ONTARIO DEPARTMENT OF LANDS AND FORESTS.

MANAGEMENT PLAN

FOR

MIDDLESEX COUNTY FOREST

LAKE ERIE DISTRICT

For the Period

APRIL 1, 1963 to MARCH 31, 1973.

Prepared by.....Date: November 15,1964.
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Zone Forester.

Approved by.....Date:

Chief,
Timber Branch.

ONTARIO DEPARTMENT OF LANDS AND FORESTS.

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A - GENERAL DESCRIPTION.

1. LOCATION, AREA AND STATUS.

Middlesex County Forest except for one tract in North Dorchester Township, is located in Mosa Township at the western end of the County.

The area as determined by inventory in 1962, is as follows:

Mosa Township	- 700 acres
North Dorchester Township	- 98 acres
TOTAL	- 798 acres

The first land acquired by the county for forestry purposes was in 1937. Additional areas have been continually added until the present day. A formal agreement for management was signed by the County and the Department of Lands and Forests in 1954 and revised in 1961. Details of the agreement, property acquisition and the financial statement can be found in the Comprehensive Report and subsequent Annual Reports presented to the County.

All areas have good accessibility from a network of county and township roads. Access to most type areas within the properties, is provided by a system of secondary roads and trails.

A - GENERAL DESCRIPTION.

1. LOCATION, AREA AND STATUS.

TABLE I - AREA SUMMARY.

i. Productive Forest Land.

White pine working group.	- 89 acres
Red pine working group.	- 28 acres
Spruce working group.	- 23 acres
Poplar working group.	-164 acres
Hardwood working group.	-472 acres
Total Productive	776 acres
ii. Non-Productive Forest Land.	- 15 acres
iii. Non-Forested Land.	- 7 acres
iv. Water.	- 0 acres
Total area	-798 acres

2. PHYSICAL FEATURES.

Topography.

The topography of the region provides few difficulties in forest management. All tracts are located on relatively flat land with many of them poorly drained.

Geology and Soils.

It is believed that all of southwestern Ontario was inundated by water during the last glacial age and consequently, most sections are now covered by deep water-lain soils.

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Middlesex County soil maps show the forest tracts in Mosa Township are situated on Berrien and Watrin sand. The former is brown and yellowish sand over grey sand and impervious clay. The latter is a mixed sand soil over water-soaked subsoil. Both types generally display only fair natural drainage.

Part of the tract in North Dorchester Township is on Fox sandy loam with good drainage and the rest is on muck soil with very poor drainage. All soil types are almost completely stone free.

Climate.

The climate of southwestern Ontario is one of the most moderate in Canada. Seldom is there more than a few days of extreme cold weather in winter, while summer weather is for the most part warm and pleasant.

These conditions provide no problems in forest management except in wet, swampy areas where there is insufficient frost most years to provide good access for winter logging.

Sites.

The productive forest area has been classified by forest inventory into working groups and these have been classified by site classes as follows:

A - GENERAL DESCRIPTION.

Sites. (Continued).

TABLE 2.

Working Group	Site Classes. 1	2	3	4	Total Area.
Hardwoods	267	205	-	-	472
Poplar	100	64	-	-	164
White pine	5	84	-	-	89
Red pine	9	19	-	-	28
Spruce	4	19	-	-	23
Totals -	385	391			776

From the table it can be seen that the forest is situated on good sites as all areas were classified no poorer than Class 2.

3. SPECIES AND STANDS.

The major species of the forest are red oak, white oak, soft maple, hard maple, poplar, elm, white pine and red pine. In addition to these species the tolerant hardwood stands contain lesser amounts of almost all the species common to the Carolinian forest zone. Beech, cherry, basswood, white oak, tulip, black oak, and swamp white oak contribute substantial amounts to the volume of some stands. Sassafras, buttermut, walnut, cottonwood, yellow birch, hackberry, black gum, willow, chestnut, hickory, black ash, hemlock, white cedar, larch and white pine are also present.

Conifer plantations have been established on all lands previously used for agriculture. White pine, red pine, white spruce, Norway spruce and European larch were the species used.

Small quantities of red oak, white ash, soft maple, cottonwood and tulip have also been planted.

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The species composition based on the area of each working group is as follows:

TABLE 3.

Working Group.	Area Acres	Percentage of Total Area.
Hardwoods	472	61%
Poplar	164	21%
White pine	89	11%
Red pine	28	4%
Spruce	23	3%
	776 acres	100%

RED AND WHITE OAK.

These 2 species are found associated with each other, and with hard maple, soft maple, beech, white ash, cherry, tulip, basswood, black oak and sassafras. They can be found only on better drained sites and on sandy soils. Generally the quality of these oaks is good and will produce both sawlog and veneer quality material. Both even and uneven aged stands occur on the forest.

HARD MAPLE.

Hard maple is found mainly associated with beech in small pockets throughout the well-drained tolerant hardwood types. These stands are uneven aged and also contain the oaks, cherry, white ash, basswood, tulip and soft maple. Hard maple does not make up more than 20% of any stand, but it is of excellent quality and one of the most valuable timbers in the forest.

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SOFT MAPLE.

This species occurs on a wide range of sites from fairly dry to wet and swampy. Both red maple and silver maple are found in the forest but are treated as one species. Generally the red maple is found on moist to dry locations and the silver maple confines itself to the wetter sites. Red maple is found associated with all the hardwood species while silver maple is found most commonly with elm, ash, basswood and cottonwood. Both varieties produce excellent timber and are found in both even and uneven aged stands.

The loss of elm from Dutch elm disease has increased the importance of silver maple on wet sites. Management of these areas in the future will favour the maple and other companion species of elm.

ELM.

Elm is found throughout the forest on moist to very wet sites. It is most commonly associated with soft maple, poplar, white ash, and basswood, although it is found occasionally with hard maple, beech and oak. White elm, red elm, and rock elm are all present on the forest with the former making up more than 90% of the elm volume.

Elm is suffering from attacks of the Dutch elm disease and will be eliminated as much as possible from the forest in order to salvage as much value as possible while the timber is still alive and saleable.

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POPLAR.

Aspen, balsam poplar and cottonwood are all present on the forest and constitute a substantial percentage of the total forest areas.

Aspen is the most common and is found mainly on cut over and burned over areas, some of which were once used for agriculture. It is found almost exclusively in even aged stands and on a wide variety of sites from dry to very moist. On dry sites it quite often grows in pure stands, while on wetter locations it is associated with balsam, poplar, cottonwood, elm and soft maple. Cottonwood is the only variety of poplar that produces real timber, sometimes reaching a diameter of 3 feet or more. Aspen is used sparingly in the area for boltwood and foundry poles.

WHITE PINE.

Except for a few mature pine in the tract in North Dorchester Township, all the white pine on the forest is in even aged plantations less than 20 years old. These have been established on the medium to well-drained areas which were once in use for agriculture.

It has been planted in pure stands and in mixtures with Scots pine, red pine, spruce and European larch. Spacing has been 6 x 6 feet.

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RED PINE.

Red pine has also been planted on reclaimed farm land, mainly in pure stands, but in a few locations with Scots pine, white pine, jack pine and spruce. All these stands are on dry sites and are less than 20 years old; spacing is 6 x 6 feet. In one tract a few rows of Austrian pine have been planted along with the red pine.

SPRUCE.

Spruce makes up a very minor part of the forest occupying only 3% of the total area and being present only in young planted stands. Both white spruce and Norway spruce have been planted. They are located mostly on moist sites and in association with Scots pine and white pine. Spacing is 6 x 6 feet.

4. HISTORY.

(a) Settlement of Middlesex County began about 1830 and with the growth of population in the area, land clearing was carried out on a large scale until today there is less than 10% of the area remaining in forest. There are virtually no areas that have not been logged over at least once and many have been cut 4 and 5 times.

Against this background it was felt that some effort should be made to conserve forests and the County Forest was established with the first purchase of land in 1937. A formal agreement for management was signed with the Department of Lands and Forests in 1954 and additional properties have

A - GENERAL DESCRIPTION.

been acquired until a total of 798 acres were under management in 1962. Purchase price has been $20-$25 per acre.

(b) Damage by fire, insects, animals and diseases.

The only enemy that has caused significant damage to the forest is the Dutch elm disease. Fortunately, the volume of elm is not large and as was previously mentioned every effort is being made to liquidate these stems through timber sales.

Only one 2-acre fire has occurred on the forest, but there have been many others on nearby properties and it always poses a threat during periods of dry weather.

White pine weevil, shoot moth, and pine sawfly have all been found on the forest, but none have been in epidemic numbers.

Some minor damage to young trees has been caused by rabbits and mice. Phosbait poison has been used in some instances to control the mice.

(c) Past Management.

Past management of these forest areas has been good. No formal management plan has previously been drawn up for the forest, but each tract has been mapped, a description of each stand prepared, and a 10-year Improvement Plan drawn up in 1962.

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Annual work programs have been prepared and carried out. Tree planting has been one of the major expenditures but will be less important in future on these tracts, as all open areas have now been stocked.

Site preparation was necessary on only two areas where thorn and poor quality poplar was removed prior to planting.

Clearing was done in one area of 25 acres where sprout growth of poplar was crowding parts of a conifer plantation.

In recent years several improvement cuts have been carried out in tolerant hardwood stands. These have had the three-fold purpose of removing cull and malformed trees, thinning and harvesting diseased elms and large mature trees. Initial results of the cut appear favourable since good regeneration is appearing in some areas and the remaining stands are showing good increment.

Since all of the conifer plantations are less than 20 years old, no thinning or pruning work has been carried out.

Table 4 is a summary of products produced from the forest in the four-year period, 1959-60 and 1962-63.

TABLE 4.

SUMMARY OF PRODUCTS PRODUCED FROM THE FOREST IN 4-YEAR PERIOD

1959-60 -to- 1962-63

	SAWLOGS	PILING	BOLTS	POLES	AIRPORT MARKERS	XMAS TREES	FIREWOOD	REVENUE
1959-60	13,176 fbm	84 pcs	60 cords	25 pcs.		1,000	1½ 6 cords	$1,987.90
1960-61	-	-	-	360 pcs.	600	100	9¼ 29 cords	1,219.50
1961-62	-	-	-	450 pcs.	300	-	9¾ 39 cords	1,261.00
1962-63	8,800 fbm	480 pcs	10 cords	-	750	-	-	1,028.19
TOTALS	21,976 fbm.	564 pcs	70 cords	835 pcs.	1,650	1,100	18½ 74 cords.	5,496.59
VOLUME NET MERCH. CU. FT.	4,415	1,434	7,000	3,230	--	- 1,850		Total Cu.Ft. 17,929

5. ECONOMY.

Middlesex County Forest makes only a small contribution to the economy of the area at the present time. There are no industries entirely dependent on it for raw material, and revenue from the sale of products in the past four years has been only $5,496.59.

The forest does provide employment for 5 to 10 men each year planting trees, cutting timber, repairing fences and maintaining fire guards, roads and trails.

In 1963-64 an additional 450 acres were acquired by the county and as the forest expands its contribution will grow.

Markets for sawlogs, veneer logs, pulpwood, bolts and piling are good in this area and because of this little difficulty is encountered in the sale of products from the forest.

The following is a list of the more important local markets and the annual requirements:

Sawmills	Location	Annual Requirements
J.M.Hawkins Lbr.Co.Ltd.	Strathroy.	2 MM fbm
N.J.Odorizzi & Sons.	"	1 MM fbm
Earley's Sawmill.	"	1 MM fbm
Wallace Lumber Co.	Thamesville	1 MM fbm
Gates Sawmill	London	1 MM fbm
Geo. Coultis & Son	Thedford	1½ MM fbm
Roy Manary	Aylmer	½ MM fbm
C.A.White	R.R.#2,St.Thomas.	¼ MM fbm

Veneer Mills.	Location.	Annual Requirements.
Forest Basket Co.	Forest.	1 MM
Pannill Veneer Co.	Kitchener.	1 MM
Maple Leaf Veneer Co.	Durham.	½ MM
Boltwood and Sawlogs.		
Milner Rigsby Co.	West Lorne.	¼ MM
Nelson Wood Products.	Wheatley.	2 MM
Piling.		
J. D. Tinline, R.R.#2,	Thamesville.	5000 pieces
D. Austin,	Bothwell.	1000 pieces
M. Miller,	R.R.#2, Barrie	5000 pieces
Pulpwood.		
R. Wagner,	R.R.#2, Courtland.	8000 cords.

The following hardwood log and stumpage buyers are also active in the area, buying material for the above industries:-

Ivan Lankin,
131 High St.,
London.

Les Morley,
R.R.#2,
Ailsa Craig.

R. Eagleson,
R.R.#1,
Ailsa Craig.

J. W. Robinson,
128 St. James St.,
London.

Lloyd Williams,
Walkers.

Don Keay,
Strathroy.

6. SUMMARY OF AREA AND GROWING STOCK.

A summary of the productive forest area by age class and working group is shown in Table 5.

The growing stock and increment by age class and working group is shown in Table 6.

TABLE 5.

SUMMARY OF PRODUCTIVE FOREST AREA BY AGE CLASS AND WORKING GROUP IN ACRES.

Working Group	B & S	1-20	21-40	41-60	61-80	81-100	TOTAL.
White pine		89					89
Red pine	5	23					28
Spruce	10	13					23
Hardwoods			55	232	185		472
Poplar			164				164
	15	125	219	232	185	-	776

TABLE 6.

SUMMARY OF GROWING STOCK VOLUME AND INCREMENT BY AGE CLASSES AND WORKING GROUPS.

WORKING GROUP.	AGE CLASS.	TOTAL VOLUME M. CU. FT.	C.A.I. CU.FT.
Hardwoods	21-40	68.0	2,420
Hardwoods	41-60	302.2	9,212
Hardwoods	61-80	345.0	5,646
Poplar	21-40	320.0	14,697
	TOTALS -	1,035.2	31,975

NOTE: Only stands with an inventory volume are included in this table.

B - OUTLINE FOR MANAGEMENT.

7. MANAGEMENT OBJECTIVES AND SYSTEMS.

The original aim in establishing Middlesex County Forest was to reforest abandoned agricultural lands. These lands would thus be returned to a productive state and would make some contribution to the prevention of soil erosion and maintenance of ground water levels.

In more recent years this aim has been enlarged to include the use of the forest to provide a home for wildlife and for recreational purposes.

The present aims of the Department of Lands and Forests in managing the forest for the county, are on a "multiple use" basis and defined in the Forestry Act 1960, (Sec. 2 (1) as follows:

> "....primarily for the production of wood and wood products and includes such secondary purposes as proper environmental conditions for wildlife, protection against floods and erosion, recreation, and protection and production of water supplies....."

These management objectives can be more precisely stated as follows:-

1. To produce a regular and sustained supply of high quality timber and to make continuous use of the productive capacity of the area.

2. To maintain and improve wildlife habitat, ensuring harvest of the game birds and animals produced.

3. To maintain ground water supplies and help prevent erosion of soil by wind and water.

4. To provide areas for recreational and educational purposes which are compatible with the first three objectives.

The growth of high quality timber is the primary objective of the forest. To achieve the good management of the area, including site preparation, thinning, pruning, cleaning and harvesting of products will be required.

In all stands the primary objective will be to produce top quality sawlog and veneer log material with piling, poles, bolts and pulpwood as secondary products.

Hard maple, soft maple, white ash, basswood, cherry, beech and oak will be the principal veneer and sawlog species in the near future, with red pine, white pine and spruce contributing some material at a later date when the plantations mature.

A good veneer quality tree will have a long straight, clean bole, almost completely free of defects such as rot, knots, splits, conks, catfaces and blemishes, with a top diameter inside bark of at least 14".

Good sawlog trees will have similar specifications, except that more defects are permitted and a top diameter of 12" inside bark is acceptable. White oak is the principal species in demand for piling. Straight sound pieces from 12' to 60' long, with a top diameter ranging from 4" to 10", are acceptable.

Pulpwood and boltwood trees will be as long and straight as possible, sound, with a minimum of branches, and a minimum top diameter of 4" for pulpwood and 6" for boltwood.

Regarding other objectives, the acquisition of these forest ~~tracts~~ will ensure that some wildlife habitat is preserved and maintained. Some projects to improve habitat may be carried out in the future, but none are planned at the present time.

The forest provides some space for such recreational activities as hunting and hiking and its presence contributes to the maintenance of the general ground water level of the area, and in some cases, protects nearby farm fields from erosion by wind.

8. DIVISION OF THE AREA.

Middlesex County Forest has been divided into numbered compartments to provide orderly management and facilitate record keeping. Details are shown on accompanying maps. The existing township surveys form the basis of compartmentation. The base management lines coincide with concession roads in an east to west direction. Most of the compartments are

rectangular, ranging in size from 39 to 98 acres. There are 16 compartments with an average size of 50 acres. The majority have the proportion of base to side in the ratio of 2:3. No new base management lines are required and most of the compartment side lines are readily located on the ground, by means of existing fences. There are, however, some 300 chains of new side lines that will require location on the ground. This work will not be done immediately, but will proceed in connection with forestry operations and will likely extend over more than one management period.

Compartment lines must be accurately located, surveyed and mapped. Slight changes may be necessary because of topography and ground conditions. They will be cleared out 8' wide, or the trees along the east side of the line painted red. If necessary, stakes or posts will be placed along the lines to assist in their identification.

A numbered post will be established at the southeast corner of each compartment, and if necessary, at the northeast corner.

Very few expenditures will be necessary for roads, because all compartments are located on established township roads.

Logging and service roads will be necessary in each compartment and such roads will be just wide enough to provide ease of access and efficiency of operation.

9. SILVICULTURE.

Methods of harvest cutting and subsequent restocking of cut-over areas, cannot be stated at the present time, because no such work is planned for any of the stands within the management period.

All cutting that will be done, can be classed as thinning, improvement or selection cuts.

With regards to other silvicultural treatments, some of the work proposed is common to several working groups and will be described together under the following headings:

Choice of Species for Planting.

Planting Methods.

Planting Spacing.

Other techniques peculiar to each working group are described under the appropriate heading.

CHOICE OF SPECIES FOR PLANTING.

Choice of species is dependent on site. In assessing the site, the most important factors to consider are soil, moisture level and the species and density of any vegetation already on the area.

Species which will be planted on the forest, are spruce, white pine, red pine, soft maple, cottonwood and red oak.

Spruce will endure more moisture and shade than the other conifers and will grow on a range of soils - from moist sand to clay and muck.

White pine will withstand a reasonable amount of moisture but will tolerate only moderate shade and brush competition. It will grow in a range of sites - from moist to fairly dry - and on sand or clay soil.

Red pine requires an open, dry site with sand or sandy loam soil for good development.

Soft maple will grow on all locations from moist to very wet and on sand, clay or muck soils. It is not tolerant of shade and will stand only a small amount of competition. It reaches its best development in wet locations on muck soil.

Cottonwood is primarily a wet land species, intolerant of shade and grass competition.

Red oak should be planted on a sand or sandy loam soil, although it will also grow on a fairly well-drained clay loam. It will not stand much moisture and is not very tolerant of competition. It does not do well in large, open farm fields, but is satisfactory adjacent to a woods or in small openings within a woods.

PLANTING METHODS.

Both hand and machine planting will be required. The choice depends on the suitability of the area for operating a planting machine. Relatively flat areas, free

of brush and stumps and large enough to warrant machine work will be done this way. Other areas will be hand planted using the wedge method - an 18 x 18" square of sod will be scalped away, prior to planting, where dense grass is encountered.

PLANTING SPACING.

Spacing must be related to the objectives of management, the growth habits of the species, the site and any planned silvicultural treatments.

The objectives of management are to produce good quality trees for veneer logs, sawlogs, piling, poles, bolts and pulpwood. Good quality veneer and sawlogs have an even distribution of annual rings, and very few branches. Piling, poles, boltwood and pulpwood trees should not be heavily branched.

Proper spacing is the key to attaining this development. Wide spacing cannot be justified because the area would be supporting fewer trees than it is capable of, and they would be poor in quality, limby and of low value at maturity.

Neither can close spacing be justified, because of h igher cost of stand establishment, and subsequent cost of cleaning and thinning, in order to allow for maximum stand development.

The following spacing is recommended.

SPECIES.	SPACING.	NO. TREES PER ACRE.
White pine	6 x 6	1210
Red pine	6 x 6	1210
Spruce	5 x 5	1742
Soft maple	5 x 5	1742
Cottonwood	6 x 6	1210
Red oak	5 x 5	1742

In areas partly covered by brush and volunteer (natural) regeneration, spacing will be uneven and the trees spot planted in advantageous positions between the other growth in order to bring the area up to a satisfactory stocking level.

WHITE PINE WORKING GROUP.

Planting -

White pine is a species that can be planted on a range of sites from moist to fairly dry and in open fields or under moderate shade. Spacing in open fields will be 6' x 6'. Regular spacing is not possible in underplanting or spot planting.

In well-drained areas white pine will be planted in pure stands. In areas with wet depressions, it will be planted on the higher land with spruce or soft maple occupying the lower wet sections. It will also be used to underplant the higher sections of poplar stands.

It should not be row planted in mixtures with red pine or spruce as the growing habits of these species are not the same as white pine.

PRUNING.

With the large difference in sale value, between low-grade and high-grade white pine lumber, it is logical to select and prune crop trees, so that a high value stand will result at maturity. Pruning will be done with saws only and the branches cut flush with the trunk of the tree. The operation will be carried out just after the first thinning has been completed, at which time some 200 crop trees per acre will be selected, marked and pruned to a height of 17 feet.

THINNING.

The first thinning of white pine plantations will take place at 25-30 years of age. Every fourth row will be completely removed, and selection thinning will be carried out in the remaining rows to favour the dominant and co-dominant trees.

Subsequent thinnings will be on a selection basis, at approximately 10-year intervals.

CLEANING.

Some white pine stands have been planted in alternate rows with Scots pine or with Scots pine occupying every tenth row. The Scots pine have been pruned and selectively marketed for Christmas trees in past years, and only the poor specimens remain.

A cleaning will be carried out in these stands to remove these Scots pine, since they have in many cases over-topped the white pine and are hindering their growth.

WEEVIL AND BLISTER-RUST CONTROL.

Only a few white pine weevil have been found on the forest and their leaders have been clipped and burned. This procedure will be followed in small infestation and insecticides used if a large outbreak occurs.

Blister rust has not been found on the forest, but Ribes eradication will be continued as a precautionary measure.

RED PINE WORKING GROUP.

PLANTING.

Red pine will be planted in pure stands on dry sand or gravel sites only and in soils showing no free lime content. Spacing should be 6 x 6 feet in open field planting. It is not recommended for planting in shade or in mixture with other conifer species.

THINNING.

The first thinning in red pine stands will be carried out at age 20-25 years. The object of these thinnings is to provide as much as possible, a uniform release of the stand.

Every fourth row of the stand will be completely removed and selection thinning to release the dominant and co-dominant trees in the remaining rows will be undertaken.

Second, third and subsequent thinnings will be done on a selection basis to provide optimum growing conditions for the final crop trees.

PRUNING.

Pruning of red pine stands is questioned on an economic basis at the present time, because no large premium is paid for clean stock lumber such as done in white pine. However, with the possibility of a market developing for red pine as veneer stock, plus the uncertainty of future requirements of the lumber market, pruning should be seriously considered in stands where it will not be too costly.

Pruning will be undertaken just after the first thinning has been completed. Potential crop trees at the rate of 200 per acre will be selected, marked and pruned to a height of 17 feet. Pruning will be done with saws only, cutting branches as close to the trunk as possible.

SPRUCE WORKING GROUP.

This group includes white spruce and Norway spruce, both of which are planted on the forest and require much the same habitat for good development. Norway spruce appears to grow at a slightly faster rate.

PLANTING.

The two spruces will be planted in pure stands on moist sites, in patches of lower land where white pine and red pine are planted on the higher land, and because of being tolerant of shade, underplanted beneath poplar stands.

Spruce are conical in shape and heavily branched and in order to ensure good cleaning of the bole, should not be spaced wider than 5 x 5 feet.

THINNING.

Spruce stands do not grow at a uniform rate, nor do they grow as fast as pine stands. For this reason it is not expected that the first thinning will be required before the stands reach 30 years of age, except where they have been planted in a mixture with Scots pine. In such cases, the pine will be removed in the first thinning, and the stand allowed to develop with subsequent thinnings on a selection basis; the time to be determined by the degree of crown closure.

Where spruce is underplanted beneath poplar, or spot planted in openings between willow, dogwood, thorn or other brush, it is expected that the overstory of poplar will be harvested and a certain amount of cleaning of the other species done to ensure that the spruce is allowed to develop fully.

PRUNING.

Since no economic advantages can be seen in the foreseeable future, for clean stock spruce, no pruning program is planned.

POPLAR GROUP.

Two situations exist with respect to poplar stands on the forest. Some stands contain a large amount of tolerant hardwood such as oak, elm, soft maple, ash and basswood. These stands will be gradually converted to the hardwood

group through the removal of the poplar. Aspen and balsam poplar are short-lived pioneer species which become decadent at 30-50 years of age, and thus the natural process is for them to disappear and be replaced by other species. In such instances the poplar will be cut and marketed as pulpwood, boltwood or poles and the other species allowed to occupy the area.

Other poplar stands are almost pure and even aged, mostly on land once cleared for farming. These stands will be converted by underplanting white pine on the drier locations, spruce and soft maple on the more moist areas, and harvesting the poplar stand when mature, to allow the conifersto take over the area.

Harvesting will not take place until the underplanted trees are approximately 6 feet high. This will ensure that they will be visible during the logging operation and not destroyed or damaged.

HARDWOOD GROUP.

The history of settlement in southwestern Ontario has left its mark on the hardwood stands in several ways. Many stands were clear cut years ago to provide logs and fuelwood and have since grown up more or less even aged, with a mixture of coppice and seedling stems. In Middlesex Forest this is noticeable in the lowland stands containing soft maple, elm, poplar and cottonwood, and also in some

upland areas of white oak, red oak, black oak, hard maple, beech, ash and basswood.

Other stands have been logged over with only the choice large trees being removed (high grade logging), leaving a fairly full stand of trees but of only fair quality.

Still others have been logged over several times, leaving only a few large trees per acre which are usually cull or inferior species.

Since these cuts have taken place intermittently over the past century, the result is a whole series of both even and uneven aged stands of varying degrees of quality and a mixture of all the species of the zone.

Thus two silvicultural systems will have to be employed to ensure maximum use and return from each hardwood area.

In the case of even aged stands, improvement cuts will be made to remove cull and defective trees and thin out coppice clumps. At this time, any mature trees will also be removed and marketed. In the case of younger stands, subsequent thinnings will be required and these will be done with the aim of favoring the trees which will make up the final crop.

Regeneration of tolerant hardwoods is quite satisfactory through natural seeding and the final crop will be removed, once it has matured - but not until sufficient regeneration has been established to provide another crop.

In the case of uneven aged stands, a selection system of management will be required for many years to obtain the maximum return from each stand.

It is anticipated that these areas will be gradually changed to an even aged system of management, but in order to realize the maximum from the trees presently on the forest, light improvement cuts will be required to remove mature trees, cull trees, defective trees and trees of inferior species, as well as to improve spacing. Walnut, hard maple, soft maple, white oak, red oak, white ash, basswood and cherry, are the preferred species and these cuts will be designed to remove the less valuable species such as ironwood, beech, elm, hickory and sassafras and ensure that the areas regenerate to the valuable varieties.

CLEANING.

Some cleaning will be required to remove areas of thick underbrush, such as thorn, ironwood, blue beech, willow, dogwood and nannyberry and provide openings for regeneration of high value species. These are small areas and will be cleaned by hand, using axe and saw.

THINNING.

When markets are available, thinning will be done by axe and saw and the products sold. Where no markets are available, or where this method is uneconomical, thinnings will be done by girdling, frilling and poisoning the undesirable stems.

PLANTING.

Tolerant hardwood stands will usually regenerate satisfactorily through natural seed fall. However, some stands in the forest were virtually clear cut prior to their

acquisition by the county, leaving some barren areas. White pine, spruce, soft maple, cottonwood and red oak will be spot planted in these areas to bring them up to full stocking.

10. ALLOWABLE CUT.

No calculation of allowable cut has been made for the forest because none of the stands will be maturing within this management period.

Thinning and stand improvement projects are planned which will yield some products, but these will be incidental to the main purpose of the operations.

By the end of this management period, some hardwood stands will be approximately 100 years old which is considered a mature age for hardwoods in a managed forest. At that time, it may be possible to initiate a systematic plan of harvest cutting for the forest and calculate an allowable cut.

11.
SUMMARY OF OPERATIONS.

The operating plan period started with the fiscal year 1963-64, and will end with the year 1972-73. Writing of this plan has been delayed and is taking place in September 1964.

Table 7 is a summary of proposed work for the first 10-year operating period.

The total area to be thinned in this period is 30 acres, yielding approximately 90 cords (9,000 cu.ft.) of pulpwood. Improvement cuts will cover 268 acres and yield 10,000 cubic feet of products (50,000 fbm of sawlogs and bolts; 100 piling and 1000 foundry poles). Some 50,500 trees will be required to

TABLE 7.

SUMMARY OF PROPOSED WORK FOR FIRST 10-YEAR PERIOD.

Working Group	Type of Work	Acres	Planting Stock Required	Products	Estimated Cost	Estimated Revenue
Pw	Planting	5	1000		$ 20	
	Cleaning	41			250	
	Thinning	12		25 cords		
				500 Airport Markers		
				500 Xmas Trees	400	750
	Pruning	5			75	
Pr	Planting	10	5500		120	
	Thinning	9		45 cords	360	450
	Pruning	9			135	
Sp	Planting	14	5000		115	
	Thinning	9		20 cords	160	200
Po	Planting	51	20000		500	
	Stand Improvement	36		1000 foundry poles	120	170
H	Planting	56	19000		475	
	Cleaning	5			150	
	Stand Improvement	232		10000 cu.ft.sawlogs, bolts and piling.	2500	3000
Forest Protection, Maintenance of Equipment, Roads and Firegaurds, Establishment of compartment lines -					4000	
TOTALS		494 acres	50500 trees		$9380	$4570

TABLE 8. WORK COMPLETED 1963-64.

Working Group	Type of Work	Acres	Planting Stock Used	Products	Cost	Revenue
Pw	Thinning	5	-	400 Xmas Trees 450 Airport Markers	150.00	390.00
Pr	Planting	3	2000 Pw		54.68	
Sp	Planting	5	3000 Pw	-	82.02	
Po	Improvement cut	10	-	540 foundry poles	66.00	91.80
H	Planting	5	3000 Pw	-	82.02	
	Improvement cut	50		17,387 fbm sawlogs	357.74	850.08
Forest Protection, Maintenance of Equipment, Roads and Fireguards -					485.48	
TOTALS		78 acres 8000 trees			$1,277.94	$1,331.88

carry out the necessary planting on these lands. Since additional acres will be acquired during the 10 year period, an additional amount of stock may be required in order to plant those areas as well.

Table 8 is a list of the work completed during the first year of the plan(1963-64).

12. SECONDARY FOREST USES.

All areas of the forest are open for hunting or hiking. There are no lakes or streams on the areas, suitable for fishing.

Deer, partridge, pheasants, quail, woodcock, fox and rabbit are all found in the forest and hunting is the principal secondary use made of the forest.

No plans are being made to develop other recreation facilities at the present time.

13. FOREST DAMAGE AND PROTECTION.

(a) Fire.

Protection from fire will be carried out as outlined in the "Fire Control Plan for the Western Zone". A copy of this plan is kept at District Office and at Rondeau and Pinery Park Offices.

The following are the principal features of the plan -

i. Initial detection is dependent on the fire being reported by either the public, or by forest caretakers, one of which has been appointed for each tract.

ii. Fire suppression will be carried out by Rondeau Park staff on tracts in Mosa Township, and by Dorchester Fire Brigade in North Dorchester Township.

iii. Patrols will be carried out by the Zone Foreman in periods of high hazard.

iv. All Conservation Officers' cars are radio equipped and can be called on to assist in communication work in the event of a fire.

v. Annual training sessions are held for all staff likely to be involved in fire suppression.

vi. Firebreaks are maintained where necessary on tracts where they border on travelled roads.

(b) Protection from animals, insects and diseases.

Dutch elm disease is the only serious enemy active in the forest at the present time. No cure or protective method has been discovered to combat this disease, so the only practical effort possible is the elimination of all saleable elm from the forest while they are still alive and in reasonably good condition. Steps will be taken to carry out this cutting where it is practical.

Damage by mice in plantations will be combatted by the spreading of Phosbait poison each fall, where necessary.

Spraying will be carried out where needed to combat pine, sawfly, weevil and shoot moth.

Ribes eradication will be undertaken to prevent the buildup of white pine blister rust.

14. CONSOLIDATION OF THE AREA.

Land acquisition has been confined to Mosa Township in recent years where the area is particularly suited for forestry use. Most tracts have areas adjacent to them, which could be acquired to enlarge and consolidate the area. Interest among county councillors and local residents has been high in the past few years and some good progress has been made in enlarging the area under agreement. Some 450 additional acres were acquired in 1963-64.

15. MAINTENANCE OF THE MANAGEMENT PLAN.

This management plan is written covering the 20-year period, April 1963 to March 1983. The 20-year period is divided into two 10-year operating plan periods, covering from April 1963 to March 1973, and from April 1973 to March 1983. The first 10-year operating plan forms a part of this management plan. Preparation of the second 10-year plan will take place not later than December 31st,1972.

Revision of the management plan must start so that it will be completed prior to the expiration of this plan. Annual summaries of operating plans will be submitted to Timber Branch.

Forestry inventory data has been entered on ledger forms T.M. 203, Parts 1 and 2 and the operating plan has been entered on Form T.M. 203, Parts 3 and 4. Ledgers are kept at District Office.

RECORDS OF CUTTING OPERATIONS.

Timber will be scaled in the standard units of measurement - cubic feet, stacked cords, feet board measure Ontario Log Rule, lineal feet or piece count. The scaled volumes will be converted to net merchantable volumes cubic feet. The righthand pages of Form T.M. 203, part 3, will be used to record by subcompartments the net merchantable cubic foot volumes of the cuts. The net revenue of each cut will be shown in the space below the volume figure. Annual total costs of any activities connected with the cutting plan - such as delineation of coupes, operational cruise, marking, cut inspection and scaling - will be entered on Ledger Form T.M. 203, part 4. Costs involved with the cutting plan will not be recorded by subcompartments but will be recorded annually for the whole unit. The individual costs of delineation of coupes, marking, scaling, etc., will be shown on a separate line for each under the year column that the work was completed.

Records of Completed Silvicultural Operations.

Records of completed silvicultural improvement operations will be the area and cost figures entered by subcompartments on Ledger Forms T.M. 203, Part 4.

Record of Costs of Physical Improvements and Other Costs.

Ledger Forms T.M. 203, Part 4, will be used to record completed work and costs of physical improvements as follows:

Survey	(a) Compartmentation
	(b) Engineering (except roads)
Roads	(a) Survey
	(b) New Construction
	(c) Maintenance
Forest Protection	(a) Firebreaks
	(b) Fencing
	(c) Insect, disease, animal control.
	(d) Fire Protection costs.
Fish and Wildlife.	(a) Habitat Improvement.
	(b) Maintenance.
Recreation.	

Recording Revenues in Addition to Timber Revenues.

Form T.M. 203, part 3, righthand page, will be used to record all revenues from all sources.

Daily Records - "Journal".

The unit forester and unit foreman will each keep a "journal" or field notebook in which to record daily observations of all kinds. The journal will be used to record the commencement, progress and completion of all work, as well as occurrences and observations in the unit. The journal will be the source of information for ledger entries concerning volumes, revenues and costs. Any journal

notes that have to do with the revision of the management plan will be transferred into the Management Unit Memo Book.

Management Unit Memo Book.

This is an office book kept by the unit manager to assemble information for the revision of the management plan. The Management Unit Memo Book is set up in sections corresponding to the Management Plan report, and pertinent notes from the Journal are transferred to the Memo Book.

The Management Unit Memo Book will be a 10" x 11½", 7-ring looseleaf notebook. The book must be kept in a good state of repair.

Map Records.

Map records will be kept to assist in control of the operating plan, to show the progress of the organ-igational development of the unit (forest division) and to provide information for the next inventory at the time of revision of the management plan. Map records will be kept of:

1. Completed cutting operations.
2. Completed silvicultural operations.
3. Completed physical improvements, (eg; roads).
4. Completed forest division.

5. Damages by fire, insects, diseases, windstorms, flooding.

6. Insect and disease control work done.

The maps used for office record purposes must not be used in the field. Record maps must be kept in a separate file drawer and clearly labelled - "For Records Only - Not to be Taken to the Field."

Map records will be kept on the 4 inch to 1 mile township maps.

Scaling.

The standard methods and forms used by the Department of Lands and Forests on Crown Management Units will be used on Middlesex County Forest.

Summaries.

Summaries of completed work will be prepared each year showing volumes, areas, distances, revenues and costs, and the summaries will be compared with the planned work.

16. FOREST INVENTORY.

The inventory of Middlesex Forest was carried out during the summer of 1962 by the Inventory Unit of the Silviculture Section of the Timber Branch.

Stands over 20 years of age were cruised using procedures as outlined in Forest Resources Inventory pamphlet "Point Sampling, Wedge Prisms and Their Application in Forest Inventories", by R. M. Dixon.

Plantations less than 20 years of age were sampled by a strip cruise - the lines generally being run perpendicular to the rows of trees.

District planting records and maps were also used for obtaining species composition and ages.