts with a middle diameter less than 6 inches, contains about 90 ft^3 of solid wood. A cord of crooked wood with the

[1]Because much of the data used in this report are presented in decimal or English units in the original source, no attempt is made to convert these to metric units.

same diameter and length may contain only 70 ft^3. Also, specific gravity (and therefore, pulp yield) varies from 0.33 for balsam fir (Abies balsamea (L.) Mill.) to 0.40 for black spruce (Picea mariana (Mill.) B.S.P.); white spruce (P. glauca (Moench) Voss) is 0.35 and red spruce (P. rubens Sarg.) is 0.38 (Flann 1962). It is assumed here that the average mix with respect to size and species is relatively homogeneous.

Market location obviously affects price. Pulpwood may be sold standing, at roadside, or at the mill (or concentration yard). When possible these variables should be taken into account in price determination.

B. Price Determination Methods

There are several approaches to estimate pulpwood prices. These are identified by the Forest Products Commission (1972) as follows

1) market value as determined by sales - purchase agreements
2) costs of production
3) costs of production from other sources, and
4) as a residual.

The question of fairness depends on whether one is a buyer or seller.

1. Market value from sales - purchase agreements

Using this approach, prices are based on going rates from other sales. This might be reasonable if some portion of those sales were based on competitive bidding, but if sales are in non-competitive markets, the rates may not be meaningful or indicative of fair market prices.

2. Costs of production

Costs of production provide only an indication of the price a seller would have to receive to remain in business over time. The Forest Products Commission (1972) states that costs are not a measure of value. This might be so from the point of view of the buyer, but the seller may think differently. The important point is, however, that unless costs of production are met, for at least some portion of the producing sector, output over time will decline. Eventually, prices will go up unless offset by productivity advances.

A major problem with this approach is the difficulty of determining costs. There are many variables including land productivity, labor efficiency, stand conditions, and distance to market. These are discussed further in a later section. Costs of production are relevant to price determination, but this does not mean that prices should be sufficient to cover all costs. Should the price be set sufficiently high to cover costs of all operators - even inefficient ones?

3. Cost of production from other sources

The Forest Products Commission has relied heavily on this method as a guide to prices for private non-industrially produced wood. Before 1980, a weighted average cost (at mill) was calculated for pulp and paper company produced wood. This was compared to the weighted average price paid for spruce-fir pulpwood.[2] Since the usefulness of a weighted average cost for all companies was questioned, this was discontinued.

The philosophy of this approach is that prices paid for purchased wood should approximate the costs of company produced wood. Independent producers feel that a company should be willing or compelled to pay at least as much for purchased wood. The approach appears to be straightforward and intuitively equitable. However, a company that controls a large area of freehold should be able to produce wood at lower cost,

[2]In 1976, the weighted average cost of company produced wood was $43.73 per rough cord of spruce-fir delivered to the mill, including overhead. The weighted average price paid for purchased wood was $38.91 per cord. Overhead for this was estimated to be an additional $2.75 per cord. (N.B. Forest Products Commission 1978).

simply because of size of operations and economies of scale. More mechanized equipment can often be justified and overhead can be spread over a larger volume of wood. This applies not only to timber management, but also to harvesting and transporting. In this situation, company costs per unit may not be an equitable guide. The reverse might also apply. A company that produces only a small proportion of its requirements may have relatively high fixed costs.

The question of efficiency also arises. Should one use costs of the producer with average efficiency? What are valid costs? What proportion of company overhead should be charged? How can figures be verified?

4. Residual approach

With this method, intermediate or end product prices (e.g., newsprint) are determined. All costs of production and distribution are then subtracted. The residual is the value or price of wood. This is a buyer's market. The purchaser is assured of covering all costs including an allowance for profit and risk (this assumes there is some residual).

There are conceptual and practical problems with this method. Pulpwood producers argue that because of weak market power, they are subsidizing other factors (labor, management, fuel and electricity suppliers) in the case of inefficient manufacturers or where factor owners have strong market power. This approach also might be more acceptable if the residual were more sensitive upward, that is, when markets were strong. There is evidence, however, that in times of strong market demand for end products, part of the true residual goes toward increased profit. There is no doubt that profit to manufacturers also fluctuates widely.

The practical problem of this approach is how to identify end product price (over what period, in what market) and costs of manufacturing. What is a reasonable allowance for profit and risk? For what size of operation should costs be identified? Should wood producers subsidize inefficient operations?

Which of the above methods is best? It depends on the criteria one uses to compare. Sellers obviously favor an approach based on costs of production. Buyers feel that the residual method is most equitable. About the only statement one can make is that an equitable price is based on considerations of both buyers and sellers.

PULPWOOD PRODUCTION AND PRICE TRENDS

A. Production from Small Freehold Land

Data on pulpwood production from small freehold property in New Brunswick are limited. Some information has been collected through the census, but this is restricted to farm woodlots. In 1958, a primary forest products survey was started by the federal government and the provincial Department of Natural Resources, which provided estimates of production by major products and landowner group. In 1976, it was replaced by a timber utilization survey.

Estimates before 1976 and immediately following (Table 1) show a considerable discrepancy. This is primarily due to differences in methods. The early survey consisted of a mail-out questionnaire and follow-up letter. Estimates included production not only of commercial products (sawlogs, pulpwood), but also firewood[3]. Beginning in 1976, data were derived from questionnaires sent to processors, but this includes only commercial products (Fig. 1).

Data for the period 1976-1980 show that total commercial production (based on utilization and excluding exports) averaged 817 M cunits (964 M cords). Of this total, average softwood production was 683 M cunits (806 M cords) or 85% of

[3]Reported production was probably less than actual. The federal government was involved in data collection and some landowners were concerned that the data might be used for income tax purposes and therefore, understated actual production.

Table 1. Timber production from small freehold area[a] in New Brunswick by principal product, 1960-1980

Year	Sawlogs	Pulpwood	Other[b]	Total	Fuelwood
	(000 cunits)				
1960[c]	95	333	195	623	191
1961	116	263	167	546	155
1962	149	287	143	579	136
1963	102	148	138	388	131
1964	53	434	145	632	132
1965	88	387	128	603	122
1966	57	442	120	619	104
1967	86	345	114	545	113
1968	55	363	100	518	102
1969	133	373	134	640	88
1970	47	451	104	602	86
1971	45	286	83	414	69
1972	32	249	77	358	65
1973	31	266	75	372	52
1974	55	368	70	493	55
1975	19	259	92	370	44
1976[d]	201	625	-	826	-
1977	204	634	-	838	-
1978	193	576	-	769	-
1979	257	482	-	739	-
1980	258	655	-	913	-

[a]Ownerships of less than 500 acres - as interpreted in N.B. Inventory.

[b]Includes fuelwood.

[c]Data for period 1960-1975 from primary production survey.

[d]Data for period 1976-1980 from timber utilization survey. Excludes exports and noncommercial products.

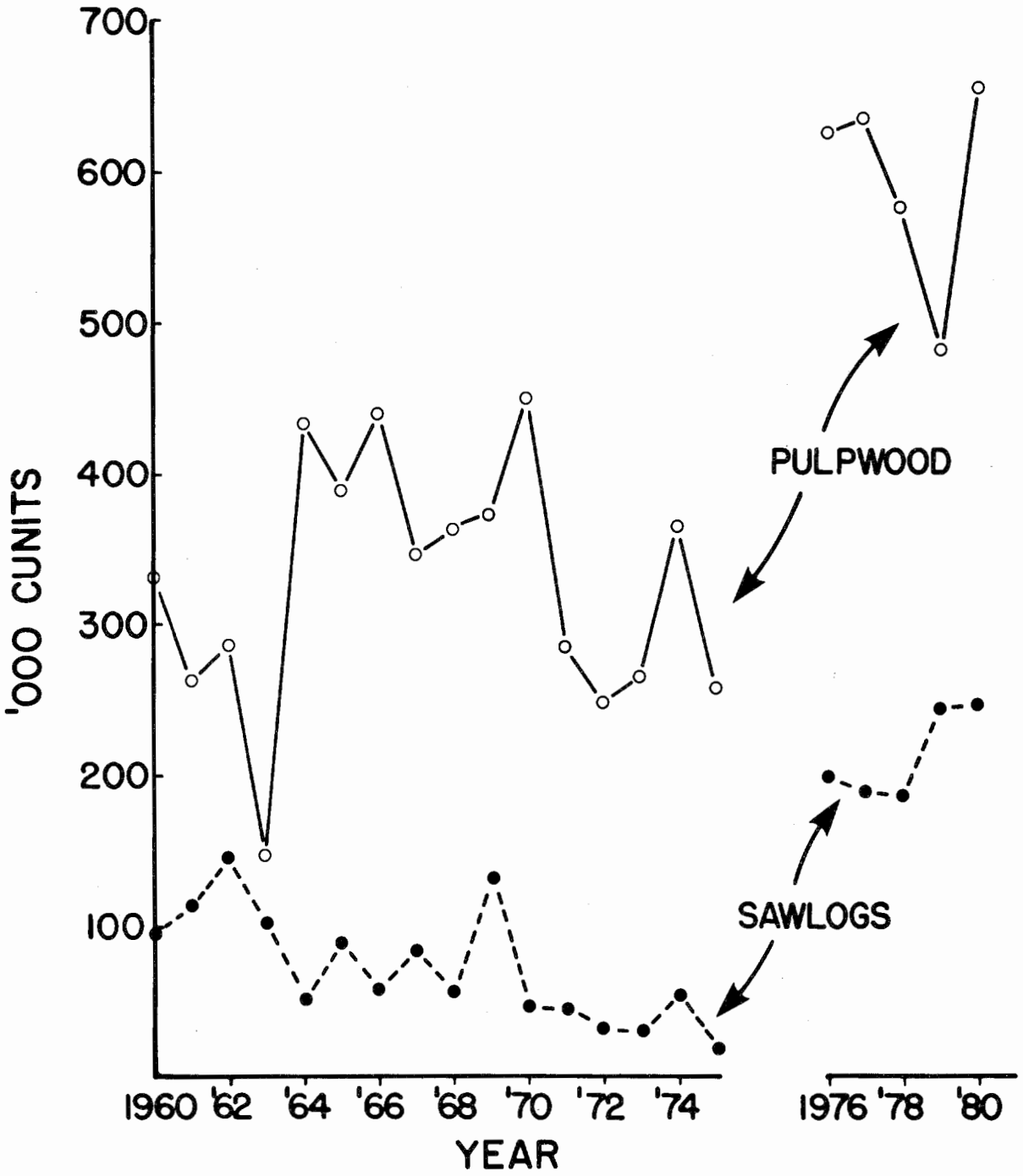

Fig. 1. Primary forest production from small freehold in New Brunswick 1960-1980. Source Table 1.

the total (Table 2). Most softwood production has been in the form of pulpwood. From 1976 to 1980 softwood pulpwood production averaged 470 M cunits (550 M cords), about 70% of the total. For the same period, hardwood production averaged 134 M cunits (160 M cords, excluding fuelwood and other noncommercial products). Over 90% of this is pulpwood.

B. Pulpwood Price Trend

Pulpwood price data are also limited, however, there are enough bits and pieces to provide an indication of the general trend and differences by geographic area. Prices remained relatively stable from 1950 to the early 1960's (Fig. 2). Since 1960, prices have been rising steadily. This appears to be due in large part to the establishment of marketing boards, since the increase coincides closely with formation of the Madawaska Board in 1963. Using prices paid at the Fraser Mill in Edmundston, the average annual price rise over the period 1951-1981 has been about 8%.

Table 2. Timber production from small freehold area[a] in New Brunswick by principal product and species, 1976-1980

Year	Product	Softwood		Hardwood	Total
		Excluding cedar & white pine	Total (cunits)		
1976	Sawlogs	158 280	199 128	2 713	201 841
	Pulpwood	519 224	519 224	105 782	625 006
	Total	677 504	718 352	108 495	826 847
1977	Sawlogs	172 163	189 775	14 187	203 962
	Pulpwood	540 424	540 424	93 475	633 899
	Total	712 587	730 199	107 662	837 861
1978	Sawlogs	156 820	181 895	11 304	193 199
	Pulpwood	470 161	470 161	105 989	576 150
	Total	626 981	652 056	117 293	769 349
1979	Sawlogs	222 962	245 615	11 583	257 198
	Pulpwood	334 477	334 477	147 058	481 535
	Total	557 439	580 092	158 641	738 733
1980	Sawlogs	216 055	248 388	9 607	257 995
	Pulpwood	486 553	488 216	167 234	655 450
	Total	702 608	736 604	176 841	913 445

[a] Ownerships (as defined in N.B. Inventory) less than 500 ac. Figures exclude exports and noncommercial production.

Source: N.B. Dep. Natural Resources. Timber Utilization Survey, various issues.

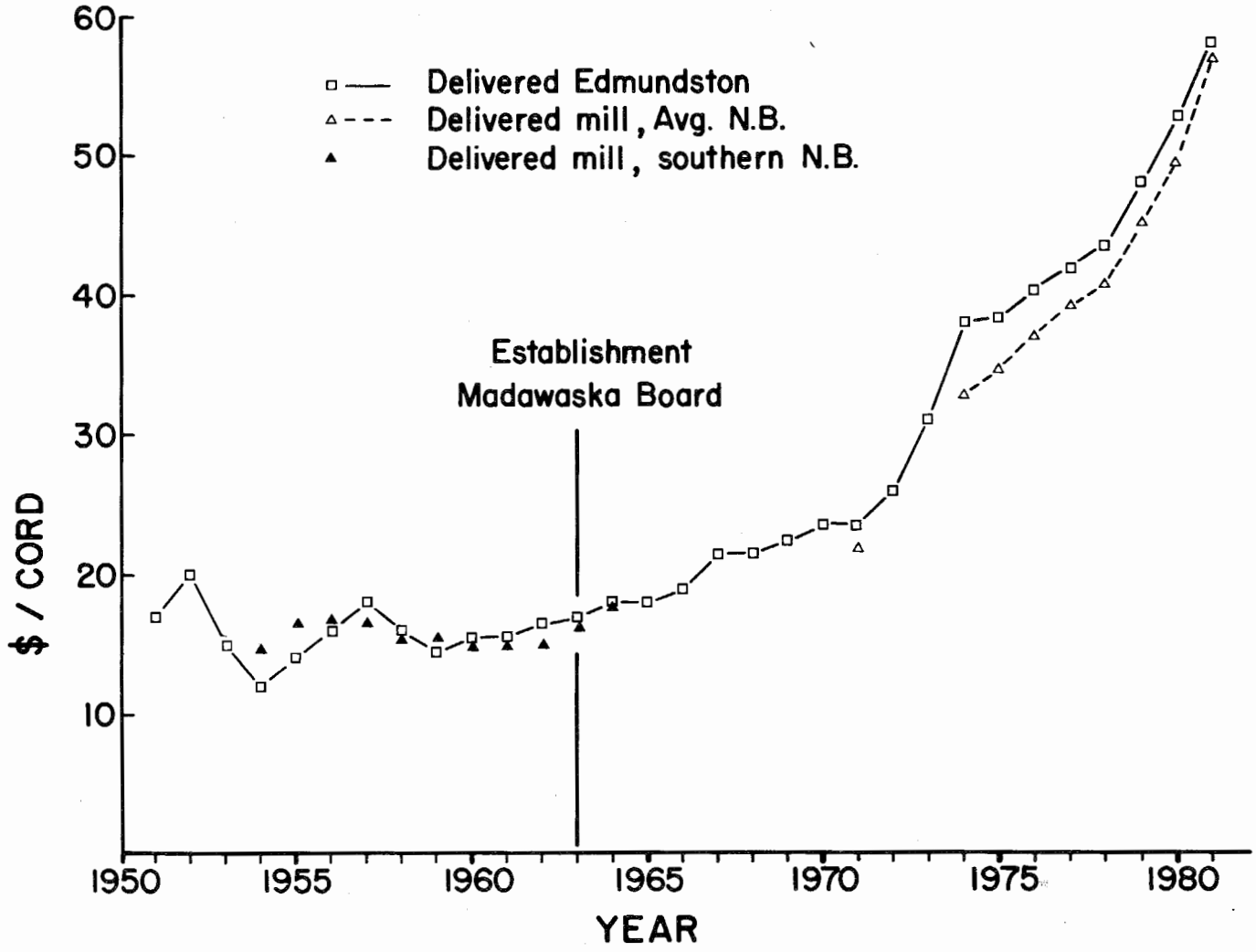

Fig. 2. Spruce-fir pulpwood prices in New Brunswick 1951-1981. Source Table A1 Appendix.

However, since 1960, the annual increase has been over 13%.[4]

It is difficult to generalize on regional differences in softwood pulpwood prices because of the variables (distance, bolt size) included in price determination. However, data presented by the Federation of Wood Producers Inc. (1981) show that over the past 8 years, Fraser Co., Boise Cascade Canada Ltd., and NBIP Ltd. have paid higher than average rates, while Irving Pulp and Paper Ltd., MacMillan Rothesay Ltd. and Acadia Forest Products Ltd. have paid lower.

It is often asked whether the real price of pulpwood has gone up - whether the producer's purchasing power from income has fallen, stayed the same, or gone up. This is difficult to say because there must be a comparison with some standard or base. Using the consumer price index (indicates price change for a mix of consumer goods) for Saint John, N.B. with the base year of 1971, the (CPI) increased 139% from 1971-1981. Pulpwood prices have risen 147%. So at least pulpwood prices on average have risen as quickly as the mix of consumer goods used to calculate the CPI.

COSTS OF PULPWOOD PRODUCTION

A. Inputs and Outputs

There are three basic activities in pulpwood production. These are tree growing, harvesting, and transporting. Inputs and outputs for each are shown in Fig. 3. Costs per unit of input vary by geographic area, volumes, quality, and so on. Costs per unit of output are influenced by a variety of factors. Roadbuilding costs are sensitive to topography and parent material. Site preparation is affected by size of area treated and method. Harvesting costs vary by size of trees, stocking levels, and area. Productivity of land also affects harvesting costs.

Because of these variables, pulpwood production costs differ. Although it is questionable how meaningful it is to talk about averages, it is useful to identify costs for different circumstances to provide guidelines.

B. Pulpwood Production Costs

The most definitive data on production costs are those collected by the New Brunswick Forest Products Commission for company operated wood. These are weighted average costs for companies operating pulp mills in New Brunswick, and Georgia-Pacific Co. at Woodland, Maine (N.B. Forest Products Commission, 1972). Data from 1971 to 1976 are presented in Table 3.

While these figures may be the real costs to companies, they are not necessarily the total costs of production. Stumpage charges shown represent an average as reported by the companies. In some cases, the charges are for both company and Crown timber. For some, apparently there is no cost attributed to company timber.[5]

Cost data for small freehold production are not complete. Recently, however, the New Brunswick Federation of Wood Producers, Inc. attempted to identify representative costs. For estimation of stumpage, it is assumed that a typical woodlot that has received no silvicultural inputs, is capable of a sustained annual yield of 0.5 cord per acre per year. Net annual return on the land is 13%. This includes an allowance for appreciation in land value over time. Given these assumptions, cost per cord of stumpage is about $40 and harvesting and trucking $53; a combined cost of $93 landed at the mill (The average price paid in 1981 was $57 per

[4]The compounded annual increase from 1951-1981 is a little over 4%, from 1960-1981, about 7%.

[5]Personal communication. V.C. Bastin, Chairman of the New Brunswick Forest Products Commission, Fredericton, N.B.

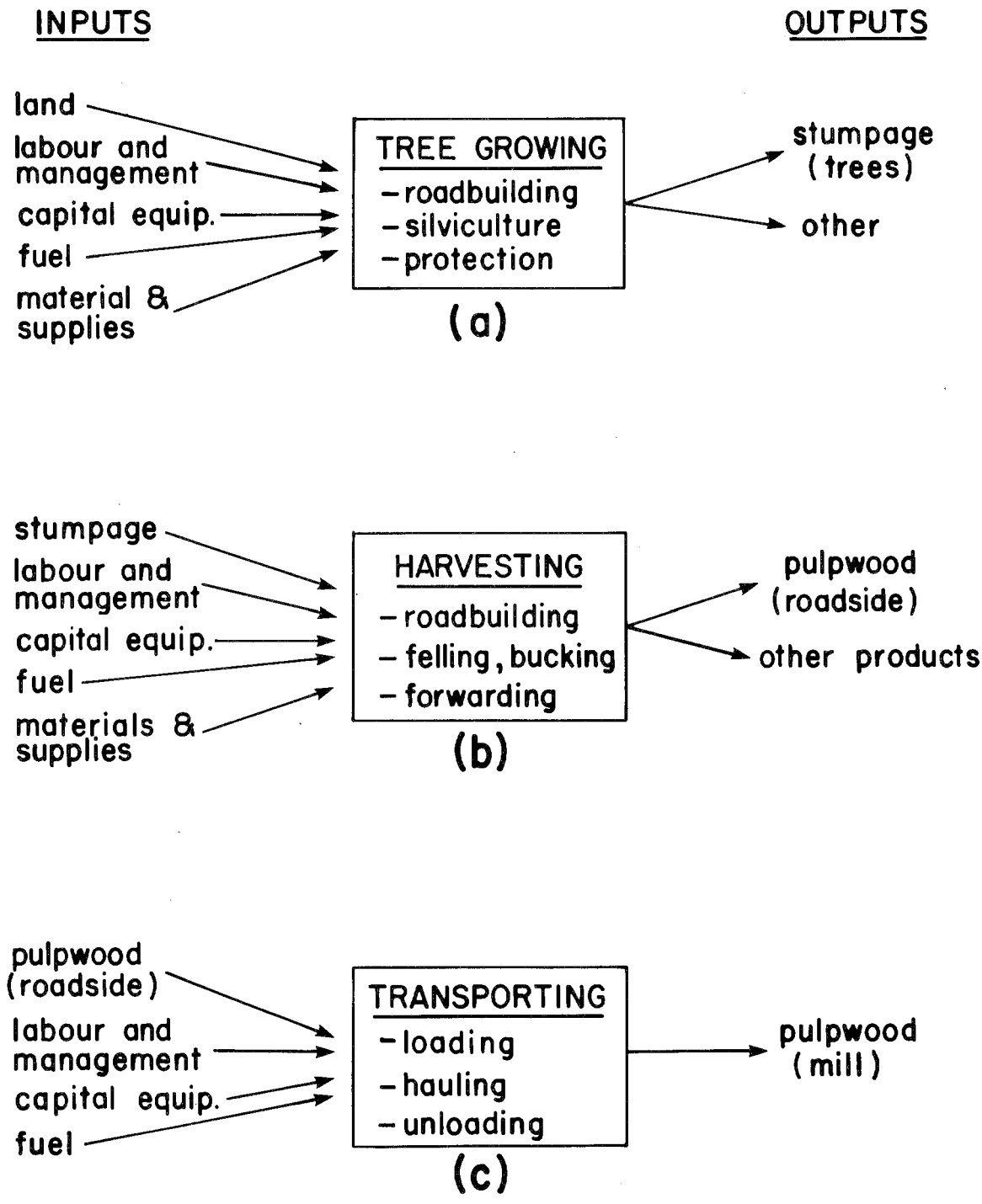

Fig. 3. Inputs and outputs of pulpwood production by principal activity

Table 3. Weighted average costs of company[a] pulpwood operations in New Brunswick, 1971-1976

Activity/item	($/rough cord) 1971	1972	1973	1974	1975	1976
Stumpage	2.58	2.00	1.90	2.69	2.40	1.99
Cut & forward	10.47	11.61	12.42	15.15	17.72	17.00
Trucking	5.65	7.28	9.25	9.33	10.25	12.26
Roads[b]	1.44	1.37	1.67	2.04	2.04	2.86
Overhead[c]	3.59	3.71	3.05	3.73	5.82	7.49
Fringe, UIC[d]	1.22	1.15	1.33	1.62	2.47	3.20
Other[e]	1.46	1.46	1.83	1.66	2.39	2.93
Total	26.41	28.58	31.45	36.22	43.09	47.73

[a]Companies operating pulp mills in New Brunswick.
[b]Includes road construction, ploughing, and maintenance.
[c]Total company overhead apportioned over Company produced wood and purchased wood.
[d]Includes Canada pension plan, compensation insurance, unemployment insurance, and fringe benefits.
[e]Includes scaling, contractor or company foreman, clerical, and camp construction.

Source: N.B. Forest Products Commission, various progress reports.

Table 4. Estimated[a] average costs of pulpwood production on small freeholds in New Brunswick, 1981

Stumpage:		
1.	Land value per acre	$150
2.	Net annual return on land	13%
3.	Taxes per acre per year	$0.30
4.	Yield	0.5 cord/ac/yr
	Cost/cord = 150 (0.13) + 0.30/0.5	$39.60
Harvesting and trucking: (per cord)		
1.	Cutting (including fringe benefits)	$18.00
2.	Forwarding (including fringe benefits)	8.00
3.	Loading and trucking (avg.)	18.00
4.	Road construction, maintenance	3.00
5.	Supervision	2.00
6.	Financing	3.50
7.	Marketing board levy	1.00
	Sub total	$53.50
Total/cord		$93.10

[a]Figures presented by the N.B. Federation of Wood Producers Inc. (personal communication, David Curtis, Secretary Manager, Feb. 1982).

cord landed at the mill.) (Table 4).

Considering only stumpage, it is obvious that prices paid now are not sufficient to cover costs of growing pulpwood. Present stumpage rates are only about $12 per cord. One can argue that $150 per acre[6] is too high for a woodlot capable of producing 0.5 cord per acre per year. But even if the price were only $100, stumpage costs per cord would be almost $27. Other factors (interest, taxes, yield) remaining the same, the $12 stumpage return would be sufficient to cover only costs, if the land price were no more than $45.

It might also be felt that the average yield is too low. However, assuming a yield of 1 cord per acre per year, stumpage price would have to be $20 per cord. With the assumptions given, a break-even yield would be 1.65 cords per acre per year. While this break-even yield might not be unreasonable for a managed plantation, it is probably not realistic for the average unmanaged woodlot. And, if one were to assume some inputs (site preparation, planting, cleaning) additional costs would have to be included.

Other factors should be considered in the evaluation. It is felt by some that it is not realistic to charge carrying costs (interest) on land because it has been in the family for years and disposing of it is not an option. In this case, the land holding cost is not an opportunity cost (there is no opportunity) and therefore should not be charged. Costs in this situation are essentially nil and any return for stumpage is a windfall.

In other instances, the owner might consider selling the land as an option, but the price is not sufficient to compensate for the benefits received. In this case, the owner is implicitly (or explicitly) attaching more benefits to the woodlot than the return for stumpage. This attitude appears to be common. There is a strong sense of security in owning property.

Another consideration is potential benefits to the landowner for harvesting and transporting pulpwood. The woodlot provides an opportunity for work during slack periods (fishermen, farmers) and to utilize equipment that might otherwise be idle.

An alternative to the one presented above is to assume one is starting out with bare land. Assuming an average bare land cost of $35 per acre and an interest rate of 13%, the carrying charge over a 40-year period would be $4,648. With a yield of 20 cords per acre at rotation, the stumpage value in the year 2020 would have to be $232 per cord to cover land costs. Assuming a $12 per cord stumpage rate now, the annual increase (compounded) would have to be almost 8% to cover costs. This includes no charges other than land. Earlier it was shown that from 1951 to 1981, the compound annual increase in mill prices was a little over 4%. But for the period 1960-1981, it was roughly 7%.

If bare land is site prepared and planted at an average cost of $150 per acre, the capitalized value for land and management in 40 years would be almost $25,000. Assuming a yield of 40 cords per acre, stumpage value would have to be $625 per cord to cover costs. This is a compound annual increase of over 10% to meet costs.

There has been considerable discussion over whether forest management costs should be expensed or capitalized. If expensed, costs are charged to income from harvesting the current crop. But as shown in the earlier example of a woodlot on a sustained yield basis producing only 0.5 cord per acre per year, the $6 income per acre will not go far. A woodlot owner in the business of producing wood is different from a provincial government or manufacturer in that he is not constrained by a sustained yield

[6]This land price is considered a reasonable average for the Province. It will vary by location, quality, and stocking. (Personal communication, Gordon Young, Woodlot Service (1978) Ltd.).

policy or to meeting long-term mill requirements. The woodlot owner has the option of putting that money (land, management) into a number of alternatives. Unless the owner is directed by legislation (maintain the land in productive state) or by a personal commitment to sustained yield, forest management is an investment - present consumption is foregone for the future.

In summary, given the examples outlined above, one cannot justify buying or holding land to produce pulpwood stumpage on a purely investment basis.[7] One can argue over specific figures, but the changes would have to be significant to affect the results appreciably.

Costs of harvesting and transporting are also affected by many factors including stocking levels, topography, travel distance, and so on. The company cost data in Table 3 show that in 1976 these costs were about $45 per cord. The Federation of Wood Producers (Table 4) indicate an average cost now of just over $53 for harvesting and trucking. It is questionable whether $53 is enough. Many small producers keep poor records and many either fail to include capital equipment depreciation or depreciate at a low rate. Also, in many cases, owners do not charge for their own time, or charge less than the going rate.

If company costs for the period 1971-1976 were projected to 1981, the current rate for harvesting and transporting would be about $85 per cord. The real average cost is probably somewhere between $53 and $85 per cord.

PULPWOOD PRICE AS A RESIDUAL

A widely used approach for determining pulpwood prices is to estimate residual value. The end product prices for selected items such as newsprint and pulp are identified. Manufacturing costs (except pulpwood) and shipping charges are deducted. The remainder is what a company could afford to pay for wood and still cover payments to labor, capital, and other materials and supplies with an allowance for profit and risk.

This method is based on the attitude that the value of wood is ultimately derived only from the value of products for which it is used. This is intuitively reasonable, but why should the price of pulpwood rather than wage rates, or return to shareholders be determined as the residual? Should a pulpwood seller be penalized for inefficient manufacturing or marketing operations?

There is not sufficient space to go into these complexities in this paper. Presented below is an indication of changes in end product prices and manufacturing costs.

A. End Product Prices

The principal pulp and paper products manufactured in New Brunswick are mechanical, sulphite, and sulphate pulp (bleached, semi-bleached, unbleached) and newsprint.[8] Prices for the period 1950-1981 are shown in Fig. 4. Prices remained relatively stable from 1950 to 1972, but since 1972 they have risen sharply. Part of this increase, at least since 1976, has resulted from devaluation of the Canadian dollar.

Comparison of pulp and paper prices (Fig. 4) with pulpwood prices (Fig. 2) shows that over the 30-year period 1950-1981, the average annual price increases for pulp and newsprint have been between 10 and 15% compared to only 8% for pulpwood prices. From 1960 to 1981, however, end product prices have risen about the same as those for pulpwood. In general, newsprint prices rose gradually and continually from 1950 to 1972. From 1973 to 1981, the increase has been dramatic. Pulp prices changed little from 1950 to

[7]Certainly not in the case of an ongoing operation. The financial returns from a bare land operation are uncertain. The feasibility therefore is unknown.

[8]Mechanical pulp and newsprint requires a little over one cunit of pulpwood per ton of product; chemical pulps require slightly over two cunits per ton output.

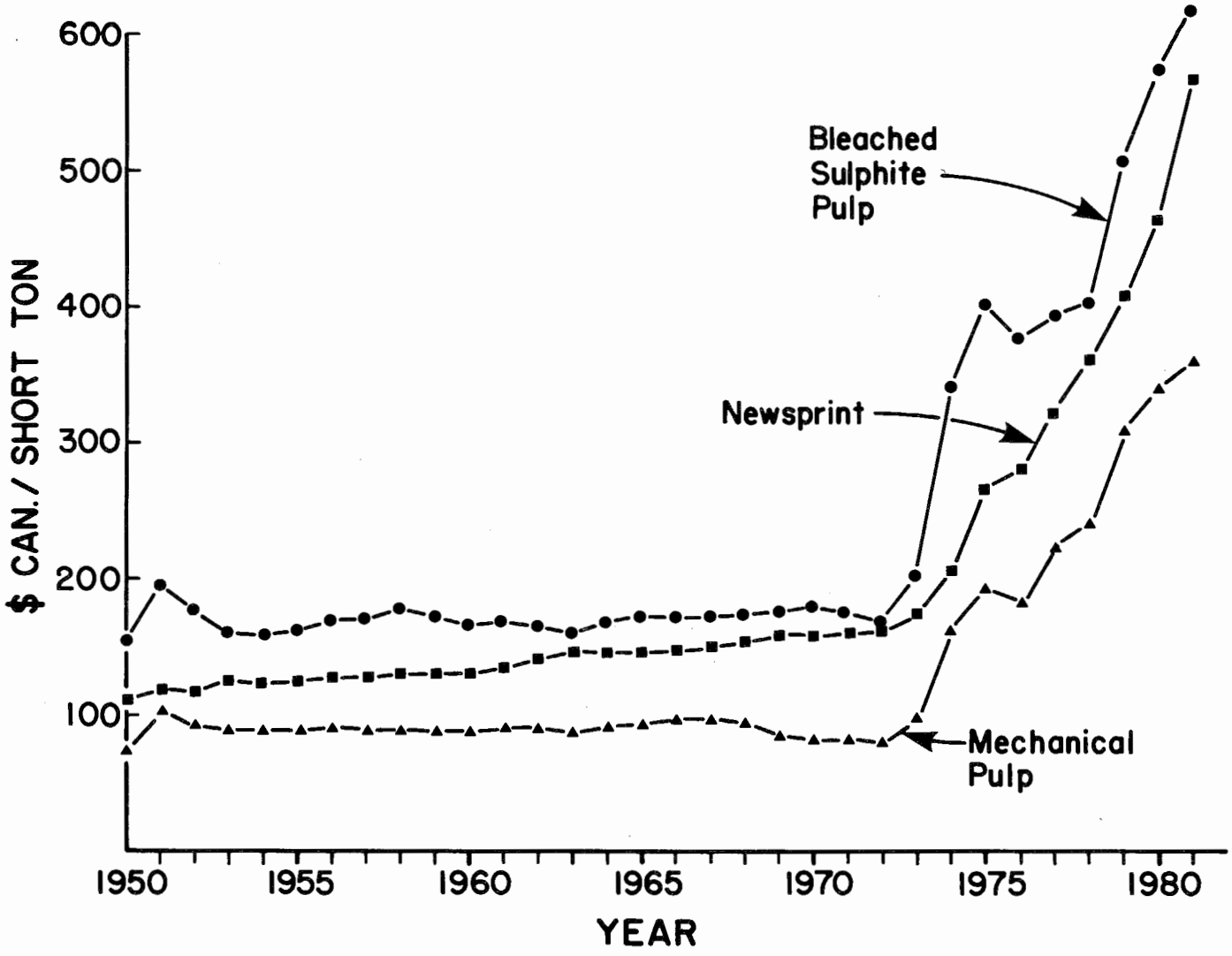

Fig. 4. Prices for selected pulp and paper products, 1950-1981

1973. In fact, prices in 1973 were about the same as they were in 1950. In 1974, however, prices jumped by 60-70%. Apparently this was due to a combination of factors but mainly to a strong market demand combined with inflationary pressure. Pulp production prior to the early 1970's had been depressed. The increase to some extent represented a catch-up phase.

B. End Product Manufacturing Costs

Principal inputs for pulp and paper manufacturing are labor, fuel and electricity, materials and supplies, and capital equipment. Data on costs of specific inputs for the industry in New Brunswick are limited. Statistics Canada collects annual data by company through its Census of Manufacturers, but they are aggregated to maintain confidentiality. Information on inputs and costs for the Canadian industry is available but would not be too meaningful, since costs of chemicals, fuel and electricity, and so on would vary considerably.

In lieu of cost data for specific inputs, figures are presented for the share of inputs to total costs or value of shipments (Fig. 5). In this figure, the relationship to value of shipments is explained by the formula:

Value of shipments = cost of fuel, electricity, materials and supplies + value added + inventory change

Value added includes payments for salaries and wages, depreciation, interest, rent, taxes, and profit. In Fig. 5, wages have been separated from the "other" category to permit analysis of change over time.

For the period 1970-1979, costs of materials and supplies (includes wood) as a percent of total costs have declined. In addition to wood, this includes costs of chemicals, containers and packaging materials, and operating and maintenance, and repair supplies such as cylinder wires, fourdrinier wires, and felts. Fuel and electricity costs as a percentage have gone up. In 1970, these accounted for 9% of total costs and in 1979, almost 17%.

Despite fairly substantial average wage increases, wages as a proportion of total inputs have declined. In 1970, they were 17% of the total and in 1979, only 14%. Average weekly earnings for all employees in the pulp and paper industry in New Brunswick have gone up from $166 in 1970 to $429 in 1980. This represents an average annual increase for the period of almost 16% (compound rate is 10% per year).

The "other" category in Fig. 5, includes profit, interest, taxes, depreciation, and inventory change. The peak in 1974 coincides with the large increase in pulp and paper prices. It is not possible to say much more about this except that a sizable proportion was probably profit. Corporation taxation statistics show that taxable income for paper and allied industries in New Brunswick went up substantially in 1974 and 1975. Even though this is a relatively short period, the changes are great. This cyclical performance with respect to profits must be recognized by owners of factors of production - timber owners, labor, and so on. It is the nature of the business. Newsprint and pulp producers are selling in international markets and generally have little control over prices. Periods of depressed markets and reduced profits have to be offset over time by better-than-average returns, if the manufacturer is to stay in business.

In summary, comparison of pulp and paper with pulpwood prices from 1950 to 1981 shows that pulp and paper prices rose faster than those for pulpwood. For the period 1960-1981, the price increases were about the same, and from 1970 to 1981, pulp and paper product prices increased much more sharply than did pulpwood.

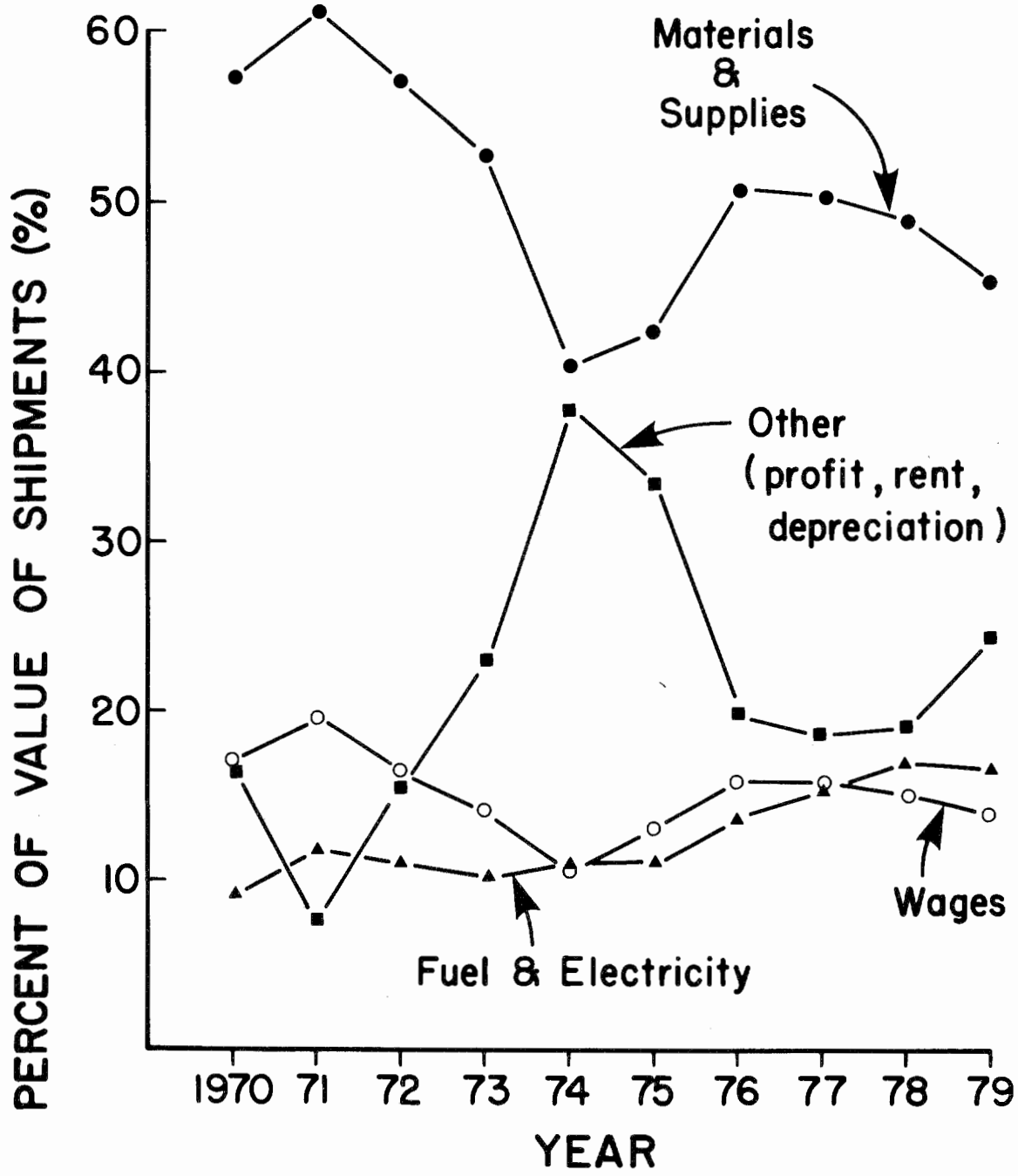

Fig. 5. Cost of principal inputs of pulp and paper manufacturing in New Brunswick as percent of value of shipments, 1970-1979

IMPLICATIONS OF PULPWOOD PRICING POLICIES

It is not very useful to discuss various pulpwood pricing methods and rates without considering why prices are being determined. There appear to be three objectives from a government point of view. These involve equity, wood supply, and rural development. The New Brunswick Forest Products Commission states in its first progress report that its objective is "... to encourage and facilitate the achievement of expanding markets and equitable prices for both the producer and consumer of purchased primary forest products. Behind this stated objective we assume there is a desire on the part of government to maintain a healthy primary forest industry on an owner-operator basis as a source of employment, income, and attractive opportunities for the rural population."

The Private Woodlot Resource Study terms of reference includes the statement that small private woodlot problems must be identified and resolved, "In order to secure a long-term supply of raw material for the forest industry, and to secure a sound economic base for a viable rural economy."

The question of equity has been discussed. In the following two sections the effects or implications of pulpwood pricing on wood supply and rural opportunities are examined.

A. Pulpwood Pricing and Wood Supply

For most commodities including pulpwood, the higher the unit price, the larger the quantity offered for sale.[9] However, the specific nature of this relationship is not well known. At any given time, there is a physical limit on quantity available regardless of price. Over time, this limit can be changed by bringing more land into production, fertilizing, planting, and cleaning. Present prices for pulpwood serve as signals to woodlot owners in current sales. Past and present prices and expectations serve to guide the owners' response for the future.

At present, pulpwood prices in the Province are sufficient to meet industrial requirements from small freehold. In fact, owners of small woodlots would sell more, if they could, at present prices and it appears they would sell the same amount even if prices were lower. Short-run supply is sufficient; requirements are being met. It is obvious, however, that many woodlots are treated as "mines". The resource is managed as a finite stock that is depleted over time. The stock may or may not be replenished naturally, but because of a variety of reasons (financial, age of owner, lack of information) there is little incentive to be concerned with renewability. From a financial viewpoint pulpwood rates provide sufficient incentive to sell (for many) but not enough to warrant putting anything back. Some owners do invest, but financial gain is not a primary concern. They have a strong sense of stewardship or they are interested in non-timber benefits. Governmental financial assistance is an incentive to some, but for others, even if government paid 100% of costs, they would not be interested.

The potential effects of this attitude and practice over time are difficult to forecast. It is stated that, "the unmanaged forest has a poor age class structure, the natural regeneration after cutting has not been complete, and the forest suffers a severe hangover from high-grading." (New Brunswick Department of Natural Resources 1981). In essence, there is an overabundance of old trees (softwoods 50-70 years old) whose growth is slow and

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[9]There may be exceptions to this in that a woodlot owner wants or needs only a certain income from the woodlot. If the unit price is higher, he simply sells less.

mortality from natural causes is high. Intermediate-aged trees (30-50 years old) are scarce, and there is a fair abundance of young trees (0-30 years). The forest composition is changing. There is an increased abundance of hardwood due in part to selective clear-cutting.

Specific changes of small freehold resources over the past 20 years can be identified by comparing inventory data.[10] The changes can be summarized as follows:

1. Forest land area in small freehold ownership has increased from 4.5 million to 5.1 million acres.
2. There has been a significant decrease both absolutely and proportionally in the area classified as softwood cover (area with greater than 75% of volume in softwood species); the increase has been in the hardwood/softwood cover type (area with 25-50% of volume in softwood species).
3. There is an increasing proportion of area in the more mature classes.
4. Total volume of timber on small freehold land has increased over 1958 and 1968, but softwood volume since 1968 has declined considerably, while hardwood volume has increased.
5. Average timber volume per acre has increased over 1958 but decreased since 1968 with the reduction in softwood volumes.

The various forestry incentive and extension programs in the Province have undoubtedly had an impact on the level of forest management and long-term wood supply. It is suggested, however, that if pulpwood prices were higher there would be no need for governmental assistance. The only problem with this is that there is no assurance that all or even a significant portion of the increase would go into management.

B. Pulpwood Pricing and Rural Development

The New Brunswick Federation of Wood Producers, Inc. reports that in 1981, the six marketing boards and one association in the Province had contracted sales of 517 M cords at a value of $28.8 million.[11] A rough guess of employment associated with this volume would be about 1,750 man-years.[12]

Because of the small average size of woodlots[13] in New Brunswick, they cannot provide full-time employment to owners. At a yield of 0.5 cord per acre per year and $12 stumpage rate, one would need between 3,000 and 4,000 acres to obtain a gross income of $20,000. An increase in stumpage prices of course, would lower the area requirement.

Woodlots can and do provide part-time employment which when combined with other jobs, provides a sufficient base for rural families. Contractors can either be employed full-time or part-time.

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[10]Inventory comparisons can be misleading if methods change or if areas or categories used for comparison are at a highly disaggregated level. Comparisons here are made at the Provincial level and, therefore, this is assumed not to be a problem.

[11]This includes sawlogs and some other products but does not include noncommercial products or sales outside of contracts.

[12]Assume 1.5 cords per man-day for harvesting, 6 cords per man-day for loading and hauling, and 250 days per man-year.

[13]It is not known exactly what the average size is. The most recent inventory shows there are about 5.2 million acres of forest land in small freehold. If there are 35,000 owners, average size is about 150 acres. The average size of woodlot reported by the Federation of Wood Producers, Inc. is only about 90 acres.

SUMMARY AND CONCLUSIONS

This paper reviews the concept of fair market price for softwood pulpwood in New Brunswick and examines different methods for determining those prices. It includes pulpwood price trends and comparison with costs of production and end product prices. In addition, there is an evaluation of pricing policies and implications for wood supply and rural development.

Pulpwood prices remained relatively stable from 1950 to the early 1960's. Since that time they have risen steadily. From 1950 to 1981, the average annual price increase has been about 8%. From 1960 to 1981, however, the annual increase has been over 13%. Over the past 10 years, pulpwood prices have more than kept pace with the consumer price index (for Saint John, N.B.).

Pulp and paper prices over the period 1950-1981 have risen faster than those for pulpwood (between 10 and 15% annually compared with 8% for pulpwood), but this has been mainly in the past 10 years and results, in part, from devaluation of the Canadian dollar. Pulp and paper manufacturing costs have gone up, particularly for energy inputs. Average weekly earnings for employees in New Brunswick pulp and paper mills have increased more rapidly in the past 10 years than pulpwood prices, but less than end product prices. Because of lack of data on other inputs and unit costs, it is difficult to determine the specific relationship between total manufacturing costs and end product prices.

There are no adequate time series data on pulpwood production costs. But, available information shows that pulpwood prices are not sufficient to cover costs and that on a purely financial basis, stumpage production is not feasible. Pulpwood stumpage prices are adequate to meet short-run quantity requirements, but do not provide sufficient incentive to encourage more intensive forest management. In the long-run and in the absence of government (or industry) assistance, small freehold resources will continue to deteriorate.

Despite the fragmentation of holdings and seasonal nature of work, small woodlots provide an important base for rural employment and incomes.

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APPENDIX

Table A1. Spruce and fir pulpwood prices in New Brunswick, 1951-1981

Year	Delivered[a] Edmundston	Northern[b] New Brunswick	Southern[b] New Brunswick	Average[c] New Brunswick
		($/cord)		
1951	17.00	-	-	-
1952	20.00	-	-	-
1953	15.00	-	-	-
1954	12.00	14.50	14.50	-
1955	14.00	14.50	16.50	-
1956	16.00	16.50	16.50	-
1957	18.00	17.50	16.50	-
1958	16.00	15.50	15.50	-
1959	14.50	14.50	15.25	-
1960	15.50	14.75	15.00	-
1961	15.50	14.75	15.00	-
1962	16.50	14.75	15.00	-
1963	17.00	15.25	16.50	-
1964	18.00	16.50	18.00	-
1965	18.00	-	-	-
1966	19.00	-	-	-
1967	21.50	-	-	-
1968	21.50	-	-	-
1969	22.50	-	-	-
1970	23.50	-	-	-
1971	23.50	-	-	21.84
1972	26.00	-	-	-
1973	31.00	-	-	-
1974	38.00	-	-	32.84
1975	38.25	-	-	34.59
1976	40.35	-	-	37.10
1977	41.75	-	-	39.11
1978	43.50	-	-	40.86
1979	48.00	-	-	45.04
1980	52.70	-	-	49.38
1981	58.14	-	-	57.00

[a]Rough spruce and fir, 4-foot lengths (MacDonald, 1981).
[b]Rough spruce and fir at mill, average price (Seheult, 1964).
[c]Average price paid by company, short haul, mainly 4-foot but including some 8-foot lengths (N.B. Federation of Wood Producers, 1981).

Table A2. Prices for selected pulp and paper products 1950-1981

Year	Exchange rate US $ in Cdn $	Newsprint[a]	Bleached sulphite[b]	Bleached sulphate	Mechanical[b]
			($ Can. per short ton)		
1950	1.0982	111	154	163	74
1951	1.0528	117	195	215	103
1952	0.9789	118	177	190	92
1953	0.9834	124	160	148	88
1954	0.9732	123	159	158	88
1955	0.9863	124	163	166	89
1956	0.9841	128	170	170	90
1957	0.9588	128	172	168	87
1958	0.9706	130	178	168	88
1959	0.9590	129	172	169	87
1960	0.9697	130	166	165	87
1961	1.0132	136	168	162	90
1962	1.0689	143	165	166	91
1963	1.0785	145	160	169	87
1964	1.0786	145	169	178	91
1965	1.0780	144	172	179	93
1966	1.0773	148	172	176	96
1967	1.0787	151	173	170	96
1968	1.0775	153	175	164	94
1969	1.0768	158	177	167	83
1970	1.0440	158	181	177	81
1971	1.0098	160	176	176	82
1972	0.9905	163	167	166	78
1973	1.0001	175	202	205	98
1974	0.9781	206	340	328	162
1975	1.0173	265	400	439	195
1976	0.9861	280	376	419	183
1977	1.0635	321	391	428	224
1978	1.1402	360	401	385	240
1979	1.1715	407	507	492	310
1980[c]	1.1708	462	572	565	342
1981[c]	1.2024	565	616	603	360

[a]Annual average from data shown in ANPA Annual Newsprint Statistics, delivered at New York.

[b]Average value per short ton (converted from metric ton) of U.S. pulp imports from Canada. U.S. Dept. Commerce, Bureau of Census.

[c]Projected prices.

Source: Canadian Pulp and Paper Association, Reference Tables, 1980.

Table A3. Pulpwood and pulp and paper price trends in New Brunswick 1950-1981 (1950=100)

Year	Pulpwood[a]	Newsprint[b]	Pulp[c]		
			Bleached sulphite	Bleached sulphate	Mechanical
1950		100	100	100	100
1951	100	105	127	132	139
1952	118	106	115	117	124
1953	88	112	104	91	119
1954	71	111	103	97	119
1955	82	112	106	102	120
1956	94	115	110	104	122
1957	106	115	117	103	118
1958	94	117	116	103	119
1959	85	116	112	104	118
1960	91	117	108	101	118
1961	91	123	109	99	122
1962	97	129	107	102	123
1963	100	131	104	104	118
1964	106	131	110	109	123
1965	106	130	112	110	126
1966	112	133	112	108	130
1967	126	136	112	104	130
1968	126	138	114	101	127
1969	132	142	115	102	112
1970	138	142	118	109	109
1971	138	144	114	108	111
1972	153	147	108	102	105
1973	182	158	131	126	132
1974	224	186	221	201	219
1975	225	239	260	269	264
1976	237	252	244	257	247
1977	246	289	254	263	303
1978	256	324	260	236	324
1979	282	367	329	302	419
1980	310	416	371	347	462
1981	342	509	400	370	486

[a]For rough spruce/fir pulpwood delivered Edmundston, N.B.
[b]Delivered New York.
[c]Based on average value per short ton of U.S. pulp imports from Canada.

Source: Table A2.