CHAPTER 4

CONSERVATION MEASURES IN PROGRESS

When one speaks of plantable land, the first thought of most people is of light, sand land, usually of the "blow sand" type which is the easiest and most economically feasible land to reforest. Most of the reforestation in Ontario to date has been on this type of soil, little of which exists in the Upper Thames Watershed. The absence of sand land and the lack of knowledge concerning the proper methods of planting hardwoods account for the very small amount of reforestation which has been done within the watershed.

Since there are few sand lands in the area, wind erosion is not a problem; similarly, because of the generally level topography, spectacular gully erosion does not exist, although sheet erosion and some gullying occur on the steeper slopes.

For forestry purposes the Department of Lands and Forests has divided Southern Ontario into Forest Districts which are subdivided into zones. Each zone has its Zone Forester and assistants, whose duty it is to give advice and assistance to private individuals and municipalities on the management of their woodlands and the establishment of plantations. The office covering the zone in which Middlesex lies is located in Chatham and the office for Oxford and Perth Counties is in Stratford.

The nearest forest tree nursery to the Upper Thames Watershed is that at St. Williams in Norfolk County, which was established in 1908 and has served as the largest production and distribution centre for trees ever since. Today, 43 years later, the Norfolk Provincial Forest Station of 3,800 acres presents a magnificent young forest of pines and other species. This station also maintains a small sawmill, in which thinnings from improvement cuttings are being manufactured into materials for local use. Thousands of

visitors go to this beauty spot and a small park is provided for their accommodation. Many officials of municipal and other organizations from all parts of the Province have visited this station and returned convinced that all the waste areas of the Province should be reforested and so made useful and beautiful.

1. Private Planting

Reforestation, combined with the protection of natural woodlots, is essential if farmers are to have sufficient woodland to supply the local community with fuel-wood, fence posts and poles, and to have a few saw-logs for sale which will provide a cash crop at times when the prices of other farm products are depressed. Reforestation of certain areas will not only mean that the land will be producing a crop where little or nothing of value is growing now, but it will also provide adequate protection for the soil and will retard run-off of water from melting snow and rain, thus making for a more even stream flow throughout the year. In addition to this, the greatest advantage will be that it will retain the many wood-using industries within the watershed, where the employment they provide will benefit all the members of the river valley community.

The free distribution of trees for planting was first begun in Ontario in 1905, and the following year a statute was passed which permitted a township council to exempt a part of the woodland of a farm from taxation; it provided that exemption be extended to any part of a farm used for forestry purposes or being 'Woodlands'; provided that such exemption shall not be greater than one acre in ten acres of such farm and not more than twenty acres held under a single ownership.

> "'Woodlands' for the purpose of this paragraph shall mean lands having not less than four hundred trees per acre of all sizes, or three hundred trees, measuring over two inches in diameter or two hundred, measuring over five inches in

This is a private plantation of Scotch pine on light soil.

Plantations are not numerous on the watershed and extensive areas suitable for planting are few but a great many small areas exist of a few acres in extent which should be planted by private owners.

> diameter (all such measurements to be taken at four and one-half feet from the ground) of one or more of the following kinds: White or Norway Pine, White or Norway Spruce, hemlock,tamarack, oak, ash elm, hickory, basswood, tulip (White wood); black cherry, walnut, butternut, chestnut, hard maple, soft maple, cedar, sycamore, beech, black locust, or catalpa, or any other variety which may be designated by Order-in-Council, and which said lands have been set apart by the owner with the object chiefly, but not necessarily solely, of fostering the growth of the trees thereon and which are not used for grazing livestock." - R.S.O. 1950, c. 24, s. 5 (18)

In 1927 the exemption of taxation on woodland was made compulsory if applied for, and is interpreted as meaning planted as well as natural trees.

In 1938 The Assessment Act was amended to prevent the assessment being raised on land after it had been reforested and now reads as follows:

> "Land which has been planted for forestation or reforestation purposes shall not be assessed at a greater value by reason only of such planting." - The Assessment Act, R.S.O. 1950, c. 24, s. 33 (12)

Both these Acts were designed to facilitate the planting of trees on private land and should be taken advantage of by citizens anxious to improve woodland conditions on their own property and at the same time benefit the whole community of the river valley.

Within the Thames Watershed there are 272 private plantations, most of which are small, namely two to twenty acres in area. The largest are those of Dr. R.S. Murray in Downie Township which cover 120 acres.

The accompanying table shows the total numbers of trees distributed for planting on private land in the counties lying partly within the Thames Watershed since the Provincial Government first began to distribute trees for this purpose in 1905. The total number of trees is given as 6,093,000, but it is impossible to estimate how many were actually planted within the watershed. However, on the basis of an area an estimate of 3 million might be made.

The total acreage of private plantations of over one acre in extent existing today is 1,034 which would

TREES DISTRIBUTED FOR PLANTING

DEPARTMENT OF LANDS AND FORESTS FIGURES

PRIVATE PLANTING

YEAR	MIDDLESEX	OXFORD	PERTH
1905-1912	40,165	10,785	33,195
1913-1925	198,998	151,271	93,817
1926	114,998	82,464	61,522
1927	130,032	88,698	72,184
1928	161,082	152,971	95,747
1929	141,945	127,296	72,847
1930	214,326	156,119	111,312
1931	177,852	137,895	86,468
1932	306,721	243,637	85,589
1933	293,716	233,377	120,322
1934	212,736	218,526	88,839
1935	184,554	219,058	103,548
1936	316,103	274,464	105,687
1937	362,258	268,275	126,281
1938	272,920	316,044	83,590
1939	340,528	368,043	223,054
1940	327,733	407,948	121,971
1941	229,369	342,736	100,990
1942	341,579	272,510	98,430
1943	238,957	293,012	97,783
1944	217,729	211,535	64,683
1945	211,208	176,499	53,757
1946	301,399	274,181	96,992
1947	217,225	113,699	70,186
1948	232,948	251,007	69,746
1949	306,328	162,100	110,364
1950	379,671	225,331	171,904
TOTAL	6,473,080	5,778,981	2,620,790

COUNTY FORESTS AND OTHER MUNICIPAL PLANTING

YEAR	MIDDLESEX	OXFORD	PERTH
1913-1925	20,441	6,525	--
1926	1,150	--	--
1927	8,275	--	17,000
1928	2,850	9,000	1,775
1929	24,200	24,000	14,600
1930	11,200	15,000	46
1931	28,825	10,700	--
1932	18,317	10,689	375
1933	10,750	4,975	1,500
1934	18,250	7,000	450
1935	118,156	6,300	16,800
1936	11,938	1,600	12,300
1937	14,650	700	18,400
1938	78,625	1,300	14,500
1939	52,810	17,237	5,300
1940	8,956	11,500	1,300
1941	9,510	1,600	4,450
1942	17,950	9,700	4,200
1943	2,835	3,508	10,650
1944	10,516	60,700	15,700
1945	26,075	11,206	7,400
1946	76,275	144,250	9,250
1947	45,385	36,500	14,795
1948	9,975	13,850	150
1949	55,616	16,100	60,548
1950	69,234	41,275	21,405
TOTAL	752,764	465,215	250,084

TREES FOR SCHOOLS

YEAR	MIDDLESEX	OXFORD	PERTH
1933	675	--	424
1934	1,735	881	2,050
1935	786	370	875
1936	675	4,925	--
1937	34,836	19,010	78,782
1938	1,970	4,222	53,262
1939	5,853	36,740	23,993
1940	1,385	30,051	74,191
1941	5,401	37,953	11,905
1942	4,254	41,550	13,825
1943	5,786	216,410	172,672
1944	6,280	104,900	77,634
1945	1,985	141,556	86,734
1946	3,717	48,161	30,945
1947	193	3,460	--
1948	31,100	--	350
1949	--	725	1,231
1950	--	--	2,300
TOTAL	106,633	690,914	631,173

require 1,250,000 trees spaced 6 feet apart. If we take into consideration the fact that large numbers of the trees would be used for replacing losses on established plantations, for planting open areas in woodlots and for the establishment of shelterbelts and windbreaks, it is apparent that large numbers have been lost through various causes, chief among which are lack of protection from cattle, planting on soils unsuited to the species used and to lack of care of young plantations to eliminate competition from weeds and damage by mice. This loss is now being greatly reduced by a much closer examination of applications for trees and inspection of planting sites by the Zone Foresters.

2. County Forests

The County of Hastings was the first in the Province to interest itself in reforestation and as long ago as 1911 appointed a reforestation committee which was instrumental in having the Counties Reforestation Act passed which has since been incorporated in The Trees Act. The committee also recommended[1] that "The Corporation of the County of Hastings purchase from the municipality of the Townships of Elzevir and Grimsthorpe certain lands containing 2,800 acres, more or less, for $200" as the nucleus of a county forest. However, no further action was taken and the act lay dormant till 1922 when the present policy of county forests was laid down. The work is done under the authority of The Trees Act (R.S.O. 1950, c. 399), which provides for the purchasing of land and the entering into agreements by the county for the management of such lands. No limit as to the size of the area is stated, so that some counties have plots of a few acres while others have forests of several thousand acres. If, however, a county wishes to enter into an agreement with the Minister of Lands and Forests for the planting and management of such county-owned land, it is preferred that

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1. Minutes of the Meeting of the Council of the County of Hastings, December 8, 1911.

the county purchase not less than 1,000 acres. The agreements which are in force at the present time run for a period of 30 years, during which time the Ontario Government agrees to establish the forest and pay the cost of such items as fencing, buildings, equipment, labour, maintenance, trees, etc. - in short, everything connected with the management of the forest.

At the end of the 30-year period the county has the privilege of exercising one of three options: First, to take the forest over from the Government and pay back the cost of establishment and maintenance without interest; second, to relinquish all claim to the forest whereupon the Government will pay to the county the cost of the land, without interest; third, the forest may be carried on as a joint undertaking by the Province and the county, each sharing half of the cost and half the profits.

It will be seen from the above summary of the agreement that all a county stands to lose on such a project is the interest for 30 years on the purchase price of the land. Also, it should be pointed out that, in drawing up such a liberal scheme, it was done purposely to encourage the reforestation of land not suited to agriculture. Again, it was not the intention of the Government to have the counties stop at a minimum of 1,000 acres, as the overhead necessary on an area of this size could very easily be spread over an area of five or even ten times the size. As a matter of fact this is what happened in some counties where the councils have initiated a progressive reforestation policy.

This Act also provides that municipal councils of townships shall have all the powers, privileges and authority conferred on councils of counties except that, instead of issuing debentures to an amount not exceeding $25,000 they shall have power to levy, by special rate, a sum not exceeding $1,000 in any year, for the purpose of providing for the purchase of land for planting and protecting the timber thereon.

The agreements which have been drawn up between the Thames, Humber and Ganaraska Authorities and the Ontario Government to establish and manage the Authority forests is substantially the same as that made with the counties, except that the Government has agreed to pay half the cost of the land and the agreement for planting and management is to run for approximately fifty years.

Oxford County now has the largest county forest in the Thames area, comprising 515 acres in five separate tracts. These are added to from time to time as land becomes available. Middlesex has 240 acres in three tracts. Forty acres were originally purchased in 1937 and two 100-acre tracts were bought in 1945.

PUBLICLY OWNED FOREST LAND IN THE THAMES WATERSHED

Forest	Tract	Township	Con.	Lots	Acres	
Conservation Authority	Ellice Swamp	Ellice	IX	11,12	150	
			X	10,12	150	
			XI	9,10,12	314	
			XII	8,9,10,11,12	495	
			XIII	8,9,10,11,12	495	
	Gads Hill Swamp	Easthope North	VII	37	101	
			VIII	36,37	100	
	Fish Creek	Blanshard	XI	20,21	66	
			XII	21	80	1,951
Oxford County	Banner	Oxford N.	VI	20	137	
	Chesney	Blandford	IX	5	100	
	Embro	Zorra W.	IV	15	113	
	Lakeside	Nissouri East	XII	27	78	
			XI	28	21	
	Macbeth	Dereham	III	24	66	515
Middlesex County		Dorchester North	I	13	100	
		Nissouri West	V	10	100	
			IV	1	40	240
Woodstock		Oxford W.	III	2		40
Stratford		Easthope North	I	44		8
St. Marys		Blanshard	XIX	19		10
TOTAL						2,764

A portion of the Gods Hill Swamp where the Authority will restore the tree cover by natural and artificial reforestation.

This is the former Perth County Forest now owned by the Authority.

Much of the remaining cover is poplar which will make pulpwood and improve the site for better species.

Perth County has, however, made no further acquisition to its original purchase of 100 acres in the Gads Hill Swamp and all the trees planted in 1945 are now dead. This land has recently been sold to the Authority.

3. Upper Thames River Conservation Authority Forest

Following the recommendations of the preliminary report prepared by the Department of Planning and Development in 1945, the Authority has acquired 1,951 acres of potential forest land, in the Ellice and Gads Hill Swamps and along Fish Creek which form the natural water-storage areas of some of the streams. Forty-four acres have been reforested along Fish Creek and a number of other areas are under consideration in the Authority's program of purchase and management of forest land at the headwaters.

4. Municipal Forests

Municipal forests are areas owned and managed by municipalities other than counties.

The three municipal forests in the Thames Watershed are: Woodstock 40 acres, St. Marys 10 acres, Stratford 8 acres; and the City of London has also done some reforestation work in the vicinity of its wells.

The town of Woodstock derives its water from wells near Cedar Creek south of the town. Forty acres in this vicinity are owned by the municipality and the planting of trees has been carried on periodically since about 1913. Most of the trees planted have grown well and the plantation is observed by thousands of people every year. It stands as a credit to the town and an inspiration to others; at the same time it is protecting the water supply and is a potential source of lumber. It could, however, be enlarged considerably.

St. Marys plantation, set out in 1927, is a small one, but the survival is good and there is considerable room for expansion on the banks of the tributary of Trout

Creek where the present plantation is situated. The area is close to the town and it is readily seen from Highway No. 7.

Stratford's small plot was planted by school children on land owned by the City, and could well be extended. In addition to this area, close to the city of Stratford are a number of kettle ponds, surrounded by slopes which undoubtedly help to maintain the level of the water table in the surrounding land. If some of these were acquired by the City, the slopes around them reforested and the areas made into municipal parks, urban and rural citizens alike would benefit. (See the Recreation section of this report.)

Assistance with regard to the establishment of municipal forests and the supplying of free trees is still the policy of the Department of Lands and Forests. Moreover, as provided by The Trees Act, (R.S.O. 1950, c. 399), it is possible for a township council to enter into an agreement with private landowners for the reforestation of their property. The agreement will prescribe the cutting conditions of all trees planted and such conditions will be subject to the approval of the Minister of Lands and Forests.

Provision is also made for exempting such lands from taxation and for making arrangements with the Dominion and Provincial Ministers of Labour regarding conditions of labour and payment of wages in connection with planting and conservation of such areas. - The Trees Act.

Before leaving the subject of municipally owned forests and forests which on a large scale would provide the local communities with at least a part of their livelihood, it would be as well to review what is being done along these lines in other places.

In Nova Scotia there is a community living on Hammonds Plains near Halifax, which depends entirely on wood taken from small woodlands for its livelihood. In this

the largest woodlot is not over 400 acres in extent and because of the rocky nature of the soil the people are not able to augment their incomes by farming, though most families own a cow, a pig and some chickens. The wood from the woodlots is manufactured into barrels and boxes by more than twenty small mills which are largely family-owned and -operated. The people are thrifty and industrious; they have comfortable homes, are public-spirited and extremely forest-fire conscious. This is a community which has developed naturally and yet resembles communities based on a forest economy which have been planned and established in Europe for a considerable time.

One of the most recent is the forest of Ae in Dumfriesshire, Scotland. It was established by the British Forestry Commission in 1927 and covers an area of 10,683 acres of which 3,000 acres have been planted, 4,500 acres are scheduled for planting in the near future, 250 acres of the best land have been set aside for cultivation, and the balance of 2,800 acres is unplantable because of its altitude but is used for sheep pasture in summer.

The forest is in charge of a forester who resides on the spot and under him there are foremen and gangs of workers. In the first year 16 men were employed, just before the war 27 full-time employees were engaged, and by 1960 about 90 men (or one man for each 80 acres) will be needed the year round for essential forest work. This does not take into account temporary employees who will be required for sawmilling, transport and other jobs. It is planned to create a forest village for the workers embodying a church, a school, playgrounds and sportsfields. The combination of the forest and the village dependent on it is something new in Scotland and represents an important stage in the resettling of men and women in the country. The village is to be the forerunner of other similar villages and in many parts existing villages will be revitalized by the stimulus of forest wealth.

5. Demonstration Plantations

In 1922 the Provincial Government began the policy of assisting municipalities in the establishment of small forest plantations for the purpose of demonstrating the use of trees on marginal and submarginal land. To meet the requirements for such a plot the Government required that the area be on a well-travelled road so that as many people as possible could see it; that the municipality either purchase land or use land which was in its possession, fence it, and agree to give the area reasonable protection after planting. In return the Government agreed to supply the trees and pay the cost of planting and of supervising the work when the planting was in progress. In 1932, when Government funds were curtailed, the policy governing these demonstration plots was changed, and from that time to the present the Government has not paid the cost of planting, although the other conditions governing the establishing of these plots have remained the same.

The only demonstration plot in the watershed was established by the London Kiwanis Club on city waterworks property on Highway No. 2, about one mile south of London, in 1929. It covered approximately seven and one-half acres of land and 11,000 mixed hardwood and spruce seedlings were planted. This plantation suffered the fate of many similar ones on heavy soil - weed competition was too great for the trees to overcome and more than 50 per cent were killed by mice girdling the stems.

The value of such plots, if well cared for, in showing landowners what can be accomplished in a very few years by planting trees is so great that every township should endeavour to establish at least one plot.

6. Demonstration Woodlots

Demonstration woodlots are privately owned areas of woodland on which the owners have agreed to follow pres-

cribed methods of woodlot management, outlined by the Department of Lands and Forests, under the Zone Forester and to permit access to the area by interested persons. Such demonstration woodlots and the influence they exert for the proper management of similar areas contribute to the total conservation effort in any watershed.

Twenty-nine demonstration woodlots have been established in the Upper Thames Watershed - 5 in Middlesex, 15 in Oxford and 9 in Perth County.

7. School Forests

In order to encourage the establishment of school forests planted and cared for by school children, the Ontario Horticultural Association in 1945 organized an annual competition. Prizes are offered for the school having the best plantation and knowledge of forestry in each forest district in Southern Ontario and for provincial winners from the winners in the districts. Prizes for these competitions are generously provided by the Ontario Conservation and Reforestation Association, Mrs. D.W. Boucher of Kingston and Mr. A.J. Jackman of Owen Sound.

Many schools in the area have entered these contests in the past and several schools have taken prizes in the district competitions.

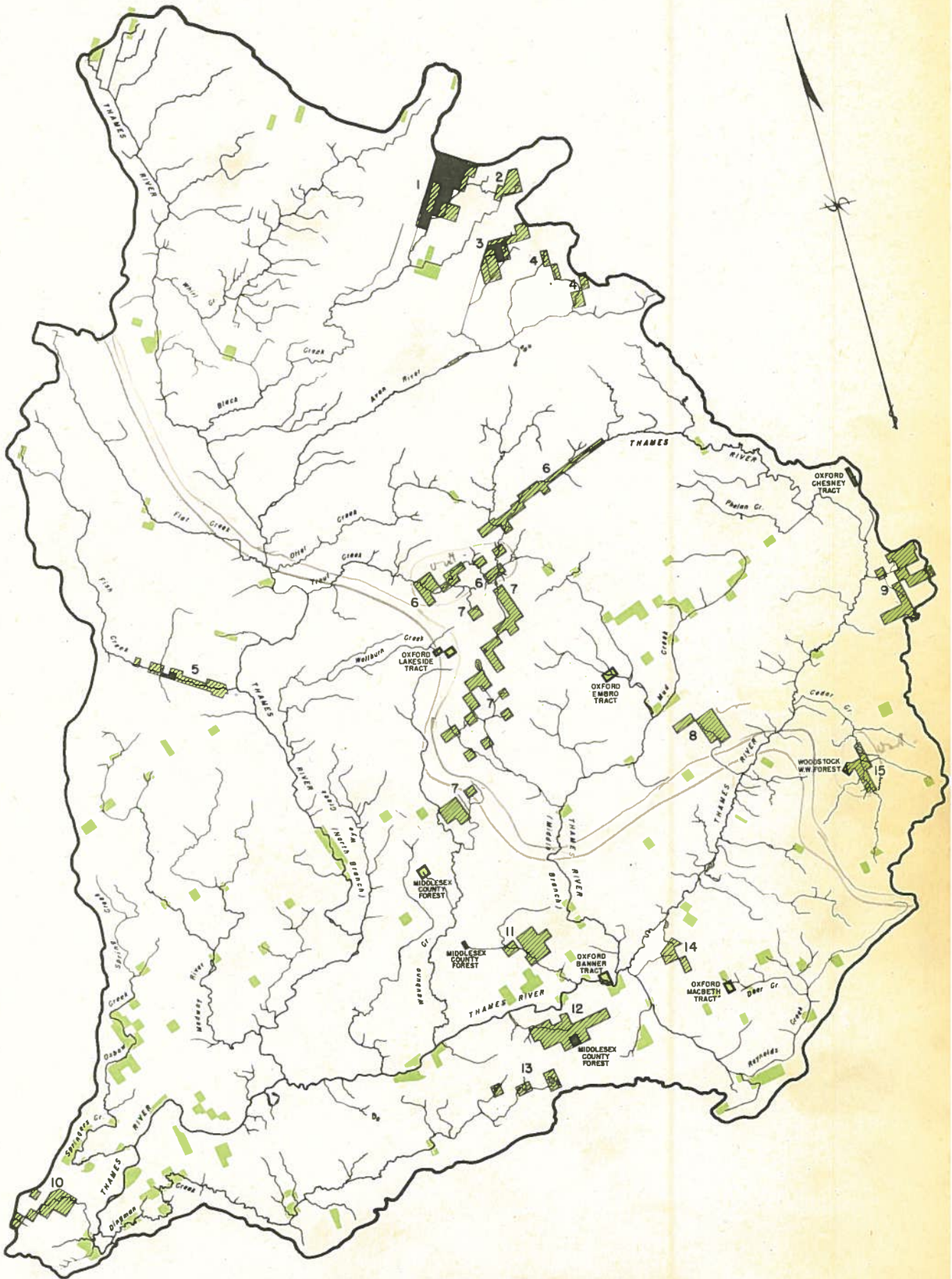
Trees have also been sent out to schools in the watershed and have been distributed to children for planting on the home farm, and many of these have been used to form shelterbelts and windbreaks. The number of trees distributed for this purpose is shown in the accompanying table.

8. Boys and Girls Forestry Clubs

These clubs are organized by the Ontario Department of Agriculture assisted by the Department of Lands and Forests and must be sponsored by an organization interested in the improvement of woodland and reforestation.

Members must be between 12 and 21 years of age and each member undertakes a project such as marking a half-acre plot of woodland for thinning or reforesting a quarter-acre of land. Projects are judged annually on Achievement Day and prizes awarded; for this purpose the Department of Agriculture furnishes $3.00 per member and the sponsoring organization $1.50. Winners may enter the Provincial Inter-Forestry Club Competition.

The Counties of Middlesex and Perth each had one Forestry Club in 1950 and Perth came second in the Provincial Competition.



NATURAL WATER STORAGE AREAS AND REFORESTATION LAND

LEGEND

- AUTHORITY FOREST
- RECOMMENDED AUTHORITY FOREST
- COUNTY FOREST
- OTHER REFORESTATION LAND

1. ELLICE SWAMP
2. NORTH GAD'S HILL SWAMP
3. SOUTH GAD'S HILL SWAMP
4. AVON RIVER
5. FISH CREEK
6. TROUT CREEK
7. MORAINE
8. GOLSPIE SWAMP
9. BLANDFORD
10. KOMOKA SWAMP
11. NORTH DORCHESTER SWAMP
12. SOUTH DORCHESTER SWAMP
13. FOSTER, BEATTIE AND DINGMAN LAKES
14. INGERSOLL SWAMP
15. CEDAR CREEK SWAMP

SCALE : MILES

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CHAPTER 5

FOREST CONSERVATION MEASURES REQUIRED

1. Natural Water-Storage Areas and Reforestation Land

One of the most important conservation measures required on the Thames Watershed is the establishment of forest areas, to be called the Thames Forest, under the Conservation Authority which will serve to protect the natural water-storage areas of the valley. Fifteen such areas have been defined, as shown in the accompanying table, with the acreages of woodland, willow scrub, hawthorn, open land and water in each. The two-page map shows the location of these areas and the main tributary streams to which they supply water. The names given to these areas are taken from the streams they feed or from nearby places. The large folding map in the back gives more detail, showing the present tree cover, willow scrub, hawthorn and open land within the areas. The total acreage recommended for acquisition includes natural water-storage areas and reforestation land to the extent of 18,334 acres of which 7,621 have some form of tree cover, 2,811 are willow scrub or hawthorn, 7,690 are open land and 212 acres are water contained in small lakes or bogs. Of the 18,334 acres 1,951 have been acquired by the Authority and 100 acres are owned by Middlesex County.

In selecting the areas which it is felt should be set aside as permanent natural water-storage areas, adjacent swampland has been included irrespective of its present vegetative cover, that is, all soft maple and white elm woods, willow and dogwood thickets, bog land and marsh areas have been included. In addition, adjacent woodland, particularly on slopes and covering springs, has been included as well as adjacent land in moraines and gravel pits. The minimum of land in the better land classes has been included, but in some cases it was impossible to omit them entirely when they occupied positions immediately above springs or on a small part of a lot which was mostly composed of a poorer type of soil.

NATURAL WATER STORAGE AREAS

No.	Area	Wood-land	Open land	Scrub-land	Bog and Lake	Total
1	Ellice Swamp	381	462	39	18	900
	Authority Forest	997	32	516	65	1,604
2	North Gads Hill Swamp	436	74	17	-	527
3	South Gads Hill Swamp	662	184	167	-	1,013
	Authority Forest	60	26	115	-	201
4	Avon River	345	144	11	-	500
5	Fish Creek	39	603	282	-	924
	Authority Forest	36	80	30	-	146
6	Trout Creek	517	1,682	522	-	2,721
7	Moraine	776	1,824	453	7	3,060
8	Golspie Swamp	463	286	151	-	900
9	Blandford	808	860	223	49	1,940
10	Komoka Swamp	227	262	174	-	663
11	Dorchester Swamp	399	380	35	-	814
12	South Dorchester Swamp	890	294	68	1	1,253
	Middlesex County Forest	100	-	-	-	100
13	Foster, Beattie & Dingman Lakes	146	238	28	67	479
14	Ingersoll Swamp	112	91	38	-	241
15	Cedar Creek Swamp	264	249	88	7	608
	Other Forest Tracts	4,139	11,921	2,779	67	18,906
Totals		11,797	19,692	5,730	281	37,500

(1) Ellice Swamp

The Ellice Swamp is on the height of land between the North Branch of the Thames and the Nith River which is a tributary of the Grand River System. It is drained by two Black Creeks, one of which flows north to the Nith and the other south-west through Sebringville to join the North Branch. It has already been recommended that the Grand Valley Conservation Authority acquire the part of the Ellice Swamp lying in the Nith Watershed. Most of the centre is covered with sphagnum moss underlain with peat, and leather-leaf. (Chamaedaphne) is a common cover plant. At the edges dense thickets of trembling aspen occur which decrease in size toward the centre; with willow they form a young stand of some twenty feet in height. It is believed that the extensive drainage operations which have been carried out here have accelerated the drying up of the bog. This is one of the great natural water-storage areas of the Thames Watershed which should not only help to preserve a more even flow in the streams throughout the year but aid in maintaining the natural level of the water table in the soil. Drains have been constructed through it which appear to have no beneficial effect whatever. This is particularly evident on the west side where the drop from the adjacent farmland is abrupt and provides sufficient natural fall for drainage to the swamp without the necessity for a drain. In 1948 one farmer living on the edge of the swamp reported that he had to haul water for his cattle for the first time in the thirty years he had lived on the farm. The peat and muck of which the swamp is largely composed have tremendous water-holding capacities. With adequate forest cover which would reduce the rate of melting of the snow and evaporation caused by sun and wind, this area could be restored to its role of a natural water-storage area. Consideration should also be given to the abandonment of drains which are not fulfilling the object for which they were constructed. Reforestation of the bog section

Some of the main tributary streams of the Thames arise in great swamps such as the Ellice Swamp which are the natural water storage areas and should be reforested.

Others arise as springs in pasture fields, here private owners should plant the surrounding slopes which are producing only sedge grasses and skunk cabbage.

of the area is impossible, but the poplar - willow stands around the margin can be greatly improved, the peat areas reforested and the submarginal farmland immediately surrounding it should be planted. In this way the area would also be made to produce a crop of economic value.

The total area recommended for acquisition here is 2,445 acres of which 1,341 are wooded, 493 are open, 530 are willow scrub and 63 are bog, too wet for trees. The Authority has already purchased 1,604 acres of this land but there are an additional 900 acres which should be included.

(2) North Gads Hill Swamp

This area is a comparatively small one draining into Black Creek through a large drain west from Highway No. 19. It includes 436 acres of woodland, 74 acres of poorly-drained marginal land and 17 acres of willow scrub.

(3) South Gads Hill Swamp

This swamp is one of the main sources of water for the Avon River. The stream which it feeds flows in the large drain beside Highway No. 19 and enters the Avon at the eastern outskirts of Stratford. The wooded area of the swamp encloses some vigorous springs and at least one pool where inflowing water apparently enters the ground, as there is no visible surface outlet. The area embraces 1,115 acres, 722 of which are wooded, 210 are open land which is largely sub-marginal pasture and 183 are willow scrub. The area has been mostly cut over though there are some stands of larger trees, chiefly white elm, silver maple and white cedar, particularly in the north end of Lot 36. The Authority has recently taken over the 101 acres of land here which the County of Perth purchased as the beginning of a county forest a few years ago and has bought another hundred acres, making a total of 201 acres owned by the Authority.

The Avon River above Stratford as it is to-day.

The Avon River as it should be. Stream bank planting will reduce erosion, keep the water cool and make the stream attractive in appearance.

(4) Avon River

The name Avon River has been used to designate two tracts north of Shakespeare from which two permanent streams flowing into the Avon River arise. The acquisition of these by the Authority for the maintenance of permanent flow is considered to be of primary importance. The more westerly of these streams rises as a spring in Lot 30, Con. VI, of Easthope North Township, and the easterly stream also rises as a spring in Lot 29, Con. V. The easterly one has a tributary rising in Lot 25, Con. IV. This last has its source in a small swamp on the height of land which supplies both this stream and a tributary of the Nith River with water. It has already been recommended that the Grand Valley Conservation Authority acquire the part of this swamp which lies in its watershed and its maintenance should be a matter of co-operation between the two Authorities. The two tracts constitute 500 acres with 345 acres of woodland, 144 acres of pasture and 11 acres of scrub land, mostly hawthorn.

(5) Fish Creek

Fish Creek is the name given to an area of about 1,000 acres close to where No. 7 Highway crosses this stream. Fish Creek itself flows in a former glacial spillway and for about four miles before it enters the North Branch of the Thames passes between steep banks which have been heavily grazed. The soil is gravelly in many parts, a number of worked-out pits are present and many acres are completely overrun with hawthorn. A long stretch of this valley is visible in both directions from Highway No. 7 and it would make an excellent demonstration forest; therefore, its acquisition by the Authority is recommended. It contains 968 acres, 75 of which are wooded, 603 open land and 290 are hawthorn scrub. The Authority recently purchased 180 acres here, 124 of which were subsequently sold, leaving a balance of 56 acres.

(6) Trout Creek

As most of the land in this area lies along Trout Creek the name of the stream has been used for the area. Trout Creek rises in the Zorra Swamp which also gives rise to the Main Branch of the Thames west of Tavistock. Most of this swamp lies in Lot 36 across the north end of the Townships of East and West Zorra. This lot is narrow all the way and comprises only about 120 acres in each concession; it is almost unoccupied and in most cases serves as an adjunct to farms in Lot 35, so that its acquisition should be a relatively easy matter. In addition to the swamp itself, certain rough land and steep slopes, mostly further down stream, have been included and their control by the Authority is considered vital to the maintenance of flow in these two streams. The whole area contains 2,721 acres with 517 acres of woodland, 1,682 acres of open land and 522 acres of scrub land, mostly willow.

(7) The Moraine

The moraine runs in a south-westerly direction from near Harrington West to the Cobble Hills and the word moraine has been used as the name for this area. The country is rough with steep hills; gravelly and sandy areas are separated by stretches of better farmland. The poorer tracts have been included in the area recommended for acquisition and in some cases are separated from each other as shown on the map. The moraine gives rise to many tributary streams in the form of springs and as much of it as is feasible should be under the Authority's control. Altogether there are 3,060 acres of which 776 are woodland, 1,824 are open land, mostly pasture, 435 acres are scrub and 7 acres bog or lake.

(8) Golspie Swamp

The Golspie Swamp covers an area of 900 acres, 463 acres of which are woodland, 286 are open land and 151 acres willow scrub. It lies directly west of Woodstock and

though it feeds a comparatively small stream which enters the South Branch of the Thames a little further down stream it is an important natural water-storage area.

(9) Blandford

The Blandford area is directly east of Woodstock in the Township of Blandford and is made up of imperfectly drained sand near the height of land which contains several small kettles. The land is submarginal due to poor drainage and though the growing of tobacco has been attempted on adjacent land it is at the northern limit of tobacco growing in this region and does not appear to be too successful. The land would be more easily reforested than any other in the Thames Watershed. It includes 1,940 acres with 808 acres of woodland, 860 acres of open land, 223 acres of willow scrub and 49 acres of water in the form of lakes and bog.

(10) Komoka Swamp

The Komoka Swamp is another swamp lying on the height of land. It is the source of a stream flowing north into the Sydenham River, and Crow Creek which drains into the Thames. This has been largely cut over and is now covered, for the most part, with scrub willow and aspen. In 1943 a cyclone blew down many trees, leaving a dense tangle in some parts. The tree species include elm, soft maple, white pine, white cedar and aspen, with red oak on the sandy land to the south, and white oak on the clay to the north. This has been a most important natural water-storage area and was for years a favourite haunt of naturalists, particularly ornithologists, in the London area before draining and clearing changed the habitat. Some tobacco growing and small market garden development are being attempted on adjacent land but most of the open land is suitable only for reforestation. The area includes 663 acres of which 227 are wooded, 262 are open land and 174 acres are willow scrub.

(11) North Dorchester Swamp

This is a swamp lying north of the Thames River which furnishes water to a small stream entering the Thames about three miles east of Dorchester Station. It contains 399 acres of woodland, 380 acres of open land and 35 acres of willow scrub.

(12) South Dorchester Swamp

Though this swamp is drained by a very short stream named Dorchester Creek it is the second largest water-storage area in the watershed and contains a greater number of tree species than the Ellice Swamp which exceeds it in area. It lies among the hills of the southern till moraine and is fed by numerous springs which rise on their slopes. The cover is mostly mixed woods, though areas of soft maple and white elm do occur. The County of Middlesex acquired the south half of Lot 13, Con. 1, of Dorchester North Township as the nucleus of a county forest in this area in 1945.

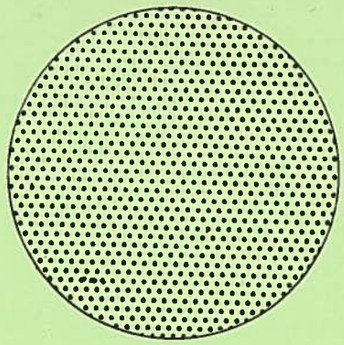
Included in the area are 1,253 acres with 890 acres wooded, 294 open land, 68 acres of scrub and 1 acre of water.

(13) Foster, Beattie and Dingman Lakes

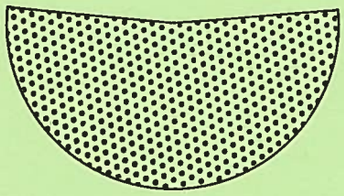
These lakes or ponds are the headwaters of Dingman's Creek which drains approximately 100 square miles south of the city of London. The preservation of forest cover on the land surrounding them is considered to be essential to the maintenance of good flow. These tracts, recommended for acquisition, contain 479 acres with 146 acres of woodland, 238 acres of open land, 28 acres of willow scrub and 67 acres of bog and lake.

(14) Ingersoll Swamp

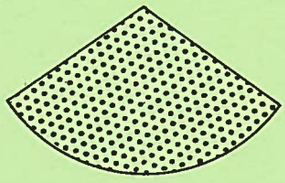
This is a small swamp containing many small springs which supply the reservoir from which the town of Ingersoll derives its water. This swamp should definitely



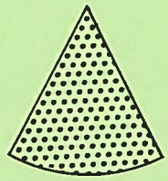
TOTAL
37,500 acres
(100%)



OPEN
19,692 acres
(52.5%)



WOODLAND
11,797 acres
(31.4%)



SCRUB
5,730 acres
(15.3%)

BOG
281 acres
(0.8%)

LAND CLASSIFICATION — AUTHORITY FOREST

INCLUDING LAND ALREADY ACQUIRED

be under public control to assure the maintenance of supply and purity of the water. It embraces 241 acres, 112 acres of which are wooded, 91 acres are open land and 38 acres are willow scrub.

(15) Cedar Creek Swamp

This area comprises 608 acres in all with 264 acres of woodland, 249 acres of open land, 88 acres of willow scrub and a pond of seven acres. It is one of the main sources of water for Cedar Creek and a number of very strong springs arise here. It includes 40 acres of swamp land which were acquired by the City of Woodstock in 1910 to protect its water supply which is piped from here. Considerable reforestation has been done on the land adjoining the swamp and, as the property is situated on the highway, it serves the triple role of conserving water, beautifying the landscape and as a demonstration plantation. The area recommended would take in the whole swamp, the mill pond on Cedar Creek, some of the surrounding dry land from which the springs flow and the natural storage basin for the waters of the creek.

Restoration of the forest cover to the land in all these areas would not only serve to protect them, slowing down run-off from the slopes and holding water in the natural water-storage areas of the swamps, but it would greatly improve the economy of the whole region by growing timber on land which is otherwise largely unproductive, thus providing work for the local people.

2. Other Forest Tracts

In addition to the fifteen major source areas there is a large number of small isolated tracts similar to those constituting the Oxford County Forest where the land is submarginal. These could and should be taken up as they become available and included as parts of either the Authority or county forests. They are shown on the Forestry map dis-

tributed throughout the watershed. Many embrace no more than 100 acres but in the aggregate make up a considerable acreage of potential woodland which should materially improve water relationships in the watershed. These tracts total 18,906 acres in area with 4,139 acres of woodland, 11,921 acres of open land, 2,779 acres of scrub and 67 acres of marsh.

3. Scrub Land

The total area of scrub land on the Upper Thames Watershed is 20,876 acres of which 12,575 acres are dry scrub and 8,292 are wet scrub. In other words one acre in every forty is scrub land and absolutely non-productive. This is in the centre of the most highly productive agricultural area of Southern Ontario.

Scrub land has been placed in two categories: dry-sited scrub which includes such species as hawthorn, apple, sumach and witch hazel, and wet-sited scrub - willow, dogwood and alder. Dry-sited scrub land is usually land which has been overgrazed and neglected for many years. The soil may be unsuited to agriculture because of poor quality, excessive steepness or inaccessibility. On the other hand it may be fairly good farmland which the owner has not been able or willing to maintain in good pasture so that shrubs whose seeds are spread by birds and which are unpalatable to cattle have taken over the area.

Wet-sited scrub land is land with imperfect drainage, often bordering swamps. The bush has been cleared from it but the subsequent pasture has been so poor that shrubs such as willow and dogwood, which require a damp site, have invaded the area.

Frequently scrub areas of these two types are only suitable for trees. They should be reforested and the acquisition of some of them by the Authority has been recommended. The wet-site areas present a problem in planting, and research should be undertaken to determine the best

In the Upper Thames Watershed two and a half per cent of the area or one acre in every forty is covered with scrub growth.

In a very few years these become "jungles" where not even trees can secure a foothold. The owner must decide whether he is prepared to clear the area or kill the scrub and plant trees to smother it.

method of handling them. There appears to be a natural succession from neglected pasture land, through willow scrub, trembling aspen, white elm and black ash to the climax types of silver maple - white elm or black ash - white elm - red maple, and every effort should be made to determine the best method of speeding up this succession.

In addition to the larger areas there are innumerable smaller areas forming parts of farms which will always be in private hands. The aggregate effect of this on stream flow is very considerable. The scrub areas of this type are shown on the forest map and the moraines and glacio-fluvial material are defined on the soil maps. These should be planted with trees to form part of the farm woodlots where they occur. Many of them should be placed under a reforest-ation and controlled woodlot scheme by agreement with the Authority, especially where they cover the sources of streams. Under this scheme the owner would get considerable help from the Authority in the establishment and maintenance of the woods, but would not be permitted to cut them indiscriminately. (See Controlled Woodlot Management)

4. Controlled Woodlot Management

Before the necessary conservation measures on that part of the watershed exclusive of the proposed Thames Forest can be properly co-ordinated, some system of controlled cutting of privately owned woodlots must be established. The reason for this is that the average owner does not take a broad view of the value of forest cover and is not interested to any great extent in what may happen to land or stream flow off his property. The result is that throughout the water-shed there is a systematic cutting of woodlots for the purposes of lumber and firewood. The type of cutting has been in progress for many years, and the portable sawmill has done a great deal of damage in removing, particularly, young, thrifty trees. The system of selling acre or half-acre

blocks of timber for fuelwood is also another vicious practice, for the reason that when a purchaser buys such a block, in nearly every case he clean-cuts every tree which can be used, down to the minimum diameter limit. Some system of regulating cutting would correct this situation and certainly the areas which are connected in any way with the headwaters of streams, or the feeding of springs, should be comtrolled to the extent that they cannot be clean-cut.

Where conditions warrant, cutting would be continued, but should be controlled by agreement with the Authority and only such trees as are marked by a competent person should be cut. Provision should be made for re-stocking, where necessary, the intention being to interfere as little as possible with the economy of farm property where the supply of wood is concerned. County by-laws restricting cutting passed under The Trees Act do not prevent an owner from clear-cutting any area if the wood is for his own use.

For many years now conservationists have advocated controlled cutting of woodlots. In some sections, particularly in tobacco-growing counties such as Norfolk County, the destruction of woodlots for the curing of tobacco has become alarming. It is admitted that the question re-quires delicate handling, but where the good of the whole community is envisaged some middle road of agreement could be arrived at. Furthermore, the distribution of free trees by the government for conservation purposes is sometimes criticized, and rightly so, where on one farm the owner plants an area with seedlings and in the same year his neighbour clean-cuts a woodlot which perhaps protects the headwaters of a stream. In fact, so distorted is the relative value of plantations versus established woodlots in the minds of some people that there are examples on record where municipalities have purchased land for reforestation and have allowed the owner to cut the timber before giving title.

It is admitted, of course, that there are extenuating circumstances when a farmer may consider it necessary to raise money by selling timber. This in itself is not so serious if the cutting is done in such a way that the benefits of the forest are retained. Young forests, as well as old, protect the soil and have water-regulating value.

The basis on which a regulation of this kind should be carried out is a consideration of the woodlot concerned. To make a blanket ruling that all woodlots on the Thames should not be cut, or should come under one type of control measure, would not work to the best advantage of the community and certainly would not be in the interests of good forestry.

Some woodlots have reached the stage at which they are worn out and if the land is good should be cleared off and cropped. Others may be composed of a high percentage of worthless species and have no relation to water regulation in the countryside, and likewise could be disposed of to advantage. But where the woodland has a direct bearing on water regulation, erosion, retarding of the wind and similar benefits, the desire of the individual should be sacrificed for the good of the community. The whole question, therefore, resolves itself into an examination of each woodlot by a competent person, and the prescribing of a program of management to suit each case.

5. Fencing Woodlots From Cattle

The most progressive forestry action taken in Southern Ontario in recent years was taken by the County of Halton in 1948 when the County Council passed a by-law to aid farmers in fencing their woodlots from livestock.

The by-law states that the County of Halton will grant a sum equal to the prevailing cost price of 8-strand fence wire with a single barb (not the cost of posts or labour) to a woodlot owner who will erect such a fence on one or more sides of his woodlot in order to completely enclose the woodlot, thus fostering forest growth by keeping

This beech-sugar maple woodlot is heavily grazed and all regeneration as well as the natural covering of the forest floor has been destroyed.

Natural regeneration can be secured by fencing the area from cattle and breaking the sod cover by discing in the fall before the trees seed.

COUNTY BY-LAWS RESTRICTING THE CUTTING OF TREES
UNDER THE TREES ACT

County	Date Passed	Diameter Limit (inches)	
		Cedar & Certain Species	Most Species
BRANT	Nov. 2/48	5	14 Stump 18"
BRUCE [1,2]	Jan. 23/48	6	12 Stump 18"
DUFFERIN [3]	Nov. 28/47	5	12 Stump 18"
DURHAM [4]	June 12/47	5	10 D.B.H.
ELGIN [5]	Jan. 24/47	5	12 D.B.H.
GREY [2] (except Keppel Tp.)	June 27/47	6	12 Stump 18"
HALDIMAND [2,6]	May 13/49	6	14 Stump 18"
HALTON	Apr. 15/47	7	14 Stump 18"
HURON	Nov. 21/46	5	12 D.B.H.
LAMBTON	June 12/48	7	12 Stump 18"
LEEDS/GRENVILLE [7]	June 21/47	0	0
MIDDLESEX	Mar. 12/47	6	14 Stump 18"
NORFOLK	Jan. 23/47	6	14 Stump 18"
OXFORD	Sept.13/46	5	12 D.B.H.
PERTH	Jan. 25/47	5	16 D.B.H.
WATERLOO	Oct. 23/46	5	14 D.B.H.
WELLINGTON	June 15/46	5	12 D.B.H.
WENTWORTH	May 12/49	6	14 Stump 18"
YORK [8]	Nov. 18/49	0	14 D.B.H.

D.B.H. is diameter breast high or 4½ feet above ground.

1. Limits apply only in the south half of Bruce County.
2. Bruce, Grey and Haldimand also have an 8-inch limit for poplar and birch.
3. Dufferin has a 10-inch limit on basswood.
4. Durham also has a 5-inch limit for birch, black locust, black ash, soft maple, tamarack and willow.
5. Elgin has a 5-inch limit for black locust.
6. Haldimand also has the following: 8-inch limit on cherry, 10-inch limit on birch, 12-inch on basswood, chestnut, coffee, cucumber, gum, hackberry, sycamore, hemlock and tulip.
7. Leeds and Grenville have imposed no limit and the by-law is almost worthless from a forestry point of view.
8. York has no limit on poplar, Manitoba maple, black locust, tamarack, white birch and willow.

livestock out. The woodlot must be of a size not less than two acres and livestock must be excluded for a minimum period of ten years.

Such action by the County Council is of infinitely more value than the planting of many millions of trees artificially. Every county should pass such a by-law and it is recommended that the Conservation Authority adopt a similar scheme.

6. Diameter Limits

The basic method of control usually advocated is cutting to a diameter limit; that is, that all trees below a certain diameter - for example, ten inches - should not be cut. Such a regulation may or may not be good forestry. In most cases it would not be because there would be much worthless material below this diameter limit, such as poplar, thorn, willow and other species, which should be taken out. At the same time there would be certain large trees above the diameter limit which should be left for the benefit of the forest, as well as trees suitable for reseeding the area. The diameter limit should not be a fixed rule but simply a guiding principle; a sort of yardstick on which the landowner can base his calculations. In an area the size of the Thames Watershed a program of individual woodlot examination should not be too heavy a burden on the Conservation Authority.

Nineteen counties, including the three covering the Upper Thames Watershed, have passed by-laws under The Trees Act (R.S.O. 1950 c. 399) which empowers a county council to pass by-laws restricting and regulating the cutting of trees. In each case the by-law has fixed minimum diameter limits below which trees may not be cut except in special circumstances. The object of this is to prevent the cutting of trees at the time when they are putting on their greatest diameter growth. These limits are usually 5 or 6 inches for white cedar, red cedar and black locust and range from 10

Clear cutting of woodlots as practised in the past created non-productive weed patches.

Similar areas cut under the diameter limit by-laws of the counties soon regenerate themselves if cattle are excluded.

inches to 16 inches in the various counties for all other species. The limits which have been set are actually far too low for the final crop trees as most trees are making their maximum diameter growth after they reach 18 inches in diameter, but it is an elementary step in the right direction. Every county should have restrictions of this type and it is recommended that similar powers be extended to Conservation Authorities as a means of protecting existing woodland on their watersheds.

7. Forest Fire Protection in Southern Ontario

The task of protecting woodlands from fire in Southern Ontario presents a very different problem, or rather series of problems, from those of Northern Ontario, and consequently must be handled in a somewhat different manner. Though fire is a serious question on the Thames Watershed only in certain areas such as the Ellice Swamp, it is a question to which some attention should be given.

Northern Ontario is predominantly forest land, the population is sparse, parties travelling through the forested areas are fairly readily accounted for by means of a permit system during the fire season, and watch is maintained for fire by means of look-out towers and air patrol.

In Southern Ontario south of the Laurentian Shield the land is normally potential agricultural land with the woodland surviving in isolated patches as farm woodlots or in larger more or less continuous blocks of swamp or sand up to ten thousand acres in extent. The population is, relatively speaking, fairly dense, no part of any woodland is more than two miles from the nearest human habitation and most roads are travelled by a comparatively large number of people.

In spite of the publicity given to the damage caused by fire the average person does not realize how serious this is. Though he may know that young growth and small trees

are burned by surface fires he does not realize the extent of the less obvious damage such as the destruction of humus which itself preserves the condition and water-retaining capacity of the soil. When the humus and ground cover are destroyed the sun and dry winds remove the moisture required for tree growth and plant nutrients are destroyed. The heat of the fire also injures the growing tissue inside the bark of older trees which are not actually burned, exposing the wood to attack by insects and fungi. Even though through time the wounds may be completely healed, the damage shows up as defects when the tree is cut for lumber.

Many farmers in Southern Ontario are so completely unaware of, or indifferent to, the damaging effects of fire that they deliberately set fire in peat land to burn off the peat, starting fires which it is next to impossible to extinguish. Such fires burn for months, even under the snow, destroying many acres of woodland every year, not only on the land of the person setting the fire but frequently spreading over land adjacent to it.

The first step in fire control is fire prevention, and the best assurance of prevention is an enlightened public opinion which will make every member of the rural community conscious of the seriousness of fire damage and of his duty as a citizen to do all he can to prevent it. The farmer can prevent most fires in farm woodlots if he exercises the same care that he does around his home and buildings.

Experience in the United States has shown that the most effective fire protective systems in rural districts are those set up under a state organization with local wardens appointed by the state forester on the recommendation of the local town[1] councils. In the rural parts of the state of Maine each town appoints its own fire wardens who handle fire protection in the town quite independently of other towns. This means there is a lack of co-operation between towns, wardens receive little practical training, organization is

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1. The "town" in the Eastern United States corresponds closely to the township in Canada.

loose, and as wardens hold office at the pleasure of the town council there is a serious lack of continuity in administration.

In New Hampshire and Vermont wardens are appointed by the state forester on the recommendation of the council and in Vermont they serve until they resign or are removed for cause by the state forester.

Mr. H. H. Chapman, writing in the Journal of Forestry, states [1]: "It is not unreasonable to conclude that the ratio of 34 to 1 in damage per acre of woodland between these two states (Maine and New Hampshire) is the direct consequence of Maine's failure to depart from the 'fire bucket' principle of town organization".

From the evidence collected in the northern states of the United States, where conditions most nearly approximate those of rural Southern Ontario, it is apparent that the most effective fire protective systems are those set up under the following conditions:

(a) Where the system is organized under the direction and control of the state forester and the wardens in each town are appointed by him on the recommendation of the local council.

(b) Where wardens paid an annual retainer are actual residents in the locality. Usually they are farmers who have had practical instruction in fighting fire. They have the power to call out other local residents to help in firefighting and maintain a store of firefighting tools on their premises.

(c) Where the warden is assisted in his work by all members of the community. That is, his address and telephone number are known to everyone and fires are reported to him immediately.

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1. Journal of Forestry, Vol. 47, No. 2, 1949.

(d) Where designated members of the community know that they are likely to be called on to fight fire and are paid so much per hour for the time they are so employed.

(e) Where every resident is thoroughly fire-conscious and realizes that loss of timber by fire is a loss to the whole community, and considers it his duty to prevent, report and fight fire.

(f) Where fires for burning brush and rubbish may be set only after a permit has been obtained from the local firewarden.

CHAPTER 6

FOREST INSECTS AND DISEASES

1. Forest Insects

In any project, such as that proposed for the Thames Watershed, careful consideration should be given to the prevention of insect outbreaks and adequate arrangements made for the immediate application of control measures when these become necessary. While it is not possible to predict accurately the course insects may take under the ever-changing conditions of a newly forested area, there are a number of fundamental principles which, if applied, will greatly lessen their destructiveness.

It is important to avoid the planting of large areas of one kind of tree, otherwise conditions will be ideal for an outbreak of abnormal numbers of some insects which prefer the food afforded by that particular host. It is preferable to plant in blocks, the blocks distributed so that trees of one species are separated by blocks of different tree species. This tends to keep outbreaks localized until natural agencies bring them under control and facilitates direct control measures if such become necessary.

It is important to plant only the species of trees suitable to the site and existing growing conditions. Healthy, vigorous trees are certainly more resistant to insect attack than weak, struggling ones.

Over-mature and dead trees should be removed from the existing stands as these harbour bark-beetles and wood-boring insects which may become excessively abundant and attack healthy adjacent trees.

Care should be exercised to prevent ground fires. Even light ground fires are frequently followed by severe outbreaks of bark-beetles and wood-boring insects.

Woodcutting operations, sawmill sites and wood storage yards should be carefully supervised or they may become reservoirs of infestations.

It is essential that surveys for insect conditions be made each year so that any abnormal increase in insect populations may be noted and control operations initiated before they develop to outbreak proportions. Serious and widespread outbreaks are frequently prevented by prompt and well-timed spraying operations over a comparatively small area. It is therefore necessary that spraying equipment be available and that laneways be maintained within the plantations for spraying purposes. Outbreaks of an extensive nature can generally be brought under effective control by strip spraying. In this method, alternate strips of trees in large plantations are sprayed, thus reducing the initial infestation and at the same time causing the native parasites to concentrate and build up in the unsprayed portions. This reduces spraying operations and the number of lanes required for the passage of spraying equipment.

Owing to the danger of injury by the white pine weevil, white pine should not be planted in pure stands unless the stands are very densely stocked in a good site. It is better to grow white pine in mixture with some immune species such as the better hardwoods. The protecting species should be taller than the white pine, at least in the early years.

In conclusion, it should be recognized that protection against leaf-feeding insects is very desirable since defoliation of a tree weakens it and thus makes it more susceptible to attack by bark-beetles and wood-boring insects as well as by organisms which do not usually attack healthy trees but which will hasten the death of weakened trees. Leaf-feeding insects alone may kill a thrifty, broad-leaved deciduous tree by completely defoliating it for three years in succession. Conifers, however, are usually killed as a result of one complete defoliation.

2. Tree Diseases

Productive woodlands require protection against fire, trespass, grazing animals and rodents, insects and

This is a sweet chestnut log near Lakeside. The Chinese chestnut blight wiped out this species some years ago and now only fence rails and a few sickly suckers remain.

Tree diseases may do considerable damage in woods which are not maintained in a sanitary condition by the removal of diseased trees. These trees are infected with the poplar canker.

disease. Protection is a part of forest management, and under a policy of sustained yield will be maintained in continuity. Good forest management is reflected in the health of the woods and, conversely, damage on account of disease is often a sign of mismanagement or neglect. In general, an objective of maximum yield, with attendant intensive silviculture, is compatible with, and often facilitates, protection and disease control.

For the purpose of discussing their pathology and protection, the hardwoods may be considered separately from pine in natural stands or plantations. The chief diseases of the hardwoods are the various trunk, butt and root rots, and chronic stem cankers, which are all endemic and may cause serious damage under aggravating conditions. Woodlots on the Thames Watershed present very diverse conditions with respect to the incidence of these diseases, a circumstance which is usually related to their past history. Thus many containing old timber are in need of heavy preliminary salvage and sanitation cuttings as a result of mismanagement or neglect. Such cuttings should precede or be combined with cleanings and improvement cuttings, designed to improve the composition and structure of the stands. Having established a sanitary condition, normal care should maintain it and obviate loss on account of decay.

The wood rots are commonly thought of as diseases of mature and over-mature timber, but experience has shown that infection may occur at a very early age. In hardwood sprouts the stem may be infected from the parent stump. In older trees infection is chiefly through wounds, either of the root or trunk, which may be caused by fire, trampling by animals, insects, meteorological agencies, or by carelessness or accident in felling and other woods operations.

Hardwoods are commonly cut selectively and not infrequently in clear fellings. Few foresters will approve the latter system, which is in fact often intended as a liquidation of the property. A system based on yearly selection,

or frequent periodic return to conveniently planned subdivisions, has obvious advantages for small woods, and is well adapted to the control of decay.

For many reasons "cleanings" in the reproduction are desirable, especially where the woods have been heavily cut. While favouring the valuable species, those sprouts which, on account of decay hazard, are of undesirable origin should be eliminated. Such will comprise sprouts from the larger stumps and those from above-ground position.

In harvest cuttings, which should recur at frequent intervals, the permissible volume allotted should include trees in which incipient decay is discovered and so far as possible those which have become a poor risk through injury or other circumstances.

White pine is found in young plantations and in natural stands, almost pure or mixed with hardwoods. From the latter stands it tends to disappear on account of hardwood competition, except on sites which are particularly favourable for its reproduction. The white pine blister rust, which with the well known shoot weevil is a principal enemy of the species, is a factor contributing towards the elimination of seedlings and young trees.

White pine should be encouraged on those sites which are naturally suited to its reproduction so that fairly compact growth may be secured, thereby facilitating the protection problem. It is an important and valuable species in Southern Ontario, and its cultivation should be promoted by the institution of effective blister rust control facilities.

CHAPTER 7

LAND ACQUISITION

The problem of land acquisition in any part of agricultural Ontario, where practically all the land is privately owned, is one which requires careful approach. The ownership and use of land, especially for agricultural purposes, is considered by most citizens as one of their few remaining inalienable rights. However, where the good of the whole community is under consideration, such personal rights should be, and have been, overruled under the principle of eminent domain. Examples of such cases are the building of highways, the construction of power lines, and the acquiring of land for military purposes in the event of a national emergency.

In Southern Ontario compulsion has not been exercised to any great extent by the Government in planning proper land use schemes. But who would gainsay the fact that the acquiring of poor land on the Upper Thames Watershed for conservation purposes constitutes a national emergency, and therefore requires a more permanent authority than the individual to bring it back to its proper use.

However, in dealing with land acquisition it should not be the desire of any authority to approach the problem in a dictatorial manner. It will require careful handling, and as a preliminary step in such work the people of the area should be acquainted with the purpose of the scheme, its ultimate benefits to the community, and by explanation and demonstration be gradually brought to the point where they will be glad to co-operate.

The only part of the Upper Thames where large-scale transfers of property from private ownership to a forest authority would have to be made is in those areas which are recommended for acquisition because they are natural water-storage areas.

1. Methods of Acquiring Land

There are several ways in which land can be acquired and controlled for conservation purposes, and it is proposed to enumerate and discuss these briefly in this section.

(a) Transfer by Private Sale

The most satisfactory method of acquiring land is by private sale between the Conservation Authority concerned and the landowner. This method has been followed by the counties of Ontario in purchasing land for reforestation work in building up the system of county forests, which totals in round figures 65,000 acres. This method has its drawbacks, however, as individuals who have not the community's welfare at heart, or for one reason or another have an exaggerated idea of the value of their property, may block the completion of a unified area by refusing to sell. This was overcome in the State of New York, which has purchased over 450,000 acres of land for reforestation, by refusing to buy individual parcels of land unless there was a sufficient number in a group to make a contiguous block of 500 acres.

(b) Maximum Price per Acre

Another method which has been used has been to fix a maximum price per acre for this class of land, beyond which the forest authority is prohibited to go, allowance being made for the presence of good fencing and buildings on the properties, which in some cases have been removed by the vendors and allowed as part payment for the land.

(c) Agreements

Where owners of property prefer to retain their woodlot, or where parts of farms fall within the forest area prescribed, and providing the retaining of ownership does not jeopardize the complete conservation scheme, agreements could be made for the control and

management of such areas.

This method has been adopted by the Dominion Forest Service in Nova Scotia, where it has been desirable to control wooded areas for experimental and conservation schemes, and in this particular case the agreements cover a period of twenty years.

In Ontario there is one example, at least, where a municipality leased a part of a farm for reforestation work for fifty years, and one United Counties council has adopted the plan of taking easements on land for the same purpose.

(d) Control by Existing Legislation

Under the authority of the Private Forest Reserves Act (R.S.O. 1950, Chapter 288), the Minister of Lands and Forests, on recommendation to the Lieutenant-Governor in Council, may, with the consent of the owner of any land covered with forest or suitable for reforestation, declare such an area to be a private forest reserve. When such an arrangement is made the Minister or his representative may reforest such areas, supervise the improving and cutting, and prohibit the removal of trees by the owner without his consent, and also prohibit the grazing of the area by cattle.

(e) Life Lease

Many of the farms on the proposed forest, as already mentioned, are of low agricultural worth and are supporting families at the present time. The problem in such cases is not so much the purchase of the property as what will become of the family after the farm is acquired. In almost every case it would be impossible for the vendor to purchase another farm with the money he receives, except one which is of approximately the same value outside the forest. In some cases such farms are occupied by older people whose families have grown up and left the community. The removal of these from their properties might work undue hardships on them, and in fact in some cases they might be-

come a burden on the municipality. With some of these the plan of giving the vendor a life lease would be sufficient. In most cases such old people make little attempt at farming the whole property, but require only sufficient pasture for a cow or two, enough land for a garden, the house and buildings, and a supply of fuelwood. The plan of giving a life lease has been adopted in the case of two properties,[1] at least, on the county forests in Ontario, and has proved satisfactory to both contracting parties.

(f) Tax Delinquent Land

Under the Statutes of the Province of Ontario,[2] land which becomes tax delinquent is sold by the County Treasurer. In the case of a farm this is not done in practice until the land has been in default for three, or in some cases four, years. Even then the owner has the privilege of redeeming his property within a year. Where such lands are marginal or submarginal, they are sometimes bought for only a part of the area which is of special value, such as woodland, old buildings, or a good field or two. In some instances the poor land remains idle and frequently appears again at the tax sale. The fact that such land becomes tax delinquent is an indication in many cases that its ultimate use is forestry. Under the present Statutes the municipalities are not permitted, at the first sale at least, to acquire or reserve such land for conservation purposes. Consequently this report recommends that the Authority expropriate all tax delinquent land subject to the regulations of the Municipal Act.

(g) Expropriation

As a last resort in land purchases, or where the owners of abandoned land cannot be located, such areas can be acquired by expropriation. The Conservation Authorities Act, R.S.O. 1950, Chapter 62, Section 15 states:

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1. Northumberland Forest and Angus Forest.

2. The Assessment Act, R.S.O. 1950, c. 24, s. 143.

"For the purpose of carrying out a scheme an authority shall have the power to purchase or acquire and without the consent of the owner enter upon, take and expropriate any land which it may require and sell or otherwise deal with such land or other property."

Also under The Forestry Act (R.S.O. 1950, Chapter 147, Section 13) provision is made for the removal of settlers from lands unsuitable for farming. To quote: "Whenever in the opinion of the Minister, it is found that settlement has taken place on lands not suitable for agricultural purposes, and which said lands are required for forestry purposes, the Minister shall have the power to make arrangements for the removal of such settlers upon such terms as may be agreed upon."

As a matter of general interest, it should be stated that this Act also provides for the power to close the roads on lands taken over for forestry purposes, the setting apart of lands for settlement, and the removing of settlers from lands unsuitable for farming. It should also include, however, provision for acquiring permanent or community pastures, and pondage areas where these are required, as an integral part of a large conservation project.

2. Cost of Land in the Proposed Authority Forest

It would be impossible to give an accurate figure for the total purchase price of all land in the proposed forest without consulting the owners of the individual parcels. However, as an indication for arriving at the approximate cost the amounts paid by the several Conservation Authorities of the Province in purchasing land for their forests will serve as a guide.

TABLE SHOWING COSTS OF LAND PURCHASED FOR FORESTS

Name of Authority Forest	Acres	Cost $	Cost per Acre $
Ausable	634	12,700.00	20.03
Ganaraska	3,253	22,078.00	6.78
Humber	411	11,795.00	28.70
Thames	1,980	10,870.17	5.49
Total	6,278	57,443.17	9.15

It should be pointed out that land acquired in the future by the Ganaraska Authority is likely to cost more than the average price per acre of $6.78 because most of the poorest denuded land has now been taken up and the remainder has more woodland and potential woodland which will naturally raise the purchase price. The very low cost of land in the Thames Watershed is explained by the fact that it is mostly burned-over swamp land with a peat soil which is of no economic value at the present time. Actually the average price of $5.49 per acre includes a ditch tax which exists as a lien against part of the property, so that the price of the land itself was closer to $1.00 per acre.

On the Thames Watershed, too, most of the poorest land has now been acquired and the cost of the remainder will certainly be higher. The development of a comprehensive conservation program is a long-term project and it may be fifty years before the Authority has all the land required. The present policy of acquiring and

reforesting some land each year is a sound one, and where the cost of certain areas is too high the Authority can afford to wait, because the land is deteriorating in productiveness through cutting, fire, grazing and neglect and eventually the price must fall too.

CHAPTER 8

SNOW FENCES

In the climate of Southern Ontario snow drifting may cause much inconvenience and sometimes hardship. Control can be readily effected by means of windbreaks and is dependent on proper placing with reference to lanes of travel and topographic features.

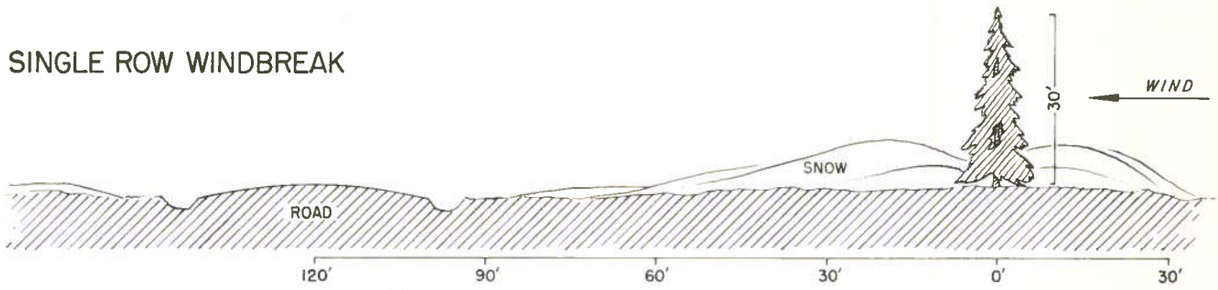
Where space is limited or land valuable lath or board fences are frequently used, but the cost of erection, removal or maintenance of these can be materially reduced by using trees as permanent windbreaks or shelterbelts. One or two rows of trees are usually referred to as a windbreak and more than two rows as a shelterbelt. The latter is preferable if space permits as it gives better and more permanent protection.

The prevailing winds in Southern Ontario are generally from the west so protection is usually required on the west side of north-south roads, on the north-west side of northeast-southwest roads, on the south-west side of northwest-southeast roads and on the north side of east-west roads.

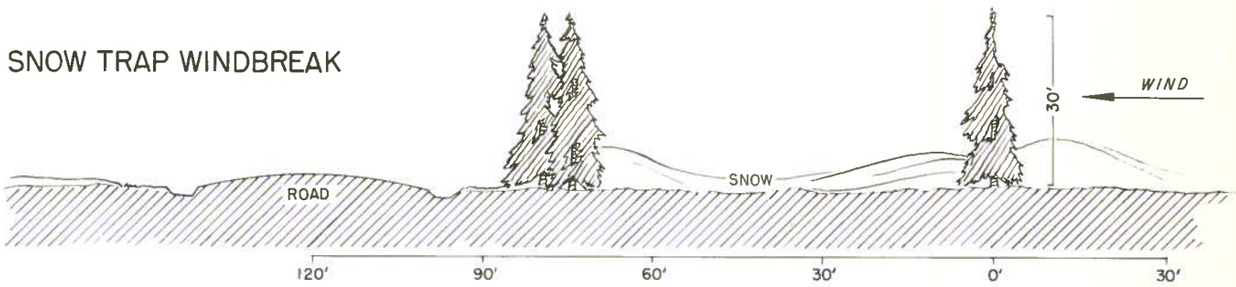
The object of a snow fence is to mechanically reduce wind velocity near the ground in such a manner as to cause a drift to form where it will be least harmful. The reduction in velocity creates two pools of relatively calm air, a small one on the windward side and a much larger one on the leeward side, and it is here that drifts form, leaving the area further to the leeward free of drifts and comparatively free of snow. The deepest part of the calm pool is close to the windbreak; if the windbreak is open at the bottom - that is, composed of trees with few or no branches near the ground - the deepest part will move further to leeward. As winds become stronger both the depth expressed in terms of velocity reduction and the width of the pool on the leeward side will increase and the centre will tend to move further away from the windbreak.

SNOW FENCES

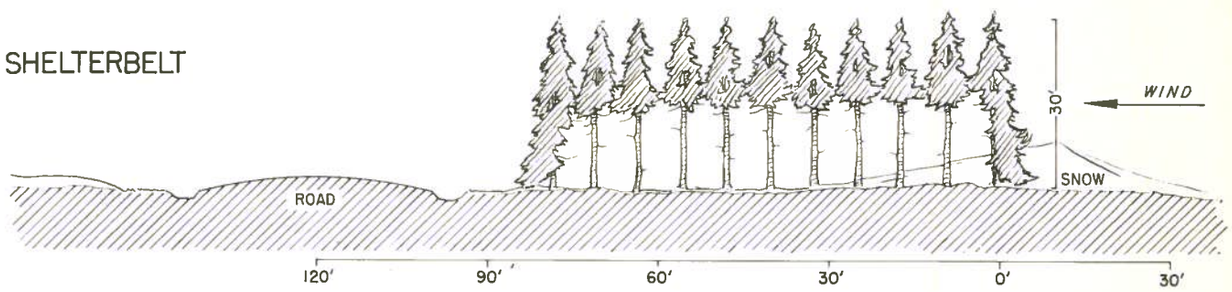
SINGLE ROW WINDBREAK



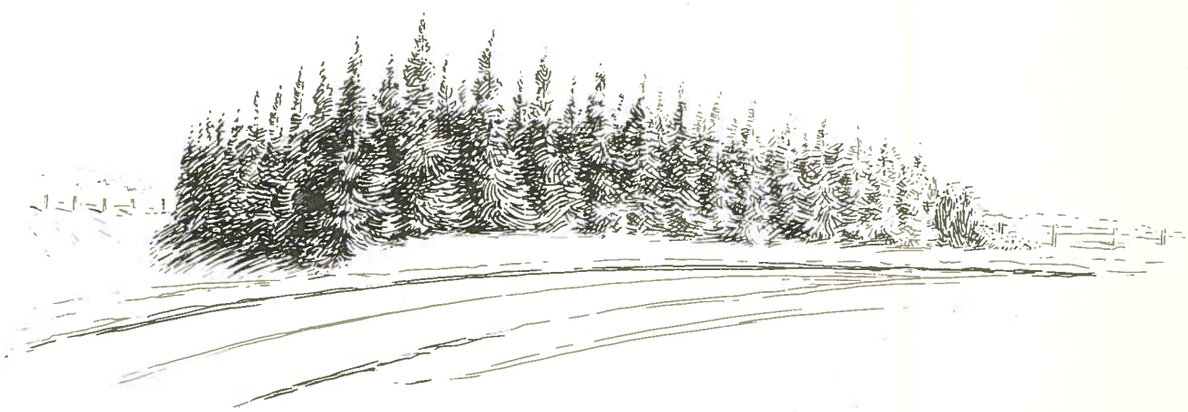
SNOW TRAP WINDBREAK



SHELTERBELT



CROSS SECTIONS OF ROAD AND SNOW FENCES



Two methods of preventing drifts at the ends— left end of shelterbelt terminates at a hollow, right end is tapered down to the ground.

A single row of trees, unless it is a dense coniferous type, is seldom dense enough to completely stop winter wind and may create drifts, just as poor placement of windbreaks may accentuate drifting conditions.

A wide belt of trees which will accumulate a large drift of snow on its windward side may be planted right to the edge of the road, the windward edge extending back a distance equal to three or four times the height of the trees and generally at least 100 feet.

In some places the snow trap type of windbreak is effectively used. It is composed of one or more rows of trees close to the road with a wide opening to windward and then a single row of trees. The single row arrests the first force of the wind and the snow is deposited in the opening. This has the advantage of requiring fewer trees than the shelterbelt and leaving the ground between open for cultivation in summer.

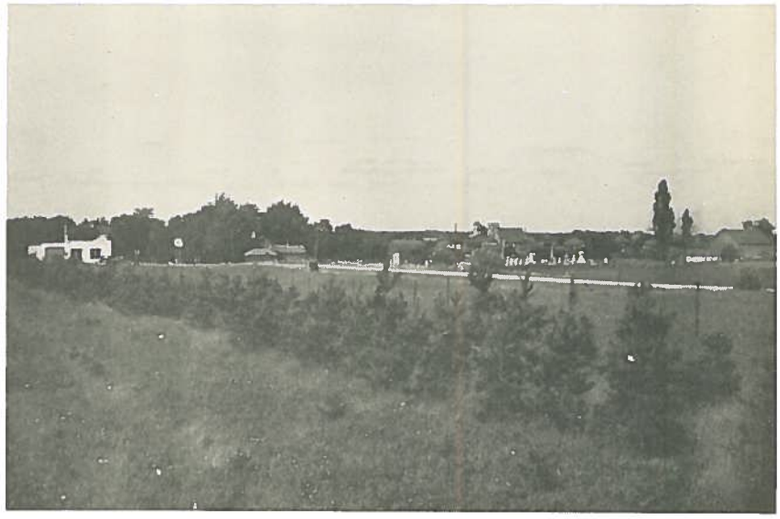
Any prejudice which may exist against windbreaks for protection against drifting snow on roads arises from poor or poorly placed windbreaks. If a windbreak has openings in it or if it ends abruptly streamer drifts will form. Windbreaks should be kept dense and tapered down at the ends by using progressively smaller species of trees and shrubs to prevent the formation of streamer drifts.

Trees are being used successfully as snow fences in Ontario by the Department of Highways, by railways and by a number of counties.

The practice of the Department is to acquire the land by purchase to a width of 100 feet from the centre line of the pavement and plant a three-row windbreak 80 feet from the centre line. The land is ploughed and cultivated and bushy stock about 2 feet high is used. Weeds are kept mowed between the rows and on the open strip between the windbreak and the pavement, which entails a lot of work on the part of maintenance crews in summer. The windbreaks are kept

Highway Protected by Woodland: The protection afforded the highway by trees is well illustrated here. Note how the stretches of road sheltered by woodlots are clear of snow whereas huge drifts have formed opposite the open fields.

Poorly Placed Windbreak: This windbreak, poorly placed with respect to the highway, has created drifts across the public road.



Waterloo County Shelterbelt — Linwood: A twelve rod strip west of the road has been acquired and the six rod strip farthest from the road planted. The remainder will be planted when the original trees are larger.

Weeds must be mowed for a few years until the trees are large enough to shade them out.

down to a height of 7 feet, partly because many farmers object to their view of the highway being obstructed and also because they are proud of their herds and fields which they want to be visible to passers-by. Also cutting the tops off the trees reduces the temptation, which some persons find irresistible, to cut them for Christmas trees.

County practice varies; sometimes the land is purchased, sometimes it is leased and sometimes it is planted by agreement. In all cases the county erects a fence behind the trees. In return for the use of the land one county plants a three-row windbreak around the farm buildings. Waterloo County has planted an excellent shelterbelt over four miles long on the west side of the county road running north through Linwood. Here the county has acquired a twelve-rod strip (198 feet) and planted the six-rod strip farther from the road, leaving the six-rod strip next to the road to catch the drift while the trees are small. When the trees get bigger it is planned to complete the shelterbelt by planting the six-rod strip next to the road. The trees used are transplant stock about one foot high obtained from the Department of Lands and Forests and planted in furrows. Weeds are kept mowed until the trees are large enough to shade them out.

The species of trees used are Scotch, jack, red and white pine, white and Norway spruce and white and red cedar. The Department of Highways uses both white and red cedar, which it obtains from areas where they are growing naturally, as well as some species usually considered as ornamental stock which it grows in its nurseries. These include mugho pine, barberry and Chinese elm. This last is the only hardwood tree used in windbreaks. It grows rapidly and its fine branching system makes it nearly as effective as an evergreen tree. The other common hardwoods such as Carolina poplar, white elm, silver maple and white ash are used fairly extensively in shelterbelts.

Snow fences are usually beneficial to crops in that they hold moisture in the fields in the form of snow in winter and reduce wind velocities and moisture loss by evaporation in summer. Occasionally they do cause ice to form over crops such as fall wheat and may be harmful in this way. The beneficial effects, however, outweigh the harmful ones so considerably that every encouragement should be given to their establishment in place of the removable type of lath fence currently in use.

CHAPTER 9

WINDBREAKS

In the process of clearing land for agriculture woodlots and belts of trees along fence lines have been removed which had served as natural shelterbelts. The restoration of these in the form of windbreaks is essential to a complete conservation program in many parts of Southern Ontario. E. I. McLoughry[1] in referring to Waterloo County states:

> "Forests and windbreaks of the county have been removed to such an extent, and the organic matter removed to such a degree, that soil drifting has become a serious problem in many areas...The policy we recommend in regard to windbreaks is to encourage the planting of desirable trees."

When proper species are used and windbreaks are correctly placed the effects are almost entirely beneficial. The effects may be direct or indirect, but in either case are the result of reduction in wind velocity. The effects of windbreaks on crops and cultivated fields may be listed as follows:

(a) Direct Effects

(1) Wind damage and lodging in small grains and corn is reduced or eliminated.

(2) Snow and the resultant moisture are more evenly distributed over fields, particularly on the higher spots where they are required most.

(3) Wind erosion of the soil is minimized.

(b) Indirect Effects

(1) Moisture loss by evaporation is reduced.

(2) Temperatures in the fields are raised, which may prevent frost damage, accelerate growth and even lengthen the growing season slightly.

(3) Erosion of the soil by water may be reduced by its more even distribution when released from snow.

The benefits of windbreaks to buildings in reducing heat loss in winter have been shown to be considerable.

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1. E.I. McLoughry. Proper Land Use Program of Waterloo County. 1950.

Experiments conducted in the United States proved that more than twice as much heat is lost from a house, per day or per hour, with a wind of 20 m.p.h. as with one of 5 m.p.h., and a windbreak can easily reduce wind velocities in this proportion. Used in this way they can often be made to form an effective background for the house and a protection for farm buildings. Another advantage of windbreaks is that they provide shelter and runways for insectivorous birds and small animals.

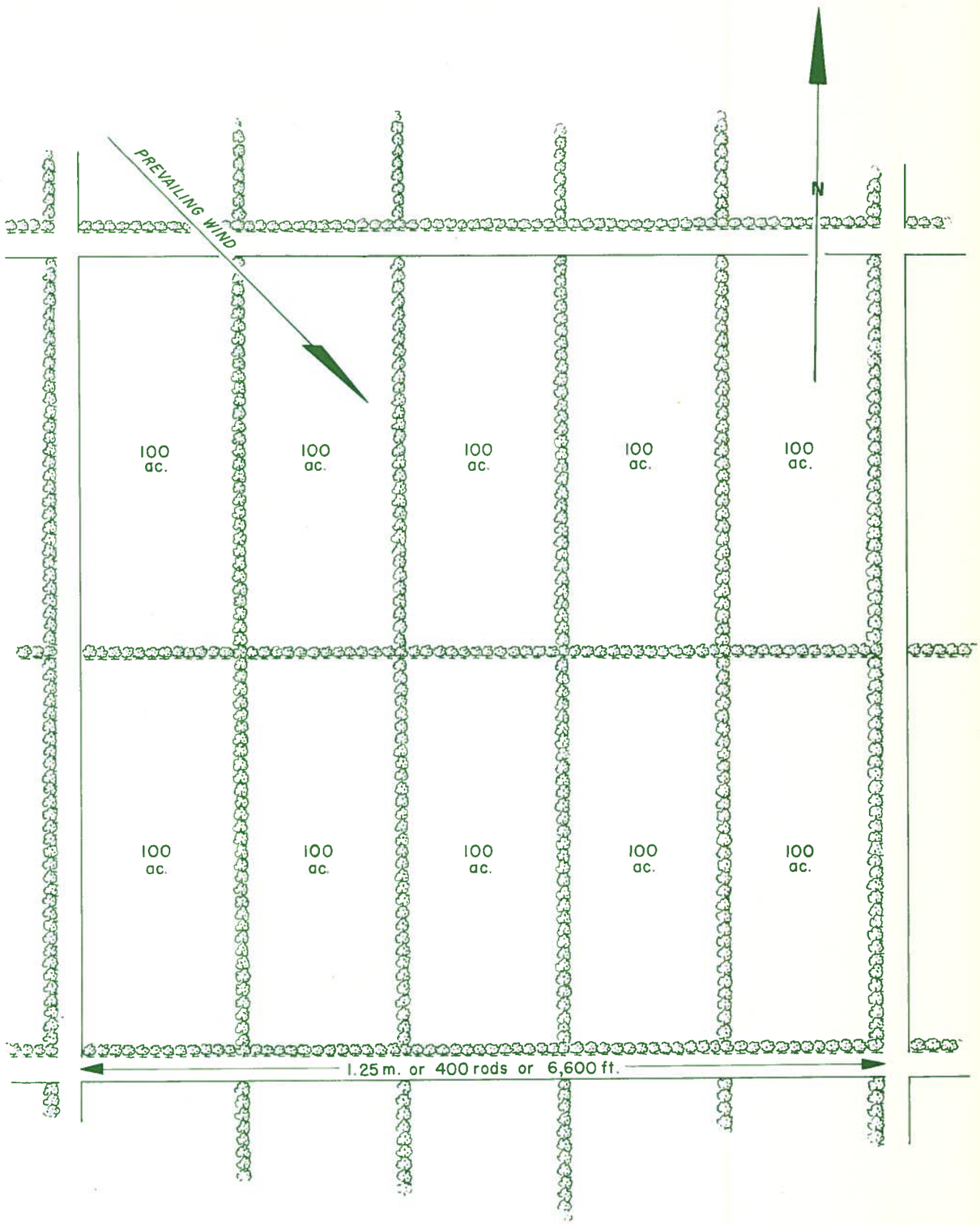
Belts of trees comprising one or two rows are usually called windbreaks, and with more than two rows, shelterbelts. In Southern Ontario windbreaks as a rule give sufficient protection except where wind erosion of soil on rolling land is severe, when shelterbelts may be required. On level land windbreaks may nearly always be established along existing fence lines, but on rolling land consideration should be given to the contour of the land. The prevailing winds in Southern Ontario are generally from the west, so that the greatest protection will be derived from windbreaks on the west side, but the placement of windbreaks on the other three sides as well should be considered.

Both the height of the trees and the wind velocity influence the effective range of a windbreak. An average windbreak will reduce the ground velocity of a 20-mile wind 10 per cent or more for a distance of about 30 times the height of the trees. About one-fourth of this effect will be felt on the windward side of the windbreak and three-fourths on the leeward side. For example, if the trees are 40 feet high the total effective range with a 20-mile wind will be 30 x 40 or 1,200 feet, 300 feet of which will be on the windward side and 900 feet on the leeward side. Generally speaking, the reduction in velocity is greatest close to the windbreak and tapers out to zero further away. With higher wind velocities and/or higher trees the proportionate reduction and the effective range will be greater.

WINDBREAK PLAN

for

1,000 ACRE BLOCK



This plan shows the minimum windbreak requirements for a 1,000 acre block on level land. Woodlots and plantations will replace some of this and placement will have to be adjusted according to topography and soil on rolling land.

A windbreak not only reduces the velocity of wind striking it but also slightly increases the velocity of the wind diverted over, round or through it if there are gaps. The increase in velocity of winds passing over it increases its effectiveness somewhat but the increase in velocity of winds passing round or through it will increase the damage caused. For example, snow drifts will form at these points (see chapter on Snow Fences).

On level land in Southern Ontario windbreaks completely surrounding each farm of 100 acres would normally give adequate protection except for light rolling land and such wind-sensitive crops as tobacco. These should be on the west side of north-south roads, but on east-west roads would have to be carefully placed on the north or south sides, depending on the direction of the local prevailing winds. On land which is not level at least the same proportion of windbreak to area should be provided, but in many cases this would have to be adjusted according to the local topography. That is, the trees should be planted on suitable contours and where hilltops or slopes are eroding badly it will be necessary to establish plantations over a large part of the eroding area. The windbreaks should, of course, be tied in with plantations and existing woodland so that where these exist additional protection would not be required.

Since density, both in winter and summer, is one of the prime requisites of a good windbreak, the conifers in most instances make the best windbreaks. The slower-growing species such as white cedar and spruce give most protection, but the faster-growing ones such as the pines have the advantage of attaining more effective heights in a shorter time. A number of broad-leaved trees have fine, dense branching habits and may be nearly as effective as conifers if the branches are maintained down to the ground; among these may be included sugar maple, Chinese elm and European alder.

A windbreak which has effectively eliminated wind erosion on light land.

Crop shows little loss in size or vigour when planted close to European alder.

This is not the prairie but a windswept, treeless stretch of Perth County.

Contrast this farm home with the house above. The windbreak gives protection, comfort and stability.

European alder is gaining great popularity as a windbreak tree because it is a nitrogen-fixer like the legumes and does not rob the soil to the same extent as non-nitrogen-fixing species. In fact, tobacco is frequently planted close to it with little loss in size or vigour of the plants. As the robbing of the soil is one of the severest criticisms levelled against windbreaks, consideration should also be given to the planting of such leguminous trees as honey locust and caragana on certain sites.

One consideration that should be kept in mind is that under certain circumstances windbreaks may cause air stagnation, which may increase temperature and moisture conditions to a dangerous degree in summer or increase frost damage in spring and fall on small areas, particularly in hollows. Where this is likely to occur, windbreaks should be planted so as to guide the flow of air past such spots. Where these conditions develop after the windbreaks are established they may be relieved by judicious opening up of the windbreaks.

Experience has shown that windbreaks are an asset to any farm, that their adverse effects, if any, are local and easily remedied, and that in many areas they are essential to the control of soil erosion by wind. It is therefore recommended that the Authority encourage the establishment of windbreaks by private owners in every way.

CHAPTER 10

SAWMILLS AND WOOD-USING INDUSTRIES

For many years the forests which originally covered most of Southern Ontario were a hindrance to the progress of agriculture. The forest was burned and slashed to clear the land for crops and, with only a small portion of the timber cut being utilized, the realization from this measure was small. Later the manufacture of lumber and other forest products became an important industry. Exploitation of the forest capital rather than harvest of a crop became the prime motive. This sequence of attack on the forest brought about rapid depletion of the virgin timber.

The dwindling forest resources suffered further as available merchantable timber was liquidated from time to time to bolster set-backs in agriculture. In time of need the farmer derived income through woodland sale.

This process of woodland depletion went on without consideration of forestry as an integral part of the farm business. Yet perhaps the most promising means of supplementing farm income to maintain a satisfactory level of living in many rural communities is the husbanding of the forest resources and the development of a permanent woodland enterprise. Many farmers strive for high yield per acre or per animal in agricultural enterprises, but few extend comparable attention to the productivity of their woodland.

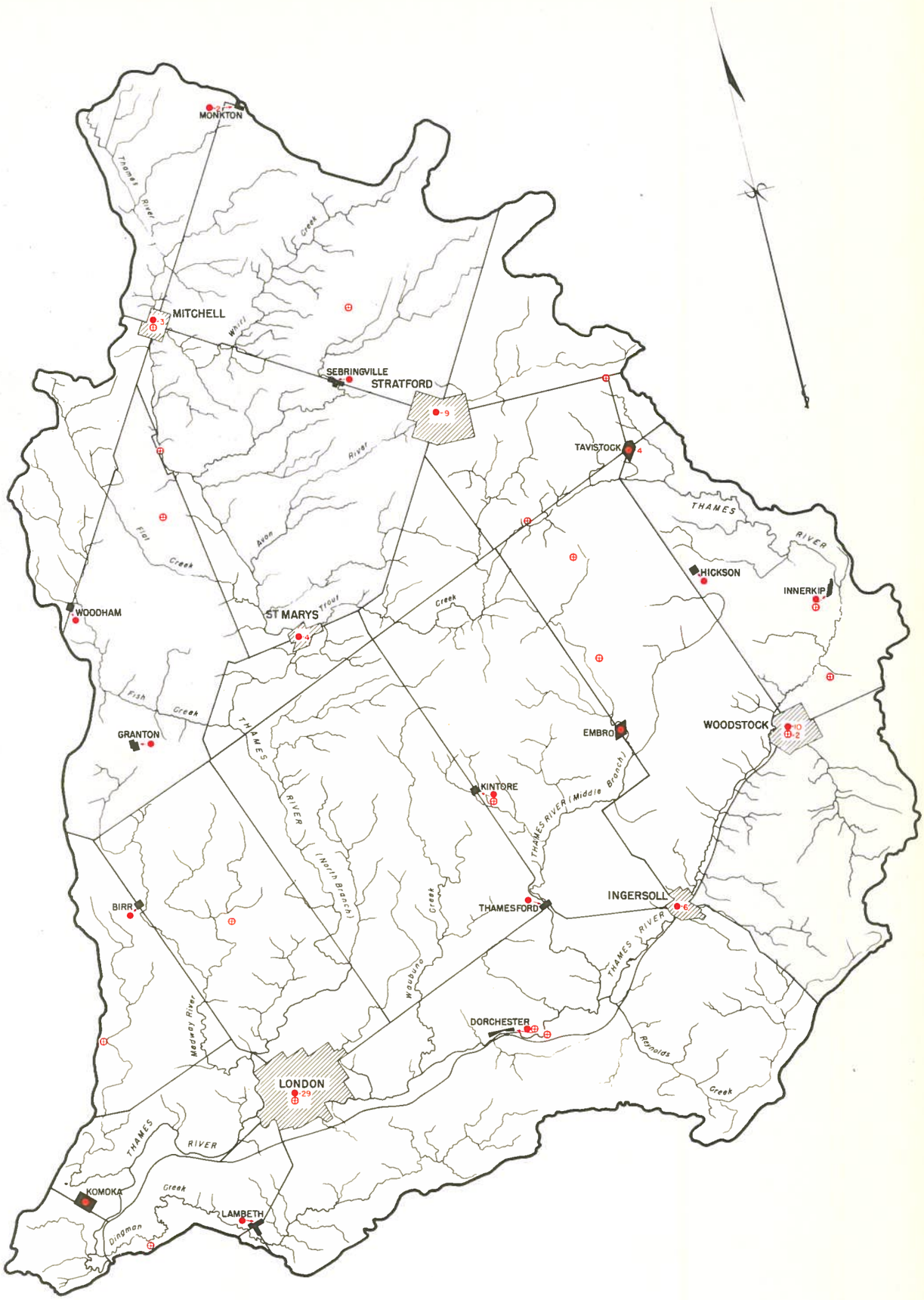
As forest depletion became more acute there was a rapid decline in forest industries. Now the forest plays only a minor part in rural economy in Southern Ontario. Satisfactory processing facilities are no longer available in many sections to provide adequate outlets for farm forest products.

When the farm woodlot is managed according to good forestry practices and the wood growth of a given area

removed annually or periodically in trees of appropriate size, instead of treating the entire woodlot as a crop and more or less clear-cutting once in a minimum of sixty to eighty years, then the woodlot should provide in the majority of cases a periodic cash return to the farmer from log and fuelwood sale. This selective logging then, involving annual cutting equivalent to the annual increase in volume, offers to the log market small numbers of logs of different species and all grades from the individual farm woodlot, with greater numbers of logs from the larger woodlots.

The profitableness of the woodland enterprise depends on the availability of adequate marketing facilities. The primary users of woodland products such as sawmills, veneer mills and others are not the only markets but all the industry that depends on the primary plants for its raw product, whether purchased directly from the plants or through the intermediate handlers or processors. Thus a study of the farm woodlot marketing problem should follow the woodland product from the tree on the stump through to its ultimate consumption, whether in the manufacture of furniture, wooden heels, veneer or plywood, farm implements or any of the many other products of the wood-using industries including lumber for construction. For this reason a study was made of the present log market in the Thames Watershed to determine how it functions, the outlets for its products and the sources of wood for the local wood-using industries.

In this report the term "hardwood" is used to denote all broad-leaved trees irrespective of whether the wood is physically hard or not. This practice is followed by large firms which handle both hardwoods and softwoods. At the smaller sawmills and lumberyards and among farmers it is a common technical misnomer to term as softwoods the hardwoods which have physically soft wood such as poplar, basswood, white (swamp or soft) elm, willow, and sometimes soft (red and silver) maple. For example, a sawmill with stove-length slabs for



SAWMILLS
AND
WOOD-USING INDUSTRIES

LEGEND

● WOOD-WORKING PLANTS AND LUMBER YARDS (79 ESTABLISHMENTS)

⊕ SAWMILLS (19 MILLS)

(●–2 Figure after symbol indicates number of establishments)

SCALE : MILES

1 0 1 2 3 4 5

fuelwood offers -

softwood - white pine, white elm, hemlock, basswood and poplar
at $11 per standard cord delivered

hardwood - white ash, beech, cherry, oak and the maples
at $15 per standard cord delivered.

In the above case three broad-leaved species which have wood of soft texture are termed "softwood".

Since the forest growth and logging industry in the area are dominantly hardwood, the discussion throughout this chapter is relative chiefly to hardwoods.

1. Local Wood-Using Industries

The sale of sawlog material from the woodlot depends on the mill-operator having sale for the lumber he manufactures. The following study of local wood-using industries shows their dependence on supply from local woodlands.

There are no natural boundaries in the field of manufacturing from wood at which divisions can be made for study. In this report the industries whose products are ordinarily thought of as being made of wood are termed the wood-using industries. Because of this limitation some manufacturing establishments which consume large quantities of wood were not visited.

In the area 79 establishments qualified as wood-using industries or intermediate handlers of lumber products. These have been separated into three general divisions as follows:

(a) Lumber merchandising, millworking, and allied field;
(b) Miscellaneous general woodworking;
(c) Manufacturing specific wood products.

Some overlapping between the three groups seems unavoidable. The phases of the lumber and products industry encountered and the sources of their raw products are outlined.

Selective logging. The 21-inch maple in the foreground is blazed for removal while the 16-inch maple in the background has been left. At the smaller size hard maple is putting on its "quality growth".

Some operators do not pay their Grade 1 prices for logs with centre defect, while others do. Maple syrup spiles caused the small dark marks seen on this butt log.

(a) Lumber Merchandising, Millworking, and Allied Field

Each of the 44 establishments in this group belongs in either or both of the following general categories:

(1) Lumberyards - retail and wholesale - may do millworking to varying degrees; some have an associated construction business; most handle the general builders' supplies.

(2) Millworking plants - primarily planing, matching and moulding; may be purely custom or may manufacture and stock their products.

Lumberyards market chiefly to the construction field; thus their turnover is mainly softwoods (generally over 90 per cent). Over nine-tenths of the hardwood handled is flooring and is oak (imported), yellow and white birch and hard maple with lesser quantities of beech, elm and white ash. Over 95 per cent of general yard stock is "imported" from Northern Ontario, Quebec and British Columbia - and lesser quantities from the Prairie Provinces and the Maritimes. The outside points which supply the local lumber merchandisers with softwoods in many cases offer well-graded hardwood lumber too. Thus the local hardwood sawmilling industry must compete against the goodwill established by salesmen from these outside points. The yearly volume handled by the lumber merchants in the Thames area varies from about 100,000 board feet by the smallest dealer to over 6 million board feet by the largest. A small percentage of this field of business backs sawmilling financially or owns mills outright in the softwood areas of Quebec and Ontario. A few of the lumberyards may act as wholesale sources for industries using hardwood lumber, especially the furniture industry. Purchasing their supply from local and more distant or regional sawmills they may maintain a considerable stock on hand or carry on a brokerage type of business.

Millworking establishments manufacture large quantities of softwoods, which are chiefly "imported", into sash, door, interior trim, frame, all types of siding, and other products including relatively small quantities of flooring.

Some damage in felling is inevitable even when the logging is done by expert cutters.

Log skidding to roadside for truck haul. This professional teamster and team were brought by truck more than 60 miles to do this skidding.

The chief species used are eastern and western pine, spruce, and hemlock; western cedar and Douglas fir. Lesser quantities of local or imported hardwoods are used for stair-treads and risers, door sills, interior trim, and similar products. Included in this group are establishments making small prefabricated buildings such as cottages, garages and small homes.

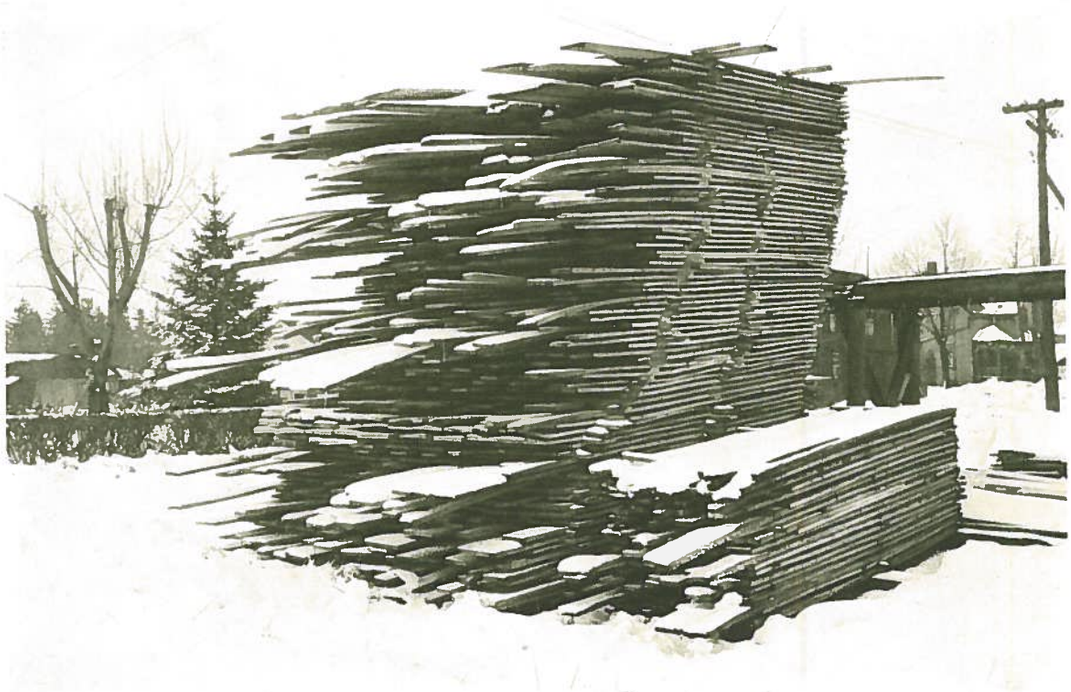
(b) Miscellaneous General Woodworking

The 13 establishments placed in this category are typified by the extensive variety of products made by each enterprise, and by the fact that in general they are small consumption units, using less than 30,000 board feet of lumber in a year. They do custom work chiefly, but in some cases certain products may be stocked in quantity. The variety of products made is shown by the following partial listing: kitchen cupboards and cabinets, store counters and showcases, bookshelves and wall brackets, magazine stands, wooden toys and children's commodes, washboards and clothes-horses, lawn furniture, lawn-mower rollers, wagon boxes and tongues and other general farm equipment and repairs, chicken crates, various types of ladders, machinery crating, wheelbarrow handles, dowels, and patterns. The hardwoods and softwoods used in these manufactures are chiefly local and are obtained from local lumber merchants or direct from local sawmills. In some cases 4-foot bolts of yellow birch are brought in direct to a plant, or local logs may be bought and sawn at nearby mills. Included in this miscellaneous category is an enterprise engaged in salvaging lumber from demolitions, fires and so on. Where possible this is made into 2 x 4's, fence pickets and other small stock.

(c) Manufacturing Specific Wood Products

The 22 establishments in this group represent 10 different types of manufacturing:

Farmers often do very little of the woods work. This lump sum purchase bought only the logs that could be made. The farmer paid the buyer's cutting crew to make the tops and limbs into 4-foot fuelwood.



Poor piling of random lengths. The grade of lumber is often lowered during seasoning due to poor piling practices which encourage warping.

Product Manufactured	No. of Plants	Raw Material and Source
Rowboats and small power boats	1	Softwood and hardwood lumber - local, regional and "imported"
Box shooks, boxes, crates, and cheese boxes	2	Softwood lumber - imported Hardwood logs and lumber - local
Slack and tight cooperage	2	Hardwood staves - American and "imported" Hardwood stave bolts - local
Caskets	2	Hardwood and softwood lumber - "imported" and regional - American "woods of value"
Furniture	6	Hardwood and softwood lumber, plywood - "imported", regional and American
Musical instruments	2	Hardwood and softwood lumber - American and local
Sporting and playground	3	Hardwood lumber - local and American
Milk-bottle cases, dairy equipment, farm implement parts	2	Hardwood and softwood lumber - "imported", local and American
Veneer	2	Hardwood logs - "imported", American and local

This group consumes chiefly hardwoods, a considerable volume of which is local supply. Four of these plants rely partly or completely on a supply of raw logs to carry on their manufacturing. These are:

Kintore Boxes, Ltd., Kintore - purchasing local white elm, ash, basswood and beech for the manufacture of cheese boxes and box stock; operating a small veneer mill.

London and Petrolia Barrel Co., London - although most of the material required by this plant comes as rough staves and headings from its own mills in Tennessee, a considerable quantity of white oak and lesser quantities of beech, maple, ash, cherry and red oak are purchased locally for the manufacture of tight cooperage.

Wood Mosaic, Limited, Woodstock - specializing in the manufacture of face[1] veneers and oak flooring requires that this plant import a large part of its stock from the United States. The veneer logs used are chiefly birch and walnut with lesser quantities of oak, hard maple, walnut, mahogany, and others. Where possible logs are purchased locally but quality, quantity and species are limited. The flooring is manufactured from rough lumber and is chiefly imported red and white oak with smaller volumes of regional or "imported" birch, hard maple and beech.

United States Plywood Corporation (Canadian subsidiary), Woodstock - producing large quantities of crossbanding[2] veneers, manufacturing furniture corestock, plywood and various products with plywood cores makes the raw material source of this plant chiefly Canadian. Yellow birch, oak, hard maple, basswood and elm are consumed in large quantities. Where possible logs are purchased locally but quality, quantity and species are limited. Softwood is used for cores in the manufacture of some products such as doors made on the plywood principle.

The last two establishments in this group use several million board feet of logs for veneer and several million feet of lumber for flooring, plywood cores and other uses.

1,2. The centre portion of a plywood panel is the core. It may be a veneer core or a lumber core. The veneer core is simply several plies of veneer. The lumber core is made by gluing strips of wood together and, depending on the width of these strips, the final product has various trade names such as blockboard and battenboard. The lumber core is then covered, on top and bottom, by a sheet of veneer to "band" the lumber strips together. This is termed "crossbanding veneer" since its grain lies crosswise to that of the next outer ply and that of the lumber core. Depending on the use to which the plywood is to be put, whether of veneer or lumber core construction, it may then be "faced" with a fancy "face veneer" such as mahogany or walnut and "backed" with a less expensive "back veneer" such as elm or low-grade birch.

Professional power saw loggers can make up to 10,000 board feet of hardwood logs (Doyle Rule) per day. The high cost of the power saw is beyond the majority of farmers.

Experienced cross-cut felling gangs can make about 4,000 board feet of hardwood logs (Doyle Rule) per day.

Lack of efficient grading is a shortcoming of the local sawmilling industry. Generally industries manufacturing from wood are quite exacting in their demands for specific lumber grades. They are, to a large degree, prepared to buy locally and avoid freight rates if there is assurance of well-graded lumber in continuous supply. But, when a mill of relatively small annual production carries out grading, the various grades become separated into rather small volumes; this necessitates considerable "shopping" by a consumer in order to obtain a good quantity of a given grade of a certain species. Inefficient grading and sporadic supply discriminate against the regional lumber manufacturers; however, the consumer may reduce the grade risk in such purchases by a personal visit to the mill when it is located nearby. The establishment of mutual goodwill between the small lumber manufacturers in Southern Ontario and the wholesale consumers, rather than reliance on rigid grading, is a major factor in consumer purchasing. Often the mill owners allow the purchasers to sort their mixed grade piles and accept the grades assigned without question.

2. Sawmilling in the Area

Nineteen sawmills were in operation in the Upper Thames Watershed at the time of the survey. On the basis of figures supplied by their operators the 19 mills annually produce about 2½ million board feet of lumber. Of this almost half is custom sawing and the remainder is termed "other sawing".

The 2½ million board feet is the approximate quantity annually produced by the 19 mills; it does not represent the annual volume of logging within the Thames Watershed. The reasons for this are obvious. Logs are hauled to some of these mills from points outside the survey area; trucks haul logs out of the area to other sawmills, veneer mills etc.; portable mills move freely into the area to carry

on operations, although only one was encountered during the survey; and fields of utilization other than sawmills process or use rough logs, for example, piling for construction of bridges, and stave bolts for cooperage.

An example of extreme distance that logs from the Thames area are transported for special purposes is illustrated by the statements of a timber exporter who obtains part of his supply from the Thames area. This exporter currently ships about a million board feet (log scale) annually and during the war years shipped about two million feet annually. A large percentage of this is shipped to overseas shipbuilding yards, chiefly to the British Navy. Rock elm, white elm and hard maple are the chief species handled by this exporter, who maintains a field buying staff and several cutting crews. The logs are obtained from a large general area in Southern Ontario from Windsor to Barrie to Ottawa. Rock elm has highly valued qualities which put it in special demand for the construction of lifeboats. Most of the material shipped overseas is in log form but a small quantity of hard maple shipped to Quebec shipbuilding yards may be squared.

There are no growth rate, yield or inventory data for Southern Ontario woodlots. It would be useful to determine whether the current annual cutting rate on all private lands or in a specific area is in excess of annual growth. Logging operators state that sawlog yield from hardwood stands in the general region of the survey is generally between 6,000 and 11,000 board feet (log scale Doyle Rule) per acre (or 15 to 30 cords of fuelwood). This yield is from stands of trees of mixed age from immature to overmature. On the basis of this general statement the annual cut of the 19 mills is approximately the yield from 300 acres of unmanaged woodland.

3. Reasons for Frequency of Small Sawmills

Formerly many portable mills operated by professional lumbermen operated in the general area. These followed the movement of the main body of the lumber industry as it moved in quest of virgin timber. Many scattered areas of good timber were left behind by the first operators. Also there had been rapid regrowth of forests in the cut-over areas, chiefly as a result of accelerated growth in areas which had been high-graded. These factors, coupled with continued land-clearing operations for agriculture stimulated by employment of artificial drainage, provided a natural field for small portable mills. After a time, as the acreage of standing timber was reduced, the logging opportunities became less. Some of the early permanent mills were dismantled and moved to more wooded areas, or were allowed to fall into disrepair and were finally abandoned. The numbers and annual cut of portable mills became less.

To move a portable mill the operator has to be assured of a minimum footage of timber to saw in order to pay the costs of moving and setting up the mill at a new logging site and to provide a measure of profit. It gradually became more profitable to move the logs to the mill than the mill to the forest. Present conditions of improved roads and efficient logging trucks have tended to put the portable mill on a permanent location. Now, larger mills may haul logs 75 miles and more, and high-grade logs for special purposes such as veneer may be hauled almost twice this distance.

The condition of more stationary location of mills rather than numerous portable mills reduces the threat to woodlots. The portable mills requiring a minimum footage for their operation often engaged in clear-cutting practices in the small woodlots. Modern motor transport of logs is very flexible and can be more readily directed to favour woodlot improvement by selective logging.

Many of the mills in the Thames Watershed are farmer-operated and their annual productions are very small. Some reasons for the establishment of small production mills, chiefly the farmer-operated type but also lumberman-operated are summarized as follows:

(a) Minor capital outlay

Availability and cheapness of mills. Old secondhand portable mills are readily available. Some mills are rebuilt from old mills abandoned in junk heaps. Manufacturers offer new portable mills at relatively low prices.

(b) Suitability of small mills to the present situation

The conditions referred to are those of sporadic and light supply to the mill due to the scattered nature of the small tracts of second-growth timber and also due to the attitude of woodlot owners to logging their woodlots. This attitude varies from complete apathy through all stages of mismanagement to, in some cases, a good attempt to practise the commonsense principles of sustained yield.

(c) Availability of power for mills

The commonplace, versatile farm tractor provides power. Since in most cases it is already a piece of the farm equipment, there need be no initial outlay for a power unit, as was the case when mills were powered by expensive portable steam units which had high maintenance and labour-operating cost and also created an extreme fire hazard. Another ready power source now is by conversion of old truck and car motors to sawmilling service. About 65 per cent of the 19 mills in the area are powered by internal-combustion engines and 80 percent of these are tractor-type power units.

(d) Farmer and other local needs for lumber and timber

Farm building and equipment repair and the occasional new building provide seasonal and emergency sawing for a small mill working chiefly on a custom basis. Since the mill does not have to provide against high overhead or expensive labour nor retire a large capital outlay, the

probability of very extended periods of idleness is of little consequence to its owner; in fact it is generally planned that these fit in with other seasonal work.

(e) Lumber Prices

Attractive lumber prices start many small mills. (Business depressions put many out of business.)

4. Mill Output - Daily, Annual and Custom

Daily output varies among the mills from 1,500 to 5,000 board feet, with the daily sawing rate for the majority of mills being 2,000 or 3,000 board feet. Only a few of the mills are operated on a professional basis. The daily output of a small mill varies almost directly as the number of men working and so can be increased - up to a point - by increasing the number employed. The output per man per day is about 1,000 board feet, with a predominance of hardwoods lowering this figure somewhat. Mills operated by non-professional owners may operate only a few days or a few weeks in a year. Thus annual production figures are of more significance than daily output figures. In the following table the mills are arranged in order of increasing annual output; the percentage custom sawing of annual output is shown.

The mill of largest output saws a little less than 3/4 million board feet annually. The total output of the 19 mills is 2,420,000 board feet, the mills averaging about 130,000 board feet annually, and 69 per cent of the mills produce less than this average.

About 45 per cent of all the production is custom work; in general as the annual output is greater the custom per cent is less. The 13 mills sawing annually 75,000 board feet or less spend more than 70 per cent of the time on custom logs and do about 36 per cent of the total custom work in the area. Mills sawing annually more than 75,000 board feet spend about 35 per cent of the time on custom logs; these

Mill No.	Annual Output (Board Feet)	Custom Per Cent of Total Annual Output
1	20,000	100
2	30,000	100
3	30,000	50
4	30,000	70
5	30,000	95
6	35,000	80
7	40,000	95
8	40,000	90
9	50,000	100
10	50,000	5
11	50,000	75
12	65,000	100
13	75,000	20
Total of Mills 1-13	545,000	71
14	150,000	0 (own manufacturing business)
15	175,000	95
16	250,000	5
17	300,000	20
18	300,000	10
19	700,000	60
Total of Mills 14-19	1,875,000	37
Total of All Mills	2,420,000	44

mills do more than 75 per cent of all the sawing in the area. The 3 largest mills do a little more than half of all the sawing and almost 40 per cent of their output is custom.

For custom sawing the general practice is to charge at a set rate per 1,000 board feet mill run - the rate being common to all species. Some mills vary this by adjusting the price according to the general size of material to be sawn out. This adjustment shows a tendency toward hourly rate sawing because by it there is a higher charge for sawing out stock of smaller thicknesses. This is to compensate for the extra time required for the greater number of cuts or "runs" of the saw in making smaller thicknesses in contrast to making larger stock such as planking. Occasionally the charge for cutting out extra large stock or timber is levied by the running or lineal foot of timber and the rate is different according to the length of the timber. Unless otherwise understood, the slabs and waste which accrue from the sawing belong to the mill operator.

The other basic method of charging for custom sawing is employment of a straight hourly rate covering the time of log handling in the yard, sawing, piling, and mill stoppage due to staples, tapping spiles, wire or other metal pieces embedded in the logs. The danger of a saw striking embedded metal pieces in logs is a very important factor limiting use of the more efficient band saw in Southern Ontario even by the largest mills operating on a strictly professional basis.

Most of the mills visited are distinctly the non-professional type. They are operated by farmers and do chiefly custom work, supplying the local need for this type of service. As a group they are extremely inefficient mechanically and from a wood-utilization point of view. Owners of these mills state that custom sawmilling is not profitable and the mills are operated only as a service to the community and a convenience for their own lumber needs.

Larger professional-type mills definitely discourage custom work. Some may do none, while others may reluctantly saw only for those who occasionally sell them logs or for certain selected customers in order to maintain, for various reasons, a certain amount of goodwill. This attitude has considerable justification. Often the charge levied pays only for the direct labour involved and other overhead must be absorbed by the mill owner. This situation arises from the extra labour involved in trying to saw from a given log the sizes of product specified by the customer and in the extra handling involved in keeping the individual's lumber apart from that of other customers or of the mill owner. Often, too, normal mill routine may be considerably interrupted by a "custom job".

When a woodlot owner needs a quantity of lumber for a new building or general repairs about the farm, he takes whatever logs he can to the mill. Often the value of the species and of the grades that could be sawn from the logs is far above that warranted by the use to which the material is put. He would be well advised to take credit for his logs and let the mill operator supply him with species and grades best suited to his requirement. The mill operator should supply these at preferred prices, since often he would profit by being able to dispose of his poor grades of low market value which he has on hand and in return receive a quantity of better grade material which can be diverted to more economical use. It is not uncommon that owners of small mills barter sawing or other services for logs.

5. Log Transportation and Source Distance

Truck hauling far exceeds any other method of log transportation; much of this is by special logging trucks. The improvement of log transportation by truck over improved roads has put the portable mill on a basis of permanent location; it could aid farm woodlot management on a large

scale. The motor truck can be utilized to provide great latitude and flexibility in picking up logs in the open market from skids located along improved roads.

The smaller sawmills which do chiefly custom work serve comparatively small areas, generally less than a radius of 10 miles - farmers wishing custom work generally go to the nearest mill. The larger mills operated on a professional or semi-professional basis go much farther afield for their logs. Some of these mills may rely on sufficient supply being delivered to their yards independent of field representatives making contacts with farmers; but more often, to obtain satisfactory supply at suitable prices, field representatives are used to purchase or encourage the making of logs or to buy standing timber. These purchases may be made 75 miles or more from the mill by a few of the mills, but a general operating distance is 20 to 40 miles. High quality logs for special purposes such as veneer manufacture may be hauled much greater distances than logs for sawmilling.

6. Log Purchase Methods

There are two distinct sources of raw material from the viewpoint of the sawmill operator. These are (1) timberland, owned outright by the operator or on which he has cutting rights by contract, and (2) open log-market purchases. However, it is rather common for the mill owner to purchase a few selected standing trees in a woodlot at a stumpage rate or an outright lump sum, or offer a delivered-in-the-yard rate for the logs.

The majority of mills visited obtain raw material chiefly by purchase in the open market. The logs are bought in skids or delivered in the yard with a fair price differential to cover hauling costs. A few mill operators derive sufficient supply from the woodlots on their own farms. In general, only the largest mills practise buying entire woodlots for logging. Often these owners buy whole farms in

order to acquire the woodlot, then resell while retaining cutting rights in the woodlot for a given number of years. Some mill owners purchase woodlots on an acreage basis; one operator reported paying about $100 per acre for swamp woodland - chiefly hardwoods.

The method of purchase of entire woodlots generally involves an estimate by the prospective buyer according to his own methods of the probable output of the stand. He then offers payment on this basis on whatever terms are agreeable to both parties. Agreements are widely variable; "deals" are made in any way possible. Undoubtedly many of these "deals" are designed to take full advantage of the present income tax law which treats revenue from selective logging as income and therefore taxable, while clear-cutting revenues constitute capital gain and therefore are not taxable. Unfortunately, as long as the tax law has its present interpretation the vicious practice of clear-cutting instead of increment cropping is favoured.

The availability of woodlots for purchase is a matter of prime interest. According to mill owners whose families have long been operators in the region, woodlots become available chiefly when a farm changes hands due to retirement or death of the owner and when there is no immediate family who will carry on the farm. Often these farms are put up for sale by auction, and when such a farm has a reasonable area of bush, it is common practice for timber operators or their agents to submit bids. Apparently the parties making such sales are often absolutely ignorant of the cash value of the woodland. Frequently log buyers are able to purchase these lands at ridiculously low prices and in the long run acquire the entire merchantable yield of the woodland at an extremely low cost per thousand. Generally in these acquisitions the farm is re-offered for sale but cutting rights are retained. If re-sale is not immediate, the farm may be rented

as pasture or in favour of the best opportunities offered. Professional mills of comparatively low annual output may be satisfied with only one such purchase a year, whereas larger mills may make several. Sometimes such areas of woodland may be held as a reserve supply against times when other supply or quality may be short. Purchases of this type may influence the interest of the timber operator in relatively small quantities of farmer-made logs and also the price offered. Local municipal officers, especially township clerks, are generally aware of properties being offered for sale by auction. It is therefore recommended, when woodland is involved, that they remind the title-holder to obtain advice from the Zone Forester on having the woodland value appraised by competent personnel prior to the sale.

Many counties now have diameter limit by-laws to control cutting for sale. These are designed to stop the practice of clear-cutting or slashing woodland. In the clear-cutting operation everything that can be made into a salable product is removed from the woodland; this is definitely not according to good forestry practices. The natural process in such devastated areas, augmented by the negligence of the owner in pasturing, leads to the establishment of small woody shrubs such as raspberry and dogwood. The land is lost to any economical use for many decades. It is wasteland.

In counties where diameter limit by-laws have been enacted the practice of clear-cutting is reduced to cutting everything salable to the legal diameter limit. This again is not good forestry; however, it is preferable to absolute clear-cutting.

The woodlot owner may sell his sawlog material in one of three basic ways - lump sum method, at a price per thousand feet on the stump, or made into logs. Experienced log buyers can appraise the volume in a timber stand quite readily, and some can do it quite accurately. Some buyers

estimate the volume in only a percentage of the trees in a stand, whereas buyers who really know their work tabulate the species and merchantable volume of each tree and keep some record of the probable grade outturn. One operator, located outside the watershed but purchasing a considerable volume within the Thames area, takes pride in his ability as an estimator; he tabulates every merchantable tree in a woodlot. Actual records of woodlot estimates compared with actual log volumes received at the mill from the individual areas show that his estimate is consistently within 6 per cent of the measured log run. Some years ago in competitive bidding for 87 acres of woodland by the lump sum method he estimated the stand to be 700,000 board feet; the chief log-buyer for a large furniture manufacturer estimated 350,000 board feet; another log-buyer estimated 100,000 board feet. The log volume cut from the stand was 746,000 board feet. This illustrates the great spread possible in volume estimating of hardwoods even among those whose business is the buying of timber on the stump. Many years of experience taught this buyer that in the long run in making purchases it is cheaper to estimate the volume in each tree rather than in a percentage of the stand.

(a) Lump Sum Transactions

The method of lump sum purchase is used to buy entire woodlots, all or certain species to a stated diameter limit or trees selected by the owner or the buyer. A lump sum purchase is based on a volume estimated by the buyer. In the case just cited each prospective buyer intended to use the bush for the same purpose, the manufactured product was intended for the same market, and so it is safe to assume that each put approximately the same basic value into his calculations for the lump sum bid. Obviously, under these conditions the sum offered by the buyer using the highest volume estimate would be the most attractive to the woodland owner. The buyer's risk

in this purchase is reasonably secure because the basic price per thousand board feet that he uses is totally influenced by all the conditions and risks that experience has taught him to appraise in each purchase. The basic price represents what the timber is worth to him standing. Thus in any lump sum purchase in an area where there is keen competition by log-buyers the old law of supply and demand should bring the owner the best price for his timber that the market will pay. It is essential though that competitive bids be sought, and from as many log buyers as possible. These buyers should represent all the fields of manufacturing from logs whose establishments are within economical operating distance of the woodlot. Standing timber is bought by scores of forest product enterprises; some of these are sawmills, furniture plants, basket plants, shoe-last block plants, cheese box plants, brush block and handle plants, timber operators who get out rough pile or post or pulpwood products; or by middlemen who operate woodlands for sale to these enterprises. The seller is advised to consult the lists of buyers of woodland products held by the Department of Lands and Forests at its Zone offices.

Many of the larger timber operators prefer to purchase their requirements by the lump sum method. The most competent buyers can successfully offer winning tenders and leave themselves the necessary safety margin to take care of the logging chance. Realization on a venture is greater according to the buyer's ability to carry through the operations on a better cost sale ratio than was used in the calculations setting his lump sum bid. The buyer accepts this challenge to his abilities and in the long run hopes that the chance taken proves profitable. It is not always so. Buying logs in skids or delivered to the mill removes the financial risk in lump sum stumpage buying; it also removes the chance for the extra margin of profit which is a measure of his ability as a stumpage buyer and logger.

(b) Stumpage Rate Transactions

Selling at so much per thousand board feet puts the sale on a volume basis - volume removed is the payment basis - or what some millmen describe as an arguing basis. The buyer may have agreed to cut the entire woodlot or all or certain species to a diameter limit or only selected trees. In any case the buyer has to measure the volume removed. In some cases the purchase agreement is a straight price per thousand board feet, but generally the buyer puts each log in one of two or three grades. The price schedule for the different grades might show the best type of log to be worth almost three times as much as the poorest grade of log, although the actual volume in the two logs is the same. (More is said about log grades in the following section on Stumpage Rates - Log Purchase Prices - Log Grades.) The woodlot owner does not know the business of manufacturing from logs and quite often feels he should dispute the log grader's allocation of certain logs to the low price category. Another strong reason for buyers wishing to purchase by the lump sum method is to avoid these arguments and the bad feelings which may result; often too such an owner puts the reputation of the buyer in a doubtful light prejudicial to the buyer's future business in the area.

Some buyers will purchase only by the lump sum method but most will purchase by either the lump sum or volume removed basis. The woodlot owner must decide whether he would do better to take the lump sum offered and leave the risk of log grade and volume recovered with the buyer or sell at so much per thousand and accept the risk of the grade of the material that will be removed. What the buyer intends to cut and pay for should be absolutely clear to both parties. He might remove only the best trees and possibly only take the best logs of these trees. This leaves the owner with many poor quality logs that he cannot readily sell, with some poor trees standing that he wanted cut, and the volume actually

paid for might be small. His total realization on the transaction might be less than by the lump sum sale method.

Whether the sale is by the lump sum method or on a per thousand basis, a written Timber Sales Contract should cover the transaction. It should set forth all the details necessary as to prices, species, sizes, rights granted to the buyer, limiting dates, times of payment, and so on. There may be considerable differences between contracts depending on method of buying, standards of measurement, type of material involved, etc. It pays to deal with established, reputable firms or buyers in the sale of woodland products. In many cases logs are transported 75 miles or more to a place of manufacture, or the owner is not resident near his woodland - it is in the interest of both parties to set forth their agreement in a written contract.

(c) Owner Log-Making

The woodlot owner may consider that he can realize labour income from sale of his timber if he sells it already made into logs and placed in a skid at the roadway, or delivered to the mill. Currently sawmills in the area pay about $20 per thousand more for logs delivered to the mill than is paid for standing timber. However, sawmill men say they would starve if they had to depend on the volume of owner-cut logs as the only source for their sawlog needs.

The majority of small owners do not log their own woodland. Some buyers would rather buy their requirement already made into logs but often cannot persuade the owner to take advantage of potential returns from the woodlot harvest by doing his own woods work. The reasons for this are not too evident. It first must be agreed that woods work with heavy hardwood timber is dangerous to the inexperienced. Many farmers can tell of members or friends of their families who were maimed or killed in earlier days in woods operations.

The average owner has not had much opportunity for experience; unless a woodlot is managed according to selective logging principles the opportunity for experience is not continual. Too many owners take absolutely no interest in their woodland - do not even take out fuelwood and instead buy coal or oil.

In an age of specialization experts in their fields and production line techniques set the price for the finished product or unit of work. Professional loggers set the price for felling, log-making, skidding and hauling. Their skills and production rates come from continuous experience. Realization for the various logging phases is most often paid by the buyer on a piece-work or volume produced basis. Whereas by the piece-work rate the skilled operator might be well paid on a day rate basis, the unskilled farmer might be poorly paid, have actually worked harder but much of the labour was wasted, and at the same time a poorer product resulted and considerably more damage was done the woodlot than by the skilled operator. At the end of the operation the amateur logger is probably much wiser, but most likely the profit is educational and not financial.

The needs of the buyers as to length and quality of logs vary from buyer to buyer, and time to time in the case of one buyer. Often a premium is paid for the product for which the buyer has great need. The quality of the log made rests largely with the log-maker by his choice of log length and thus the location of defects in the individual log. Proper appreciation of the effect of evident defects in a log is something the inexperienced cannot be told. Experience is required. The would-be logger may find after his logs are made that his price has been cut by a third because of some small specification that he did not understand.

Modern logging equipment has also contributed to the elimination of the farmer-owner from the logging field. The gasoline-powered two-man chain saw greatly increases the

output per man on a logging operation. Normally sawlogs are made by an experienced cross-cut gang at the rate of 1,000 - 2,000 board feet per day per man. Experienced chain saw gangs can make logs at 2,000 - 5,000 board feet per day per man. At the present time felling and log-making is paid for at $5 to $6 per thousand. It is natural that the apparent ease of power-sawing would make an owner hesitate to make logs by the laborious method of the cross-cut saw. The high cost (about $800) for power saws suitable for hardwood logging is beyond the average woodlot owner who has only limited use for such a saw unless he intends to do contract cutting. A given area can provide work for a relatively small number of power saws in relation to the number of woodlot owners and acres of woodland.

The skidding of sawlogs provides more farmer participation than any other phase of the logging operation. Skidding with horses is still the most satisfactory method. Handling of heavy logs (a 16-foot, 24-inch diameter, hard maple log might weight a ton) requires a good team, strong harness, and a capable teamster, particularly if the terrain is at all rough. Modern trends on the farm have in many cases replaced the heavy, well-trained work horse with the tractor. Currently operators will pay $4 per thousand board feet skidded. However, many large operators have to maintain their own stables and permanent teamsters. The team and teamster are sometimes hauled by truck 75 miles or more to skid logs.

The hauling of logs to the sawmill is the unquestioned field of the specialized logging truck. Buyers today pay on the average $10 per thousand for the delivery of logs from the skid at the edge of the woodlot to the mill. Even those owners who do carry out the logging operation are finding it necessary to leave log delivery to the truck.

Under present conditions of widely varied market requirements, small woodlot holdings, and the tendency of specialization of labour in the field that was once well

known to most of the rural population, there is limited opportunity for the average farmer to profit by attempting to be also a log-maker among his many other accomplishments. Evidently the logging industry will continue to become even more closely associated with the purchasing field. It is a business with many problems which can most efficiently be solved by the experts. The owner would do best to confine his efforts to growing the best logs possible. The marking of trees for removal is a silvicultural problem and should be carried out on the advice of the Zone Forester or other trained personnel; proper treatment of the woodland in logging greatly influences the growth rate, form of the trees, regeneration, composition and other aspects important to the future of the residual stand. Labour income can be realized by working for the logger or removing smaller products such as posts and fuelwood. The owner will probably realize most from his woodlot by extensive soliciting of tenders when logs can be made in his woodland. There are not enough logs to be cut that all owners can hope to learn how to interpret the market requirements and carry out their operations successfully from a financial viewpoint.

The utilization of the smaller woodlot products which the farmer can readily make and handle himself is good forestry and good conservation. Some of these products are fuelwood, pulpwood bolts, posts and poles. The removal of these products from the woodlot will, if properly carried out, increase the productivity of the woodlot and the gross returns per acre. Very often it is the difficulty of marketing low-grade material which makes it almost impossible to carry out the necessary improvement work and any means which can be discovered of utilizing small and poor-grade wood should be developed to the fullest extent.

At the present time interest is increasing in the possibility of manufacturing wood chips in the woodlot by means of portable chippers. Such chips can be used for the manufacture of pulp for paper, and as bedding for cattle and litter for chickens which can subsequently be spread on fields to increase the humus content of the soil. They can be made from any species of wood, and tops and branches can be utilized. The number of pulp companies which can use hardwoods is limited at the present time and only those making kraft paper can use chips containing bark, but the demand for hardwood chips will increase and portable barkers are being developed. Every woodlot owner should consider the possibility of improving the quality of his woodlot by utilizing the low-grade material as chips.

7. Stumpage Rates - Log Purchase Prices - Log Grades

An owner may wonder when the sale price at the mill for Select grade hard maple in two-inch stock is $200 per thousand and at the same time the price he receives for standing maple may average less than $40 per thousand for good trees. He should also note that No. 3 Common grade is probably selling at $40 per thousand and is not paying the mill its costs - and that high grades represent only a small percentage of the mill run, generally less than 15 per cent in hardwoods. The operator has to handle, manufacture and market large quantities of product of marginal and submarginal sale value in order to offer to the market the small percentage of high grades which puts the economic picture of the operation in a brighter light - higher grades must carry the "burden" of lower grades.

The amount of lumber that can be sawed from a log depends on the skill of the sawyer, number of defects present, shape of the log, thickness of the boards or timbers cut and the amount of saw kerf. The defects may be evident surface defects or hidden defects. Some evident defects are ingrown bark, ring shake, spiral or straight seams, "catface"

knots, live knots, dead branch stubs and centre defect. The effect on grade volume outturn of the various defects or combinations of defects is not easy to appraise. Only those with considerable experience at the head saw in a mill and in grading lumber can attempt this appraisal. Since probable grade output per log is important, the buyer considers this when buying stumpage or logs. Generally operators classify logs in at least two grades and often three or four. Prices paid are according to log grade.

Standard rules for grading logs do not exist. A first impression is that standards for woodlot products would be practical and would solve a lot of problems; that there should be some divisions in utilization for which standards could be established. When this theory is considered at length many problems arise. To cover all the aspects of log grading for the different market requirements would involve at best a long, technical, cumbersome schedule. Considerable intensive study is required to find a practical solution to this part of the complicated marketing problem. It is expected that in the near future the Research Council of Ontario will undertake a complete study of the marketing of woodlot products. The results of this study may provide the solution to some of the problems.

Some buyers attempt to keep log grading on the simplest basis possible and may have only two grades, whereas other buyers feel they must have four grades. Under present conditions each buyer has his own grade specifications. Sometimes they are rigid but often are quite flexible. The specifications are rarely published and available for comparison with other buyers' grades. The log grader simply keeps in mind certain basic principles and grades from knowledge of what can be produced from each log.

A good buyer, in making a stumpage purchase on a per thousand basis, will walk the woodlot with the owner and try to illustrate the various log grades according to external appearances. In this way the owner might get a fair idea of the probable log grade run in his sale. However, hidden defects may become evident when the logs are made and degrading may result.

Some buyers in competing for cutting rights emphasize the attractive price offered by quoting their highest grade price. They do not mention that only a very few logs will fall in this high price category, the majority of logs probably falling in the third grade. Sometimes a price list by log grades is provided, but no case was encountered where the specifications for the different grades were also set forth in general terms. An owner would have a better opportunity to compare buyers' offers for a stumpage transaction if written grade specifications were set against the grade prices. In addition the owner should require the buyer to illustrate his grading principles as far as possible on the trees he wishes to sell.

Buyers' needs for timber are different and fluctuate and so the amounts they will pay also vary. There may be special orders or contracts beyond the general sales. Such orders might call for concentration on elm of hockey-stick grade, basswood of key-stock grade, maple for heel stock, and so on. In some cases the buyers will pay premium prices for special logs that will satisfy good contracts. In other cases an order may allow certain defects such as dark heart or sound knots which may not generally be allowed in the average sales of that species, and a heavy run of rough logs may be allowed at good prices to satisfy a contract. At another time such rough logs would be of no interest to the buyer.

Log price lists and grade specifications are shown for three operators. Although the mills of these operators are not in the Thames Watershed, they are less than twenty miles from it, and a considerable part of their supply comes from woodlots within the Thames area.

Price lists for logs by grades mean nothing to a seller without some indication of grading specifications. Operators find it difficult to outline grading points. Admittedly it is difficult if there is an attempt to show each grade's limitations absolutely. But it is a help to know the general limitations of some of the variables that guide the grader.

It is useful to the seller to know that a 16-inch hard maple log 16 feet long and perfect in every respect (veneer grade) is valued at $80 per thousand board feet by Operator "B", at $100 by Operator "C"[1], while Operator "A" puts it in grade No. 3 at $35 per thousand because it does not meet his 18-inch diameter specification. A 20-inch hard maple log 16 feet long with a 3-inch centre defect but otherwise perfect is still worth $80 per thousand to Operator "B" who reduces the volume measure of the log an amount equivalent to the defective part; Operator "A" does not tolerate centre defect in grade No. 1 and puts the log in grade No. 2 at $55 per thousand. The premiums paid for lengths by Operator "C" indicate his interest in construction timber.

Much of the skepticism in the minds of woodlot owners toward dealings with log buyers would disappear if there were less obscuring of their grading standards. Some buyers feel they must say that they operate with "open books". Generally this is true. A good way to show this is to publish price lists and general log grade specifications together.

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1. Operator "C" has a special veneer grade price, although he does not use these logs for veneer; instead they are sawn for special stock. He has established this grade in order to compete against log buyers purchasing for veneer plants. Veneer logs have to be very high quality and the percentage in an average stand is generally very small. They are purchased at high prices. Thus this operator can point out to the woodlot owner that he will pay "veneer prices" for any veneer logs in the log run

LOG PRICE LISTS 1950 - 1951 FOR THREE OPERATORS

WITH GENERAL LOG GRADE SPECIFICATIONS

SPECIES	OPERATOR "A" Log Grade No.1	No.2	No.3	OPERATOR "B" Log Grade No.1	No.2	No.3
	$	$	$	$	$	$
WHITE OAK	75		35	85 (Clear - 18" diam. & up)	55	30
RED OAK	60		35	85 (Clear - 18" diam. & up)	55	30
HARD MAPLE	75	55	35	80	50	30
WHITE ASH	70		35	70	50	30
BASSWOOD	70		35	70	45	30
BLACK CHERRY	65		35	70	45	25
WHITE ELM	50		35	50 (Good - 18" diam. & up)	30	20
ROCK ELM				55 (Good - 15" diam. & up)	30	20
BEECH	50		35	45	30	20
BUTTERNUT				70	45	35
BIRCH				45	35	20
POPLAR				25	15	--
SOFT MAPLE				55	35	--
HICKORY				55	30	20
CHESTNUT				40	30	20
WILLOW						
WHITE PINE	Straight price 75			70	55	35
HEMLOCK	Straight price 70			45	30	--
TAMARACK						
SPRUCE						
CEDAR				33	23	

Prices of Operators "A","B","C", are per M Bd. Ft. log scale (generally Doyle Rule) delivered to the mill.

If the log seller does not carry out the operations of cut, skid, and haul to the mill, the operator reduces the above prices on a per thousand basis generally $10 for haul, $5 for skid and $5 for cut. These are the average costs to the operators for these operations in the area studied.

OPERATOR "C"

Length of Log 6'	8'	10'	12'	14'	16'	Special Prices for Good Diameters	Length of Log 18'	20'	22'	24'	26'	28'	30'	32'
$	$	$	$	$	$		$	$	$	$	$	$	$	$
45	50	60	75	80	85	Over 16" diam.& 16' long 90	90	95	Over 16" diam. - no defects - knots sound					
45	50	60	75	80	85	Over 16" diam.& 16' long 90	90	95						
40	50	60	70	75	80	" 16" " " " " 85								
40	45	50	55	65	75	" 16" " " " " 80								
40	50	60	70	75	80	" 15" " " " " 85								
40	45	50	55	65	70	" 16" " " " " 75								
40	45	50	55	65	70	" 16" " " " " 75	75	80	Over 18" diam. - sound & straight - knots no defects					
40	45	50	55	65	70	" 16" " " " " 75								
25	30	40	40	45	50	" 16" " " " " 55								
40	50	60	70	75	80	" 15" " " " " 85								
40	50	60	70	75	80	" 16" " " " " 85								
25	25	30	35	40	45									
35	40	45	50	60	65	" 15" " " " " 70	75	80	Over 18" diam. - sound & straight - knots no defects					
40	45	50	55	65	75	" 16" " " " " 80								
25	25	30	35	40	45									
40	50	60	70	75	80	" 16" " " " " 85	83	86	90	92	94	96	98	100
30	40	45	45	50	55	" 16" " " " " 60	58	61	64	66	68	70	72	74
25	25	30	35	40	45									
30	40	45	45	50	55	" 16" " " " " 60								
30	40	45	45	50	55	" 16" " " " " 60								

Above prices are for No.1 Grade logs

For No.2 Grade logs deduct $5 per M

For Cull and Old Logs deduct $10 per M

$100 per M for "Veneer Quality" oak, hard maple or birch

$5 per M over above prices for "white" basswood

$5 per M over above prices for "clear" white pine

Note - Logs over 16' long are scaled twice, at small end and at centre of log.

GRADE SPECIFICATIONS OF OPERATOR "A"

Grade	Length	Diameter small end inside bark	Maximum allowable defect
1	8' up	18" up	up to 3 knots or indications of knots or injuries when 1 in middle and other 2 at same end fairly straight no centre defect
2	8' up	18" up	up to 5 knots or similar defect but 2 sides clear some crook allowed centre defect allowed - gross scale reduced
3	8' up	below 18"	logs that will not grade up to #2 because of imperfections or diameter

Hard maple has 3 grades designated No. 1, No. 2 and No. 3.

All other hardwood species have only 2 grades designated No. 1 and No. 3.
Grade 1 specifications are according to No. 1 above
Grade 3 includes all other logs

White pine and hemlock are not graded. Entire log run is accepted in the one price category.

GRADE SPECIFICATIONS OF OPERATORS "B"

Grade	Length	Diameter small end inside bark	Maximum allowable defect
1	8' up	no rigid requirement, but 14" is desired (some species are qualified as to diameter in price list)	2 knots or indications of knots or injuries when other three sides clear up to 5 small knots if all on one side and rest of log is very good fairly straight centre defect allowed - gross scale reduced
2	8' up	no rigid requirement	5 or 6 knots if fairly good log some crook allowed centre defect allowed - gross scale reduced
3	8' up	no rigid requirement	rough logs that will not grade up to #2 (not many logs graded as #3 in last few years)

GRADE SPECIFICATIONS OF OPERATOR "C"

Grade	Length	Diameter small end inside bark	Maximum allowable defect
Veneer Quality	Prices vary throughout all grades according to log length	not obtained (1) generally the veneer trade requires a 16" minimum with some acceptance of sizes down to 14" and occasionally lower	clear, no knots or indication of knots or injuries straight round very little taper no centre defect
1		no rigid requirement premium paid for good diameters and lengths	4 to 6 sound live knots depending on diameter and length of log fairly straight
2		as for #1	many knots considerable crook considerable spiral grain
Cull & old logs			extensive shake rotten knot holes logs left over from previous year (2)

(1) The system of log grading of this operator was under revision.

(2) Winter cut logs generally begin to decay or "sour" at the ends by mid-August in Southern Ontario.
Logs lying on the ground may sap rot if left too long or develop severe check.
Some species are susceptible to insect injury.

Without grading specifications in simple tabulated form, as well as log prices, the log seller is at a distinct disadvantage in selecting the best market for his logs. The seller rarely has opportunity to compare the grading points of different operators. The grading specifications shown are the answers given by the operators to direct questions.

8. Species Sawn

Cutting pressure on local softwoods for sawmilling is far more severe than on local hardwoods. By actual survey in 1950 the forest area of the watershed was classed as almost 93 per cent hardwood, about 5 per cent mixed hardwood and softwood, and the remainder as pure softwood. Much of the natural softwood growth is white cedar and very little of this is sawn for lumber. The sawmill operators indicated that the average annual cut is in the neighbourhood of 10 to 15 per cent softwood. The tendency to deplete available softwoods is a reflection of the high demand for construction wood in general and of farmers to have sawn softwoods rather than hardwoods at the mills doing custom work. Although the logs sawn in the area do not all come from the Thames Watershed, the tendency to deplete existing commercial softwood is nevertheless fact. It is a general condition in the parts of Southern Ontario which are basically agricultural.

The chief softwood species sawn are white pine and hemlock. Norway spruce planted along fence lines about sixty years ago for windbreaks is occasionally sawn. All of the local hardwoods are sawn but most of the sawing is hard maple, white elm, basswood and white ash. Other hardwoods sawn in lesser quantity are soft maple, beech, red and white oak, black cherry and poplar.

The slabs produced at the mills and the tree tops of the woods operations find a ready market as fuel, particularly in the larger centres of population. Fuelwood prices (1950-1951) of two operators, whose mills are located just off the watershed but who cut extensively within the watershed, are shown. Prices are for standard cords of 128 cubic feet - hardwood species.

	Operator No. 1	Operator No. 2
Slabs in stove lengths at mill	$9.50 for hard maple, beech, cherry and ash $6.50 for elm and soft maple	$10.00 ($12.00 delivered)
4-foot lengths from bush operation stacked in bush	$9.00 to $9.50 for better species $6.00 for elm and soft maple	$12.00 best species and sizes $8.00 poorer species and sizes (Add $4.00 for delivery)

The preceding cordwood operations are paid for at the rate of $4 per cord. A man described as a hard worker and a good cordwood maker made an average of 2.3 cords per day over a 7-day period.

One operator pointed out that county diameter limits on logging operations have put out of business "those people making fortunes out of fuelwood sale". The small diameter trees (6 to 12 inches) made excellent fuelwood at a fast rate, whereas the tops from logging operations are more difficult to make into fuelwood and do not bring such good prices as the material is rougher and there is less bodywood. In addition the operators must pay less for woodlots purchased on a lump sum basis because the buyer's realization on fuelwood is reduced.

Cedar poles and posts, recovered incidental to other woods operations or definitely sought as a merchantable product, find a ready market, and cedar is brought in from northern points to alleviate local shortage. Current prices (1950-1951) paid for cedar posts delivered in the yard are shown for a nearby mill which purchases within the watershed. The prices are paid on a diameter class basis and are for sound stock 8 feet in length.

Diameter Small end:	8"	8½"	9"	9½"	10"	10½"	11"	11½"	12"
Price:	$ .80	.85	.90	.95	1.00	1.05	1.10	1.20	1.25

9. Product Outlets for Local Mills

The outlets for the production of small mills can be given four basic categories:

(a) Local farm consumption
(b) Local retail outlets
(c) Wholesalers
(d) Special industries

(a) Local Farm Consumption

About 60 per cent of the mills in the area can be described as farmer-operated. These are all low-production mills and most of their production is custom work for neighbouring farmers. Most of these operators claim they do custom work only, along with sawing for their own lumber needs. However the majority are in fact small retailers - keeping on hand a small quantity of stock for sale in the neighbourhood. Many of these farmer-operated mills - in fact, about half of all the mills in the area - have been established since the beginning of World War II. This is obviously an attempt to cut down the cost of lumber for their own needs or to "get in on" the rising lumber market, or both. This situation is not peculiar to the lumber market alone, it is part of the never-ending striving to eliminate the middleman in all fields of consumer purchasing. The process commonly produces new middlemen who exist by virtue of lower prices, often made possible by a poorer service or quality of product offered. Although the lumber purchaser may often be satisfied with a poorly sawn product for his need, at times such purchases may be false economy.

The data supplied by the mill operators indicate that about 45 per cent of all the output is custom work, and the greatest part of this is farmer business. This, coupled with mill operators carrying on small sales of their own stock to farmers and the purchases by farmers at local lumber dealer yards of some stock sawn locally, brings the total consumption by the farm of locally produced lumber to more than half of the output of local mills.

(b) Local Retail Outlets

Only a very small part of the production is sold through independent local retail yards; a small quantity of softwood production which is not custom work may be sold locally; however, the great demand for construction lumber makes it easy for the millman to sell this himself without putting it through the retail lumberyard channel. Retail lumberyards are primarily handlers of softwood lumber for construction. Generally more than 90 per cent of retail yard turnover is softwoods brought in from other parts of Canada, and of the 10 per cent handled which is hardwood, 90 per cent or more is "imported" hardwood flooring. This reduces the purchase of local hardwoods by retailers to a very small volume. However, retail yards which do some mill-working such as sash and door may purchase small quantities of local hardwoods for door sills, stair treads and risers, and so on. Occasionally a retail yard supplying one or more neighbouring small wood-specialty manufacturing establishments may stock small quantities of hardwood lumber to meet their needs.

(c) Wholesalers

The lumber wholesaler acts as a middleman between the producer and intermediate retailers or ultimate industrial consumers. Modern truck transport between the producer and his outlets, whether retailers or industrial consumers, have tended to eliminate the middleman relative to the mills in the area. However, small quantities of local production are handled by wholesalers, particularly better grades of maple which are for export to the United States.

(d) Special Industries

Special industries do not rely extensively on lumber supply from mills in the Thames area - the volume of farm consumption leaves little lumber for industrial supply. However, the buyers for special industries are a very important market for the small sawmiller, since hardwood finds only restricted use, relatively, in the construction field.

The major volume consumption of Canadian hardwood lumber is for hardwood flooring where the chief species used are birch and maple. Most of the oak flooring manufactured in Canada is made from American oak imported as rough stock. A small amount of maple, oak, beech, birch, elm and ash from the sawmills in the watershed is made into flooring.

The volume of hardwood available for the special industries market category is purchased in small lots from the various producers, chiefly by agricultural implement plants, manufacturers of hockey sticks and other sporting equipment, and furniture manufacturers; small enterprises manufacturing everything from lawn-mower rollers to ladder rungs complete the list. One of the mills consumes its entire production in its own box plant.

10. The Marketing Problem

The marketing problem has three closely related aspects:

(a) The woodlot owner who has merchantable trees that will make sawlogs. The sale of his woodlot increment should be a paying proposition the same as any agricultural enterprise.

(b) The professional or semi-professional sawmill operator who requires logs that he can mill into lumber on a paying basis.

(c) The ultimate industrial consumer who requires definite quantities of certain species in certain grades in order to carry on his annual manufacturing on a paying basis.

These aspects resolve into getting the woodland products to the mills in sufficient quantity to make their handling profitable to the woodlot owner and the sawmiller, and assuring the consumer a continuous supply of standard grades at fair prices.

In the past the farmer has been at a disadvantage in marketing logs from his woodland. In lump sum sale he must rely on his ability as a trader to strike the best possible bargain with the buyer. He is unfamiliar with methods of

estimating the quantity and value of his salable timber; experienced foresters find it difficult to estimate accurately cull and quality when appraising timber, particularly hardwoods, which predominate in the area studied. The buyer has had experience in this field and in addition allows a safety margin on the estimate. Furthermore, operators of small mills and portable mills are often at a disadvantage in marketing their lumber and so are not in a position to pay full value for standing timber. Sale methods involving stripping the woodland ruin the woodlot for decades to come. Sale by set price per thousand board feet removed gives the operator the right to cut all or certain trees above a specified diameter and to take only those portions of the trees he wishes and to pay for only the portion he takes. This pattern of sale removes the uncertainty of the cull and quality factors but introduces the question of how much of the timber cut will actually be taken; it often is highgrading the woodlot and "creaming" the logs of the felled trees. Thus a high price offer per thousand on the stump may bring a lower price to the farmer than the lump sum method. The log scale used in buying standing timber introduces another variable. Opportunity for sharp practice in scaling the felled logs exists, particularly when allowance is made for cull in defective timber. However, in fairness to log buyers it must be said that the majority are not the type to employ such practices.

The professional or semi-professional sawmiller requires assurance of log supply. The complete lack of interest by the majority of woodlot owners in any form of logging operation of their woodlots forces him to sell the idea of log sale to the owners. To assure log supply to his sawmill he is in many cases forced to buy woodlots in order to plan his milling for the year. Sporadic supply by purchase on the open log market is too indefinite. In buying woodland

for a season's milling he may acquire such volume as to remove strong interest in log purchase from individual farmers in small quantities. The disposition of his cut is often quite a problem. The preponderance of low grades in average hardwood milling, in many cases increased by poor sawing equipment and techniques (especially degrading due to poor piling), make efficient grading and separate piling of the many species sawn a serious problem. The resulting common practice is mixed-grade piling and forces him to deal lumber piles at reduced prices rather than at good prices by specific grades. His established market has considerable dependence upon mutual goodwill with the purchaser.

The industrial consumer most often requires quantities and specific grades in large lots of a carload (approximately 20,000 board feet) and up. He wants well-sawn products of standard widths and thicknesses. Most large consumers must "import" other than local species from large mills which also handle large quantities of well-graded woods which may be sawn locally. It is more practical from his point of view to pay the extra freight costs involved to be assured of continuous supply of species and grades as required than to "shop around" in the uncertain local supply market.

11. Attempts at a Solution of the Marketing Problem

(a) A Marketing Experiment near Doon

During the winter season of 1948 and 1949 the Department of Lands and Forests in the Galt Zone carried out an experiment in the marking and marketing of timber in an 18-acre woodlot near Doon. The project was initiated by Mr. I.C. Marritt, the District Forester, and the field work was done by Mr. L.S. Hamilton, Zone Forester. The scheme is patterned after a marketing assistance method meeting good success in the State of New Jersey.

The mixed uneven-aged woodlot contained considerable large white pine and red oak. Initial investigation by the Department showed growth stagnation due to overstocking and recommended the removal of certain trees representing the accumulation of growth over a number of years. Under this condition, removal of selected trees reduces the growth stagnation factor and the remaining trees grow at an increased rate. As growth again slows down another cropping should take place. This is the simple principle of selective logging - the removal of accumulated growth periodically to keep the stand at a healthy, productive growth rate.

Upon explanation of the proposed marketing assistance, the woodlot owner entered into a signed agreement with the Department as a co-operator, agreeing not to sell or allow to be cut any trees except those marked, upon penalty of a nominal fine per thousand for the estimating and marking service of the Department.

The trees were marked with a view to a second marking which would be necessary afterwards to remove weed trees and trees of low value in order to give good growing conditions. Each tree marked for removal was blazed at breast height and below stump height; the stump blaze being branded to detect any unauthorized cutting. The total log scale estimated for the 223 trees marked was 47,600 board feet Doyle Rule. The trees were tabled as to species and diameter on a mimeographed form.

All the estimation data were turned over to a timber agent chosen by the Department. The timber agent entered into written agreement with the owner to

(1) solicit tenders from buyers;

(2) draw up a timber sale contract protecting the owner;

(3) check on cutting operations; and

(4) measure and collect payment for all wood cut before its removal from the property.

The agent was to receive a percentage commission on the gross sale value.

The timber agent mailed the volume estimate sheets to all local log-buyers, giving location of the woodlot and inviting inspection of the bush.

The timber sale contract set forth the prices agreed upon for the different species, required that tops be worked into 4-foot wood to be paid for at an agreed price per standard cord, provided penalties for the cutting of unmarked trees, and required that the woods operation be conducted with a minimum of damage to the woodlot.

Prices realized by the owner were much better than the average paid in the area. Prices per thousand board feet Doyle Rule were:

White and red oak	$62
White ash, soft maple, hard maple, basswood and cherry	$60
White pine	$55
Hemlock	$45
Beech	$30

Fuelwood - $4 per standard cord

The experiment was considered very successful by all the parties concerned, yielding about 2,000 board feet more than was estimated, and the woodlot has been left in fine growing condition with an expected second cut in fifteen or twenty years of 25,000 board feet.

(b) Forest Products Co-Operative in New York State

In Otsego County in New York State local interest in forestry, stimulated by critical needs arising from the depression, resulted in the organization of the Otsego Forest Products Co-operative Association at Phoenix near Cooperstown in 1935 as a farmer co-operative under the co-operative corporation laws of New York State. In its certificate of incorporation the objectives of the Association are stated:

> "To promote, foster, and encourage the better care and increased productivity of woodlands, the orderly and efficient marketing of forest products through co-operation to eliminate speculation and waste, and to stabilize the marketing of forest products."

A survey covering a radius of 35 miles from Cooperstown indicated about 2 billion feet of merchantable timber, a fair portion of which could be available to the Co-operative. In 1937 a loan was arranged with the Farm Security Administration to construct and operate a farmer-owned processing plant. Since that time this association has afforded farmers within an increasing radius (now about 50 miles and occasionally up to 90 miles) an opportunity to practise forestry in conjunction with their usual farming enterprises on a basis that assures equitable return from any species and grade of product in whatever quantity offered. The program requires change from the common stripping of woodland and of utilizing only the best trees of a few species, to selective logging and diversified utilization whereby the forests will be managed for a continuous high-valued yield.

Otsego County, in which the centre of the mill-servicing area is located, is not unlike much of Southern Ontario. The county is dominated by dairying; about 62 per cent of the land is used for crops and pasture; 28 per cent is in forest; the remaining 10 per cent is abandoned farmland (reverted to brush), water, roads, marsh, building sites, and so on.

The Association is composed of members and operated by a Board of nine Directors elected by members at an annual meeting. The Manager is appointed by the Board and is assisted by an office manager, a complete mill crew, and fieldmen who handle member contracts and all phases of the field activities.

To become a member a person must be a woodlot owner, must purchase five shares of common stock at $1.00 per share and must sign the Association's Marketing Agreement. The member thereby agrees to manage his woodlot according to good forestry practices and to sell any sawlogs cut by him for sale to the Co-operative and to accept 5 per cent of the value of his logs in common stock. Members receive patronage

dividends. The Association agrees to assist the owner in applying good forest practices to his woodlot and to publish prices and grading specifications for logs on a delivered-to-the-mill basis and, should it be unable to handle the member's forest products advantageously, to give permission to sell them elsewhere. Lumber needs of members are met at wholesale prices at the mill. By 1941 the Association had a membership of over 600; this had increased to almost 1,100 by the spring of 1950.

The Association's fieldmen will, on request and without charge, cruise a member's woodlot and mark it for cutting, telling him the number and volume by species of trees in his woodlot and the physical condition of the stand. The marking viewpoint is to improve the woodlot by removal of mature trees and leave the young and medium-sized trees of commercial species to grow.

The plant of the Association is modern and equipped to get the most out of the log at a minimum of cost and waste. It has a hot log-pond, a modern band mill, a small circular mill, edgers, trimmers, slabsaws, planing mill, small resaw, and mechanical conveyors to the sorting and grading deck. The equipment is powered by electricity and steam. A very important feature of the plant is its battery of dry kilns. There is rail service into the mill-yard.

The mill cuts annually between 2½ and 3 million board feet of lumber, which holds consistently to 66 per cent hardwood and 34 per cent softwood. Mill operation is on a three-day week basis, it being established that full-time operation would too rapidly deplete the timber resources of the area which can be economically serviced. The 12-man crew works the remainder of the week on lumber handling. The daily cutting rate is 20,000 board feet of softwood or 15,000 to 16,000 board feet of hardwood.

The Association publishes a leaflet every two months which is sent to each member. It describes activities and facts about the Association, and farm forestry practices

in general which are of interest to the members. Through it the members are posted on current log prices at the mill by species and log grades and the standard log grades of the mill are set forth in detail. The following is the log grade specification and log price effective August 1, 1950.

LOG PRICE LIST

PRICE: (Per M Doyle Scale Delivered at Plant, Phoenix Mills, N. Y.)

Species	Log Grade			
	Select	No. 1	No. 2	No. 3
	Price per M Bd. Ft. ($)			
A Hard Maple, Ash, Basswood, Black Cherry, Birch	60.00	50.00	33.00	18.00
B White Pine	60.00	50.00	38.00	18.00
C Red Oak	47.00	37.00	30.00	18.00
D Beech, Elm, Soft Maple	35.00	30.00	23.00	18.00

E Hemlock
$39.00 per M for logs, 8,10,12,14 foot lengths
$42.00 per M for logs,16,18,20 foot lengths

Demonstrating in many ways the economic advantages of co-operative action, the Association has largely overcome many of the obstacles that make intensive forest management on a continuous yield basis impractical without a market that will absorb all classes of products, pay fair prices and accept delivery in small quantities from widely dispersed farm forestry enterprises.

(c) The Lanark County Co-Operative

Mr. W.E. Steele, District Forester at Kemptville in Grenville County, supplied the factual data upon which are made the following comments on the Lanark County Co-operative for marketing woodlot products.

The Co-operative was set up by a group of woodland owners in the County of Lanark in March 1950. Its objectives are the better management of privately owned woodland to ensure a continuous yield of the best material possible from the forested land of the members through profitable marketing of all the woodland products.

To put the woodland enterprise on a paying basis to the individual it is necessary to market not only the material suitable for lumber manufacture and special products such as veneer, but also the inferior products such as the poorer hardwood species, low-grade hardwood logs of the better species, small softwood products such as cedar posts and poles, and that material removed in improving a woodlot during what may be called sanitation cuttings. It was felt that the advantages of co-operative action by woodland owners in the field of marketing would best solve the problems of the individual, particularly in respect to inferior or small products. Acting as a group rather than individually and through a member active in contacting prospective buyers, they can hope for recognition by the buyers in the area as a stable source of the various woodland products.

The establishment of the Co-operative followed an extensive educational campaign carried on by fieldmen of the Federation of Agriculture, the Department of Lands and Forests, and the local Farm Forum leader. Interest was aroused through moving-pictures, talks at schools, local evening meetings, press releases, radio programs and public speaking competitions on woodlot management. Meetings held at Lanark were attended by officers of the Department of Lands and Forests; representatives of pulp and paper companies, sawmills, and other wood-using industries; and members of agricultural organizations. Gradually a workable plan was evolved and the Lanark Forest Co-operative was set up under a number of directors with Mr. Herb Paul as manager.

Mr. Paul of Lavant, the main force behind the formation of the Co-operative, is an energetic leader of the local Farm Forum, caretaker of the Lanark County Forest, a farmer and owner of several hundred acres of woodland in Lavant Township. As manager of the Co-operative his duties entail the location of markets for the woodland products of the members, arriving at satisfactory price schedules, collection of payment for products, ensuring that products are ready or delivered at the time promised, and advising members on cutting their woodland according to best forestry practices.

By the fall of 1950 membership in the Co-operative was approximately 60, with an increasing interest in its operations prevalent. The membership fee is $5 and in addition the Co-operative takes 5 per cent of the sale proceeds of products handled. The member pledges to supply the quantity of material at the time and place agreed and to practise woodlot management according to conservation principles.

At present the Co-operative has no intention of undertaking a manufacturing endeavour such as a sawmill for lumber or railway ties. Logs are not accumulated at a central point and sorted as to species and a grading standard, but are handled direct from woodland to buyer. The purchaser's

measure of the volume, by grade where it might apply, is accepted as the basis for payment on transactions.

An objective of the Co-operative, stated as the better management of privately owned woodland to ensure a continuous yield of the best material possible, is a highly commendable aim. However, the statement embodies a tremendous amount of field work on the part of those capable of advising on the subject of woodlot management. This is a job requiring experienced field personnel. At present, although the Department of Lands and Forests is following this development in marketing with interest and co-operation, it has not the staff of extension foresters to provide the many owners of farm woodland with the guidance that is necessary. If the farm woodlot is to assume its place in the economics of the farming enterprise it must be shown that it pays in dollars and cents to the owner. The average woodlot owner cannot afford to carry on practices at a financial loss in the interest of the region or posterity. If, in its infancy, the Co-operative manages to make dollars and cents for its members by the sale of those products generally difficult to market as well as those relatively easy to market, and does the best it can toward field guidance on woodlot management for perpetual yield, then it will have done a lot toward good forestry in its area.

APPENDIX A

AGREEMENT BETWEEN THE ONTARIO DEPARTMENT OF LANDS AND FORESTS AND THE UPPER THAMES RIVER CONSERVATION AUTHORITY COVERING FOREST LANDS

AGREEMENT made in triplicate this 11th day of April, 1951, pursuant to The Forestry Act, Chapter 147, R.S.O. 1950, and The Conservation Authorities Act, Chapter 62, 1950;

B E T W E E N:

HIS MAJESTY THE KING, in right of the Province of Ontario as represented by the Minister of Lands and Forests, hereinafter called the "Minister"

OF THE FIRST PART;

-and-

THE UPPER THAMES RIVER CONSERVATION AUTHORITY, hereinafter called the "Authority",

OF THE SECOND PART;

WHEREAS the Authority proposes to purchase for reforestation purposes lands in the Upper Thames River Watershed, and is desirous of entering into an agreement with the Minister for developing, protecting, caring for and managing the said lands, pursuant to The Conservation Authorities Act, 1950:

NOW THIS INDENTURE WITNESSETH that in consideration of the premises it is hereby agreed by and between the Parties of the First and Second Parts hereto as follows:

1. The Minister shall, until 2000 A.D., have sole and exclusive possession, control, management and care of any lands acquired hereunder, and shall and will, until 2000 A.D., at his own expense (less such sums of monies as shall have been received by the Minister for timber sold and revenues of any kind out of the said lands and improvements thereon) reforest, develop and manage the said lands, and will supply and plant trees deemed by the Minister best suited for the purpose of reforestation, and shall furnish all necessary equipment therefor, and shall erect and maintain during the said period all necessary fences and improvements; and, subject to his direction, the work of reforestation on the said lands shall be conducted in accordance with approved forestry methods.

2. The Crown agrees to contribute fifty percent (50%) of the cost of all land acquired by the Authority for the purpose of reforestation, provided the Minister shall approve in writing of purchases of land.

3. During the year 2000 the Authority shall have and exercise one of the following options, (A), (B) or (C):

   (A) During the year 2000 the Authority shall pay to the Crown one-half of the cost which shall have been incurred by the Minister in maintaining, managing, reforesting and developing the lands,

and the cost of constructing and maintaining fences, buildings and equipment thereon, provided that any monies received by the Minister from the said lands shall be deductible from such payment; and upon such payment the Authority shall share equally with the Minister the cost and expense thereafter incurred in maintaining, managing, reforesting and developing the said lands and improvements, and in the cost of the utilization of the timber upon the said lands from time to time, and shall share equally with the Crown any profits derived from the utilization and sale of any timber upon the said lands. The operation, control and management of the said lands and timber is to continue under the direction and control of the Minister; or

(B) During the year 2000 the Authority shall pay to the Crown, without interest, all monies which shall have been expended by the Minister in the maintenance of the improvements and equipment on the said lands, but any monies received by the Minister from the said lands shall be deductible from such payment; and upon such payment the Authority shall have possession and control of the said lands, subject to the written consent of the Minister for the utilization of any of the timber upon the said lands; or

(C) The Authority shall grant the said lands to the Crown in fee simple, free of all encumbrances, together with all improvements and equipment thereon, and the Minister shall pay to the Authority the purchase price of the said lands, without interest, and the payments provided for under clause 2 hereof shall be credited against such payment.

4. In the event that the Authority exercises Option (B), the Minister undertakes and agrees to give to the Authority such technical advice respecting the continued reforestation and management of the said lands as the Authority may from time to time require.

5. Should the Authority fail to exercise any of the above Options (A), (B) or (C), the Minister may designate the option by which the Authority shall be bound.

6. Upon the Minister designating the option, the Authority shall forthwith comply with and carry out the terms of the option so designated.

7. This Agreement shall be binding upon the Party of the First Part and the Authority, its successors and assigns.

IN WITNESS WHEREOF the Minister of Lands and Forests for the Province of Ontario has hereunto set his hand and the seal of the Department of Lands and Forests, and the Chairman and Vice-Chairman of The Upper Thames River Conservation Authority have hereunto set their hands on behalf of the said Authority, and attached the seal thereof.

SIGNED, SEALED AND DELIVERED in the presence of:

E. J. ZAVITZ

L. N. JOHNSON
Sec. Treas.
U.T.R.C.A.

H. R. SCOTT
Minister of Lands and Forests
for the Province of Ontario

THE UPPER THAMES RIVER CONSERVATION AUTHORITY,

BY: J. CAMERON WILSON
Chairman

AND: G. W. PITTOCK
Vice-Chairman