Bruce County Forest
Management Guidelines

INTRODUCTION:

The Bruce County Agreement Forest program was founded in accordance with the provisions as outlined in the Counties Reforestation Act R.S.O. 1927 C, 289. Under this Act, the Counties could purchase land and the Department of Lands and Forests (currently the Ministry of Natural Resources) would provide professional forest management expertise. The Province of Ontario assumed the management role of the County of Bruce forests since it's inception in 1938 and continued until the spring of 2000 when this function was turned over to the County.

The intent of the program was to "demonstrate the value of establishing a tree crop on abandoned marginal agricultural land and to show improvements that could be carried out in natural woodlands"

For example, The Sauble Beach area had all the trees removed during homesteading but, the resulting fields proved to be no match for the natural elements. As a consequence the sandy soils began to move with the winds. This led to a near desert condition and beginning in 1938 some properties were purchased by the County. Trees were once again reinstated on these open areas and the process of soil stabilization began to take place with the results becoming apparent after only a few years.

In the last number of years some improvement cuttings have been carried out on the properties and the value of this material has increased dramatically with each operation. The natural tree species have begun to once again inhabit the properties, reclaiming any openings that have appeared as a result of die back in the plantations.

THE GOALS OF THE FORESTERY PROGRAM AS SET BY COUNTY COUNCIL:

The Bruce County forest lands are a public resource belonging to all residents of the County. They hold value not only for their commercial timber production, but also for their natural heritage features. The County forestry program will strike a balance between the pursuit of commercial revenues and the protection and enhancement of the natural environment.

The Bruce County forests will be evaluated, managed and subsequently promoted as multipurpose resources, using the principles of long term and sustained development, for the benefit of local residents and the tourism public.

MANAGEMENT PLANS:

Based on the above guiding principles the County of Bruce began the management plan process in 2000 with a contract being let to Lands and Forest Consulting Ltd. to gather the required information and produce a written document. This was completed at the end of 2002 when two paper copies along with discs were turned over to the County. Summaries of each of the management plans are included in this document and complete copies of the individual plans are available from the Bruce County Planning and Economic Development Department in Wiarton.

There are currently some studies being undertaken by the Ministry of Natural Resources, the National Parks and other organizations. When this information is made available it will also be inserted into the appropriate documents.

EXISTING FOREST RESOURCES:

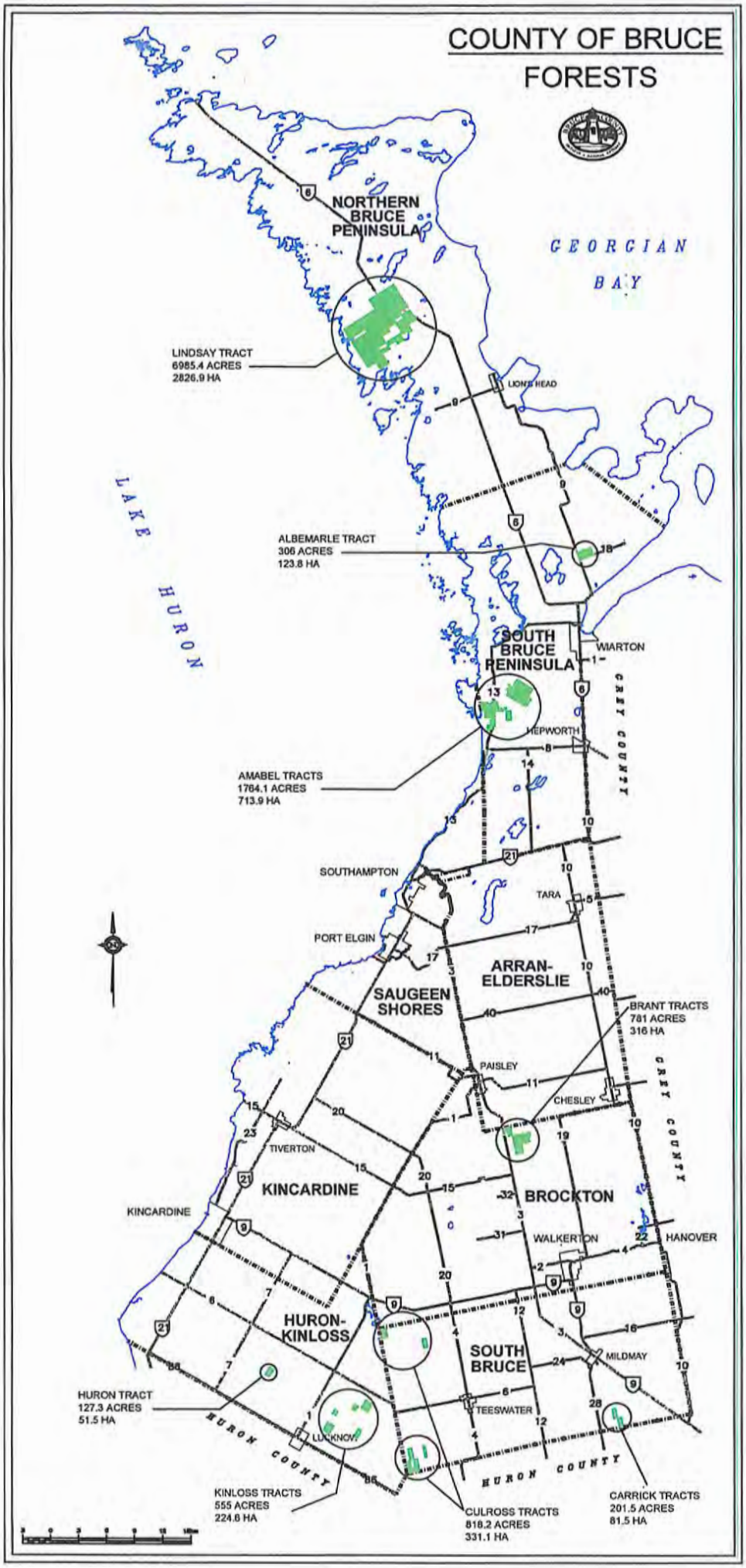
There are presently nearly 12,000 acres of forested land owned by the County of Bruce as outlined on the accompanying map. They vary in size from approximately 50 acres to almost 7,000 acres of different tree specie compositions.

2,000 acres – plantations
5,400 acres – natural conifers
1,830 acres – upland hardwoods
1,000 acres – poplar/birch mixed woods
1,770 acres – wetlands and non-productive forestland
12,000 acres

These properties not only consist of a wide variety of tree species but also contain unique wildlife habitats as well as areas of rare, threatened and endangered plants and animals such as the Eastern Massasauga Rattle Snake, American Chestnut, numerous Wild Flowers and Alvars.

With the return of these forests to the County of Bruce came the unique opportunity to develop some of them into potential tourist destinations. In the past there have always been recreational activities taking place on these properties, but now the ability to expand them further has finally been realized. Hiking, cross-country skiing, mountain biking and nature appreciation are just a few of the possible uses of these forested lands.

Joint efforts can also be undertaken to link the County forest system with other tourism promotions such as the rail trail network and nature based packages being offered by other tourism promotion groups and private operators. However, there are also some areas within the County forests that are simply not well suited for trail development, due to their sensitive nature. Prior to opening any new areas for trail development, the County shall ensure that a comprehensive evaluation is undertaken and any new trails shall be constructed in an environmentally sustainable fashion.


COUNTY OF BRUCE
FORESTS
NORTHERN BRUCE PENINSULA
GEORCIAN BAY
LINDSAY TRACT
6985.4 ACRES
2826.9 HA
LIONS HEAD
LAKE HURON
ALBEMARLE TRACT
306 ACRES
123.8 HA
SOUTH BRUCE PENINSULA
WIARTON
HEPWORTH
GREY COUNTY
AMABEL TRACTS
1764.1 ACRES
713.9 HA
SOUTHAMPTON
TARA
PORT ELGIN
ARRAN-ELDERSLIE
SAUGEEN SHORES
BRANT TRACTS
781 ACRES
316 HA
PAISLEY
CHESLEY
TIVERTON
KINCARDINE
BROCKTON
WALKERTON
HANOVER
HURON-KINLOSS
SOUTH BRUCE
MILDMAY
TEESWATER
HURON TRACT
127.3 ACRES
51.5 HA
LUCKNOW
HURON COUNTY
KINLOSS TRACTS
555 ACRES
224.6 HA
CULROSS TRACTS
818.2 ACRES
331.1 HA
CARRICK TRACTS
201.5 ACRES
81.5 HA

BRANT TRACTS

3.0 HISTORY

In the Township of Brant, negotiations were completed in 1949 to purchase 775 acres for a new county forest. This property formerly belonged to the Munro, Ferguson and Roumey families. Much of the land is wet bottom, sandy loam land of which a majority was planted using a mechanical planter in the 1950's. All of the school children from the Townships of Brant and North Greenock were assembled for an Arbor Day in May and planted more trees.

The County of Bruce in co-operation with the Department of Lands and Forests secured 13,500 acres and were committed to re-establishing the area as permanent forestland.

The Ministry of Natural Resources actively managed the Bruce County Forests until mid 1990's. At the beginning of the new millenium the Ministry of Natural Resources returned the responsibility of managing the County Forests back to Bruce County.

The early management activities of the Bruce Forest consisted of reforestation efforts and thinning in the upland hardwood working groups.

Tree planting projects concentrated mainly on the establishment of conifer plantations, which would later act as a nurse crop for quality hardwood regeneration. The preferred species for planting were White Pine and Red Pine and significant amounts of White Spruce, Norway Spruce and European Larch. These species were planted as homogeneous plantations or varying mixtures.

At the time of purchase most of the upland hardwood working groups had been severely high-graded prior to acquisition which resulted in many of the stands having even-aged polewood with a remnant stand of dominant low-grade trees. Forest management work was comprised of the removal of the low-grade material for logs followed by crown thinning in the even-aged polewood stands. Because of the limited markets available for small dimensional logs and fuelwood during the 1940's through to the early 1970's, the poor-quality trees were girdled to allow further development of the best-quality trees. Side-branch pruning of White Pine and some small conifer thinning operations occurred until the early 1990's.

At the beginning of the 1980's, markets for fuelwood and small dimensional conifer logs increased significantly. Activity in the Bruce County Forests rose with the markets and major thinning in the hardwood and conifer stands began.

A major thinning operation at the Brant Tract began in August 2000, with approximately 500 acres of conifer plantations scheduled for thinning.

4.0 RESOURCE INVENTORY

The Brant Tract Forest, in 2000, was re-inventoried and re-compartmentalized by Lot and Concession. The stands were stratified by aerial interpretation and then operationally cruised. The stand boundaries were re-adjusted where required following compilation of the inventory data. The survey method was a limitless plot cruise using a BA=2 prism. The sampling intensity was approximately one plot per one hectare in the upland hardwood working group and approximately one plot per five hectares in plantations.

New compartment maps were drafted at a 1:10,000 scale for each compartment.

The Resource Inventory in all Bruce County Forests will occur over the next five years on a per property basis or as the County Forest Technician deems necessary.

5.0 FOREST MANAGEMENT

The management of the forest resources in Bruce County Forests will contribute to local and provincial needs.

The wood produced in the Bruce County Forests will be provided predominately from conifer plantations and tolerant upland hardwood stands. The working group areas in the Brant Tract are presented in *Table One* on the following page.

5.1 PLANTATION ESTABLISHMENT

In the County of Bruce a significant acreage of land initially cleared for agricultural purposes became uneconomical working units due to the advent of more mechanized farm management practices. This land was left unproductive with no foreseeable benefits. In order to demonstrate wise land use management, the Ontario Government instituted the Agreement Forest Program, which enlisted municipalities to purchase lands for "forestry purposes". Cleared land on the acquired properties was planted to demonstrate the benefits of the reforestation of idle, non-agricultural land.

The species planted consisted predominately of conifers with small quantities of deciduous varieties. Most of the plantations were White Pine and Red Pine. Other species were White Spruce, Norway Spruce, Scotch Pine and European Larch. Common mixtures of these species were White Pine-White Spruce and White Pine-Red Pine.

One of the many benefits of plantations is the creation of a more favourable environment for wildlife. During the operational planning, provision for the creation of wildlife openings within the plantations will be designed. Openings will tend to follow areas of lower productivity, such as gravel knolls and wet depressions. The fence rows will be retained as wildlife corridors.

There are areas currently under forest cover that may require replanting. Two situations are stands with high-mortality due to Red Pine decline and areas of Scotch Pine which may be clear-cut for pulpwood. The silvicultural treatment for these areas is outlined in *Sections 5.2.1 and 5.2.5.*

5.2.0 PLANTATION MANAGEMENT

The long-term objective of the plantation is to provide a suitable environment for the establishment of volunteer hardwoods. The role of the conifers is not confined merely to that of a nurse crop, as high-quality raw materials for the area's forest based industries will also result. Species such as White Pine, Norway Spruce, White Spruce and European Larch will produce sawlogs and veneer, with the White Pine showing exceptionally high potential value. Red Pine was planted for its potential as a "hydro pole" as well as for its sawlog qualities.

When plantations are established, trees are planted relatively close together at the rate 2,200-3,200 trees per hectare. The purpose is to suppress ground vegetation, provide mutual shelter and straight growth and, after allowing for casual losses, to leave the forester a large choice from which to select crop trees. The number of trees is successively reduced by a series of thinning throughout the life of the crop so that the growth of the stand is concentrated progressively onto a smaller number of more vigorous and better-formed trees. The ultimate objective is to obtain the largest possible financial return of the crop, while maintaining a suitable environment for wildlife, recreation and the establishment of quality deciduous trees.

In order to attempt to maximize the return on investment by the production of quality crop trees in the shortest possible time frame, the crop tree approach to thinning will be employed. This method is best suited to

situations where the primary objective is to produce sawlogs or veneer. During each thinning treatment, effort is concentrated on releasing the candidates for the final crop in order that they will grow at the desired rate until the next thinning.

Due to the inter-relationship of stocking and the form of potential crop trees, thinning regimes will be regulated by basal area, to ensure that there will be enough filler trees to train the final crop while maintaining optimum conditions for growth of the superior stems. In general the residual basal area will be between 21 to 30 square metres per hectare depending on the species.

The timing of the thinning is best determined by the rate of growth on the potential crop trees. If the photosynthetic surface of the trees is significantly reduced in proportion to its height, then the diameter increment will decrease. This will occur in the development of the stand when the crowns are undergoing intense competition. The first thinning treatment should occur just prior to this point. The beneficial effect of thinning will gradually decrease, as crown vacancies will be filled by the residual growing stock. Intense competition shall again develop within the canopy and further treatment will be required.

5.2.1 RED PINE PLANTATION MANAGEMENT

Red Pine was of one the most prominent species planted in the Bruce County Forests. It was a favoured species due to its relatively quick and uniform growth rate, resistance to insects and disease, the wood's pulping properties and hence the potential utilization of thinning material and its high value as a pole and sawlog.

The seedlings on the County properties were planted at a close spacing that usually varied between a squared spacing of 1.7 metres to 2.0 metres. The planned thinning regime for the plantations was a fourth row mechanical thinning between 25 and 35 years, depending on the actual growth. This would be followed by the removal of the middle row and a selection thinning in the remaining rows or a process of continual selection thinning using the fourth row as access. The silvicultural thinning would take place at regular intervals after a 25-35 year period with the actual timing being dependent on crown expansion resulting in crown closure. The stands would be managed leaving a residual basal area of 25 square metres per hectare. This stocking level was expected to provide the conditions for the maximum production of pole quality material.

In the Bruce County area, demand for softwood products in the decades of the 1960's and 1970's tended to be very limited and as a result the forecasted thinning did not take place. There was some treatment of the older stands near Sauble and at the Brant Tract which were thinned on a pre-commercial basis with the material produced utilized by small local markets. The majority of the stands however received no treatment.

The situation at the end of the 1970's was that the older stands thinned on the pre-commercial basis had superior-quality trees to the un-thinned areas, but now required additional treatment and those plantations not treated were overstocked and badly in need of treatment. High stock, poorly developed trees with small crowns and low, live-crown ratios and small average diameters resulted from not thinning.

In 1983 the demand for conifer thinning material increased significantly. As a result of the rising pressure many of the plantations received a commercial silvicultural thinning. The thinning has a lower diameter constraint as the smaller individuals (less than 13 cm diameter) could not be utilized. The older previously treated stands received a selection thinning and the younger overstocked plantations were fourth row mechanically thinned with some selection in the remaining three rows. The residual basal area for the older plantations was 25 square metres per hectare and for the younger plantations 28 square metres per hectare.

After the 1983 treatment there now exists three types of Red Pine which can be categorized and managed in the following manner:

<u>Category 1:</u>

These stands are the older plantations established in the late 1930's which were treated in the 1960's and 1970's and again in 1983. These plantations have a significant number of poles per hectare as well as trees that will be removed for pulpwood. Currently crowns are expanding into vacancies created in the last treatment and there should be diameter growth response as a result of the increase in live foliage.

Further management of these stands will consist of an additional crown and low thinning (thinning from below). The residual basal area will be maintained at approximately 25 square metres per hectare. Depending on demand, some poles can be removed over the term of this management period.

Category 2:

The plantations in this class are generally those established in the purchases between 1948 and 1955. At this time there was a significant number of acquisitions and planting maximized in terms of area planted. If conditions were favourable with regards to market conditions for the small dimensional thinning materials, the first thinning would have occurred in the early to mid 1970's. As previously outlined, the treatment did not occur and diameter increment declined significantly. In the early 1980's, these plantations had a mean diameter of 17 cm. and a mean site index of 25. These stands had a basal area between 45-50 square metres per hectare. They were treated in 1983 with a thinning regime of a fourth row mechanical thinning and a crown and incomplete low thinning in the remaining three rows. The residual basal area was 28 square metres per hectare. (Another treatment of these stands will be required in early 2000's with the main product being pulpwood or small dimensional lumber.)

Category 3:

These areas have not received any treatment to date because they were too young or had too small a mean diameter to thin commercially in 1983. These plantations require thinning now or will in the near future. Depending on market conditions these plantations will be thinned as soon as possible. The thinning regime will be a fourth row mechanical thinning and selection in the remaining three rows. The residual basal area will be 25 square metres per hectare.

A problem has developed in some Red Pine plantations, as pockets of dieback have developed. The mortality tends to occur in the 25-35 year age class. Indications of the eventual mortality are a definite chlorotic appearance and tufted growth. Death of the trees usually occurs within three to seven years after the appearance of the chlorotic foliage. The die-back occurs in groups which resembles mortality caused by Fomes annosus. The exact cause of the decline is at present unknown but current field analysis tends to reveal a macro nutrient deficiency. Mortality appears greater on soils with a shallow depth to carbonates. At the present time there is no solution to the problem and it appears no treatment will be developed.

The plantations where significant mortality has occurred (i.e. greater than 1 hectare) should be under-planted with White Pine or allowed to regenerate naturally with hardwoods. The dead and dying stems will be salvaged where possible or left to serve as standing dead snags for wildlife. White Pine is a moderate shade tolerant species therefore the planted seedlings should grow satisfactorily in that area. Removal of the dead over-story may be considered in areas of high aesthetic value and would occur

after the establishment of the new crop. Some of the new opening would be retained for wildlife purposes.

In areas where mortality has not occurred, yet symptoms suggest significant losses will occur, clear-cutting with a prescribed burn to clean the site could be applied prior to possible replanting with a more suitable species.

5.2.2 WHITE PINE PLANTATION MANAGEMENT

There are very few pure White Pine plantations on the Bruce County Forests. The majority of the seedlings were planted in mixtures with Red Pine and White Spruce. The management of the White Pine in the mixed stands is discussed in Section 5.2.6.

White Pine was planted with the long-term goal of producing very high-quality sawlog or veneer material. To achieve this objective, the designated crop trees are side-branch pruned to 5.2 metres. The elimination of the side branches is done as soon as the trees have attained the suitable height to allow the retention of 50% of the live crown. Through this process the core diameter of trees not pruned is kept to a minimum and clear lumber is maximized.

Plantations of White Pine vary significantly in terms of individual tree growth. Unlike Red Pine where height growth usually does not have any significant variation from tree to tree, White Pine will stratify into crown classes. This stratification creates difficulties when scheduling silvicultural thinning. Due to the variation in crown class, the diameter increment also varies significantly. Markets for small diameter White Pine has developed since 1998 making the first thinning more economical.

Unlike species with more uniform growth, the development of the stand will not be significantly impaired, as the stratification into crown classes will allow for the continual development of the dominant and co-dominant individuals. Most of the suppressed and a large portion of the intermediates will be retained after the treatment and as a result the thinning regime will constitute a crown and incomplete low thinning. The target basal area of dominant and co-dominant trees after the initial thinning will be 25 square metres per hectare. The subsequent thinning will take place when crown development is such that crop trees require additional growing area. These additional treatments will maintain the basal area within the 25-30 square metres per hectare range in order to reduce branch diameters in the upper logs. Towards the end of the rotation the basal area will be reduced to 21 square metres in order to maximize diameter increment.

The delayed thinning in the White Pine plantations may also have a beneficial effect on the form. If the plantations are allowed to undergo more intense competition during the early stages of their development, longer bole lengths will develop and branch diameters in the upper crown will be reduced. The reduction of the main stem diameter growth is well compensated for by the greater merchantable height and the increased upper log grades. White Pine's ability to respond to release will allow for a delayed thinning schedule.

5.2.3 SPRUCE PLANTATION MANAGEMENT

Spruce management will deal with the pure plantations of both White and Norway Spruce. The planting on the purchases of the late 1940's to early 1950's had significant Spruce plantings, but the design consisted mainly of White Pine—White or Norway Spruce mixtures.

For the most part, the growth of the early Spruce plantations has been good with some plantations achieving a site index of 24. Poor growth was evidenced on the gravel areas where the site index is as low as 18. Diameter growth has a wide variation because like White Pine the individuals stratified into crown classes and the dominants and co-dominates produced trees with greater diameter increment.

The first thinning will occur later in the rotation in order to raise the average diameter of the material. Due to desirable pulping properties utilization of the smaller individuals is possible. The thinning required for the Spruce plantations will be a fourth or fifth row mechanical row thinning with selection in the remaining rows. The treatment in the remaining rows will be from below. Residual basal areas will be maintained 23-25 square metres per hectare.

The first thinning on some of the stands was completed in 1983 and the treatment followed the above guidelines.

5.2.4 EUROPEAN LARCH PLANTATION MANAGEMENT

The Bruce County Forests have a limited acreage in European Larch. The initial spacing of this species tended to be similar to the other species, which for European Larch is too close, unless early thinning is undertaken. The species is very intolerant of shade and therefore should have had a wider initial spacing where limited markets for thinning are available. Due to the close arrangement, crown closure occurred early in the rotation. Thinning should have taken place, but lack of markets prevented treatment. With height independent of density, the plantations have excellent height growth but the crowns are poorly developed. The stands did not stratify into crown classes to the extent of the White Pine and White Spruce, so crowns are narrow with a low live crown ratio.

The lack of treatment in these stands will not enable thinning to the desired spacing in one operation. The thinning regime will be crown and thinning from below. The treatment schedules will be accelerated until the desired spacing is achieved. Thinning will not be regulated by basal area but by present crown release of the crop trees. Each individual thinning operation will allow for a 100% crown exposure of the crop tree.

5.2.5 SCOTCH PINE PLANTATION MANAGEMENT

Scotch Pine was planted on the Agreement Forests for Christmas tree production. Provincial policy changes in the 1950's prevented the further sale of trees from public lands and the Scotch Pine plantations were left uncut. The seed source, although satisfactory for the production of Christmas trees, does not produce a mature tree with the qualities suitable for lumber production due to its southern European provenience. The plantations of Scotch Pine, although limited in number, will be clear-cut for pulpwood when the trees have attained merchantable size.

After clear-cutting and possible prescribed burning, the area will be reforested to a more suitable species.

5.2.6 MANAGEMENT OF MIXTURES

In the Agreement Forest a significant percentage of the plantations were established in mixtures of two or more species. Mixed stands were considered preferable to pure plantations due to their greater resistance to insects and disease. In addition, if one species were to become lost through natural mortality then the other species would continue to function as a crop. Plantations could be converted to a pure stand, if required, during thinning treatments.

The variable growth rates of different species may create problems and prevent the achievement of the original goals for the plantation. The more rapid height growth on one species early in the rotation may cause ascendancy over the slower growing species. The inevitable result would be a pure stand of the faster growing species. If the slower growing species is not sufficiently shade tolerant, only the random individual may achieve a position of dominance or co-dominance in the main canopy. This problem may be present if thinning treatments were not conducted prior to the suppression of the slower growing species. The inability or a delay in a thinning treatment is likely to result in the dominance of one species, not necessarily the most desirable one. If this does occur, it is wise to accept the situation as destruction of the crop trees. On the Bruce County Forests this situation has occurred in some instances and no attempt will be made to rescue the suppressed species.

It is impossible to present very precise guidelines on the thinning of mixtures due to the large number of combinations of species in various arrangements. Several guidelines for the most common mixtures are presented in the following sections.

WHITE PINE-RED PINE

In this working group the delayed thinning has allowed the superior initial growth of the Red Pine to cause it to ascend to a position of dominance. Significant mortality in the White Pine has occurred in most cases as a result of suppression. The species composition, although variable, tends to be 80% Red Pine and 20% White Pine. The complete removal of Red Pine in mid rotation is impossible, as there is not enough quality White Pine stems to fully occupy the site.

Thinning treatments will be a free thinning around the superior quality White Pine in order to maximize their numbers in the final crop. A general crown thinning will occur within the remaining Red Pine and thinning from below.

An attempt will be made to maintain the basal area at 25 square metres per hectare in the mid-rotation in order to maximize the number of potential Red Pine poles. However, if the tree thinning of the Pine causes a reduction in the basal area, the reduction of the poles will be accepted in order to maximize White Pine in the final crop. Later in the rotation the residual basal area will be reduced to 21 square metres to maximize the diameter increment.

WHITE PINE-WHITE SPRUCE

The initial objectives of this mixture was to remove the Spruce in the early rotation and then manage the plantation as a pure White Pine working group in mid to late rotation. Early rapid growth of the White Pine has caused its ascendancy and the Spruce is severely suppressed. The White Spruce is completely overtopped and will not produce the size to facilitate economic thinning. The Spruce will fall out of the stand due to suppression and therefore the result in this mixed working group is similar to an initially wide spaced pure White Pine plantation.

Due to the wide spacing, thinning will not be required until further into the rotation as adequate growing space should be provided for the first forty years. Thinning regimes will be consistent with the guidelines outlined in *Section 5.2.2.* As a result of the lack of stems for training, early pruning will be essential to limit the development of large knots.

EUROPEAN LARCH WITH WHITE PINE OR WHITE SPRUCE

The initial plan for this mixture was to thin the rapidly growing European Larch early in the rotation and then work with a pure stand of either White Pine or White Spruce. Delayed thinning has created an almost pure stand of European Larch with an insignificant number of the other species ascending into the main canopy.

These stands will be managed employing the principles as outlined in the section on European Larch plantations.

MULTIPLE MIXTURES OF THREE OR MORE SPECIES

Mixtures of three or more species cause silvicultural treatment problems as the varying growth rates of the species create operational difficulties.

The general thinning regime for these stands will be a crop tree release of the better quality trees regardless of species. However, if there is a choice between two quality trees then the tree of higher potential value will be favoured.

5.3 TOLERANT HARDWOOD MANAGEMENT

The policy for the management of the tolerant upland hardwood working group, (Sugar Maple, Beech, White Ash, Basswood), will be to create a balanced and uneven-aged stand which will have a stable equilibrium between growth and harvest. The silvicultural system employed to achieve this goal will be the selection system. The managed stands will be brought to the fully regulated situation by regularly spaced cutting cycles.

In the Bruce County area, maturity in the tolerant hardwoods will generally be 50 cm to 60 cm at d.b.h., depending on the productivity of the site. For the less tolerant species such as White Ash, Basswood and Black Cherry, the size at maturity may be slightly less (45 cm-55 cm).

The residual basal area after treatment will be approximately 21 square metres per hectare with 16 square metres in the sawlog size class (+ 25 cm). In order to maximize the saw-timber production an attempt will be made to maintain the stands with a growing stock distribution.

The condition of the growing stock on the Agreement Forests differs considerably from stand to stand. This variation is generally a result of past treatment. Many of the stands were either small polewood or heavily cut prior to the time of purchase. As a result there are no stands that are fully regulated, with the presence of good-quality trees in all diameter classes. All stands have deficiencies and a surplus in certain ranges of the growing stock and it will require several cutting cycles to achieve the fully regulated forest.

Stands on the Agreement Forests may be classified into two main groups. The first is the polewood, which tends to have a narrow range of diameter classes. These stands are a result of clear-cutting and are even-aged. The second type of stand is best designated as irregular uneven-aged that has two or more age classes and a wider diameter distribution. These are the result of high-grade cutting where some residual growing stock was left after past harvesting operations.

Stands of even-aged polewood will be managed on an even-aged system until trees obtain diameters approaching maturity. Only at this point will an

attempt be made to create cuttings of enough severity to lead to the establishment of age classes and the species of reproduction desired. Any attempts earlier in the rotation would sacrifice smaller high-quality sawlog trees that possess the potential to increase in size, grade and value. A low thinning will be done in order to re-distribute the stand growth potential to the individuals of higher quality. The residual basal area will be 21 square metres per hectare, which will be high enough to suppress stump sprouts and prevent epicormic branching. Cutting cycles during this stage of the stands development will range from around seven to twelve years depending on crown closure. When those stands approach maturity an effort will be made to create crown openings large enough to allow for the establishment and development of quality regeneration. At this point the target basal area will be reduced to 18 square metres per hectare and the cutting cycles will lengthen to approximately twelve years. The polewood stands will require 1.5 to 2.0 rotations to establish the regulated forest.

The irregular uneven-aged stands all have deficiencies or surpluses in certain diameter classes, but due to the greater size variation, they can be converted to the balanced uneven-aged situation more readily than the polewood stands. Silvicultural treatment will attempt to reduce the number of stems in the size classes with the surplus and facilitate the rapid movement of individuals into the deficient size classes. Residual basal areas will be 16 square metres in the saw-timber category and 4.5 square metres in the polewood class. With these stocking levels the poles will have sufficient room to develop into quality sawlog trees and regeneration can be established and will thrive. Cutting cycles will be approximately twelve years.

5.4 UPLAND CEDAR MANAGEMENT

The upland Cedar working groups have received limited silvicultural treatment on the County Forests in the past management periods. Work has consisted of two main types of treatment. One method of cutting has been a selection thinning. This has been difficult as the close spacing of standing trees creates operational difficulties. Thinning that is heavy enough to facilitate the use of large equipment is susceptible to significant losses due to blow-down. As a result of the problems in selection thinning, strip cutting has been attempted with some degree of success. No-cut strips running perpendicular to the prevailing winds have reduced or eliminated losses to wind-throw and provided suitable conditions for economic harvesting. However, natural regeneration in the cutout strips is slow.

A new method of Cedar cutting that will be used in certain instances is small patch clear-cuts. These small patch clear cuts will only be used when conditions or circumstances are not suitable for strip cuts.

5.5 LOWLAND HARDWOODS

The policy for the management of the lowland hardwoods (Sugar Maple, Soft Maple, Poplar, White Ash, Basswood, Balsam Fir, Green Ash, Black Ash) will be to create a balanced and uneven-aged stand which will have a stable equilibrium between growth and harvest. The silvicultural system employed to achieve this goal will be the selection system.

Management techniques will be basically the same as those discussed in section 5.3 with one exception. The residual basal area after treatment will be approximately 26 to 31 square metres per hectare. Lowland hardwoods have shallow root systems and are more susceptible to wind throw.

5.6 LOWLAND MIXED-WOOD MANAGEMENT

These areas have very limited potential for timber production and will therefore be managed primarily for their wildlife values. Management techniques will be aimed at habitat improvement for Deer. The management of these stands will be discussed in *Section 6.1.*

6.0 WILDLIFE

Bruce County Forests have been important areas for wildlife as these lands provide varying habitats suitable to a wide variety of species. Hunting has historically been a compatible use in conjunction with forest management and municipal forests have always been available to the public for their use. In the future County forests will be important venues for hunting as private land available for this activity continues to decline.

The County forests contribute to big and small game, waterfowl and trapping.

Due to the unpredictable fluctuations in wildlife population densities, no estimation of hunting opportunities will be presented. It is believed however that significant hunting activity is carried out on County forest properties particularly near population centers. Surveys may be conducted during this management period to determine the pressures of wildlife and hunting on the forests.

In general, County forestry will continue to contribute to wildlife population and habitat improvement work may take place if necessary in order to increase wildlife population in County forests. The only exception will be in regards to the beaver which will be discouraged where it's activities create a conflict with timber production or cause distress to adjacent landowners.

6.1 DEER MANAGEMENT

There have been no efforts undertaken in past management periods related to the improvement of either summer or winter habitat. The establishment of conifer plantations and the silvicultural treatment of the upland hardwood working groups have increased habitat indirectly but efforts in this regard have been aimed at the production of quality forest products.

Conifer plantations have the potential to develop into acceptable winter habitat, as the canopy structure possesses the ability to capture snow and reduce the ground snow depth. Later in the rotation, volunteer hardwoods will invade the plantations and food crops will increase. Summer range has also been increased through conifer establishment on abandoned open non-agricultural areas with limited potential for habitat that has been converted back to forest cover. The plantations create additional edge and allow for the establishment of herbaceous plants suitable as summer deer food.

In general, the greater the diversity within the canopy of the forest, the more suitable the habitat is for wildlife. The thinning in the polewood upland hardwood creates favourable conditions for deer, as increased light will filter through the more open canopy and thereby increase the herbaceous growth and allow for the establishment of regeneration of deciduous species. The benefit is temporary as crown expansion by the residual growing stock will eventually suppress the regeneration and reduce the herbaceous growth. Considering that thinning is an on-going process, the suitability of upland hardwoods for deer habitat will fluctuate until the stand receives harvesting operations that are designed for the permanent establishment of

regeneration. The harvesting for commercial sawlogs will be of significant severity to allow for the growth and development of the various age classes. When the forest attains the stage of development where there will be a substantial yield of sawlog class individuals, subsequent cutting cycles will include a regeneration-cut. The balanced uneven-aged forest will contain a continual diversity of suitable habitat.

Areas with the greatest potential for winter deer habitat are the lowland mixed wood sites containing significant populations of conifer species (i.e. Balsam Fir, White Spruce, White Cedar). While maintaining suitable winter cover, these sites usually produce food species such as poplar, willow and dogwood. This environment of food species in close proximity to winter cover provides optimum habitat for deer which is critical in maintaining or improving the site's carrying capacity. The maintenance or creation of an ecological diversity within this cover type is essential as forest succession may reduce the food crops, as the stands' deciduous species will grow taller and become unsuitable for deer food. In order to maintain the diversity, small patch clear cutting or alternate strip clear cutting may be undertaken to encourage accessible food species. Felling will take place in the areas of deciduous species and the conifers will be retained as cover. Deer will then feed in the cut over areas while the conifers provide adequate shelter.

Areas of pure upland Cedar provide only the cover aspect of the habitat requirement of deer. Food may be close by, but if the area is large, a significant portion of the Cedar stand will go unutilized. In order to improve these areas, alternate row-strip, clear-cutting will be undertaken to break up the cover and encourage the regeneration of food crops in the cleared areas. Through this treatment these areas will provide more suitable winter habitats.

6.2 SMALL GAME

The County forest's contribution to small game hunting opportunities is not calculable due to the inordinate number of variables. However, these areas will contribute to a considerable degree. There has been no effort to directly improve small game habitat during post management periods although benefits have occurred during silvicultural treatments for the production of forest products. For example, thinned plantations provide excellent roost trees for Wild Turkeys.

During this management period there will be no proactive management to improve small game production, but, during silvicultural

treatment and Deer range enhancement projects, small game habitats should be improved.

The following guidelines will be adhered to during silvicultural treatments to ensure a continuation of small game production.

a) a maintenance of species diversity in upland and lowland hardwood working groups;
b) maintenance or expansion of the existing forest edge;
c) during harvesting operations catkin producing trees will be retained where possible;
d) 6-8 cavity trees, where present, will be retained per hectare during commercial and stand improvement treatment;
e) as many trees as possible will be retained;
f) fence rows will be retained as travel corridors;
g) all stick nest trees will be retained;
h) drum logs will be laid down in areas of grouse habitat;
i) standing snags will be left standing where possible;
j) fallen woody debris will be left when possible.

6.3 WATERFOWL

Areas of potential waterfowl productions in County forests are extremely limited and therefore increase in their population will be insignificant.

Optimum habitat for waterfowl is open water interspersed with aquatic vegetation. Accompanying the open water there should be suitable nesting sites.

Sites exhibiting the potential as waterfowl production areas will be surveyed and if appropriate will be developed in cooperation with interest groups (i.e Ducks Unlimited) or through community involvement programs.

6.4 TRAPPING

Trapping opportunities for wetland fur-bearers in County forests are limited due to lack of habitat. The areas traditionally suitable for habitat will be maintained while in the newly flooded areas the nuisance beaver will be trapped.

Upland fur-bearers such as raccoon will be enhanced by den tree retention and fox and coyote dens will be left undisturbed.

7.0 FISHERIES

The contribution of the County forests to fisheries is insignificant as there are very few critical cold water and warm water sites. Protection is required in these areas to resume the preservation of the cold water habitat.

In general stream degradation occurs in proximity to open agricultural fields and heavily cut forested land where the sun's penetration allows water temperatures to rise significantly. Also, places of human settlement and cattle watering areas can be sources of pollutants that again may have severe detrimental effects.

The municipal forests in many respects demonstrate the proper management of cold water sites. Silvicultural treatments have occurred during past management periods yet adequate cover has been maintained to preserve the thermal integrity of the cold water fishery. This integrated approach to the management of two important resources on the same area will continue during the next management period. The following are general guidelines aimed at the protection of all streams and watercourses.

a) maintenance of 22-25 square metres per hectare of forest cover within 50 metres of streams;
b) no logging debris is to be deposited in streambeds;
c) harvesting will not occur during critical fish spawning periods in cold water sites;
d) properly designed and installed dredges or culverts at all major stream crossing; construction will not take place during spawning periods.

8.0 OUTDOOR RECREATION

The policy since the inception of the County Forests program has been to allow and encourage passive recreational opportunities. The rising demand for venues for outdoors recreational pursuits will mean an increased use of these properties during this management period.

Recreational activities such as cross-country skiing, snowmobiling, hiking, mountain biking and all terrain vehicle activities are compatible uses with wildlife, fisheries and forest management.

There is no targets for various out-door recreational opportunities. It is not possible to estimate the significance of the municipal forests current contribution however it is possible that surveys will be undertaken in this management period to determine use. Currently most of the compartments have some organized and approved activity (i.e. snowmobile trail, hiking trail, cross-country trail). Future user strategy will be to develop the properties in co-operation with various user groups.

It may be necessary to restrict the use of one recreation endeavor to ensure the integrity of another. For example, cross-county skiing and snow-mobile activities are not compatible uses on the same trail system.

Letters of authorization by the County will be used as the vehicle to allow the development of organized recreational activities.

8.1 CROSS-COUNTY SKIING

Demand for cross-county skiing opportunities are expected to rise significantly, especially as the County promotes tourism.

The sport may be classified into three main types; backcountry, in-track skiing and skate skiing (freestyle) all performed on groomed trails. The intrack skiing is characterized by a wider trail in order to facilitate the maneuvering of track setting equipment. The skate skiing trail requires near interior road width conditions for rolling, subsequent packing and grooming with no tracks set into the surface. No type of skiing will be given priority as the advantages of the less impacting back-country skiing is offset by the greater demand for groomed trails and hence the creation of more recreational opportunities.

The type of trail development will be influenced by the significance of the individual forest tract. The backcountry skiing will be considered a more suitable form of development in areas designated as Areas of Natural and Scientific Interest established for their life science values. The less developed trail right-of-ways will have a less visual impact and more importantly create fewer disturbances to the botanical communities. Groomed trails will be more desirable on forested areas not containing important life science values. On these tracts an attempt will be made to maximize the recreational opportunities. (ie. Mountain Biking)

8.2 SNOWMOBILE TRAILS

Snowmobile trail development has been stabilized and there is not expected to be a significant increase in new trail development during the next management period. Existing trails may be maintained or improved in partnership with local snowmobile clubs and the County.

Future trail development will be approved on the basis of providing lineal linkage between established points of interest to create a more intensive network of interconnecting passages.

8.3 HIKING

Hiking has always been encouraged in the County forests both in organized trails and general hikes through the woods. Recreational demand for hiking is low and during this management period efforts will attempt to intensify this activity.

The strategy to increase the hiking opportunities will be to develop interpretive trails on the more diverse properties. The trails will be self-guiding and will illustrate forest management, wildlife habitat and well as other areas of significance. Public education in regards to intensive forest management techniques displayed in the County forests will be given higher priority during the next management period through the system of interpretive trails.

8.4 ALL-TERRAIN VEHICLES

The fastest growing recreational use of County forests may be all-terrain vehicles. At present all-terrain vehicles outsell snowmobiles 4 to 1. New all-terrain vehicle clubs are forming across the province. Unorganized activities by all-terrain vehicles have a significant potential for site damage caused by compaction and erosion.

The County of Bruce will develop a strategy to ensure recreational opportunities by these all-terrain vehicles are compatible with County policies and procedure.

All-terrain vehicle clubs will be invited to make formal proposals to the County. Existing trails will be used where possible and in conjunction with other established users.

8.5 OTHER RECREATIONAL VEHICLE TRAILS

Trail development for 4 x 4 trucks and motorcycles will not be permitted. These activities have a significant potential for site damage caused by compaction and erosion.

8.6 MOUNTAIN BIKING

Mountain biking which is an ever increasing and physically demanding sport will be encouraged in County forests by using the cross-country ski and snowmobile trails. These sports can work well together as mountain biking is a non-snow activity while skiing and snowmobiling are winter activities. Some single track, technically demanding trails could also be developed with input from local clubs. With all season trail activities the maintenance for any one group could be kept to a minimum.

8.7 HUNTING, FISHING AND TRAPPING

Hunting, fishing and trapping are integral parts of resource management as well as recreational and tourism activities they will continue to be allowed on most of the County forests. Exceptions will be areas of high residential populations and will continue to be dealt with on an individual basis.

9.0 MANAGEMENT OF AREA OF NATURAL AND SCIENTIFIC INTEREST

These are lands containing landscapes or features that have been identified as having values related to protection, natural heritage appreciation, scientific study or education.

Some of the Bruce County Forests have been identified as such and the management treatments will ensure the protection of the designated interest.

Bruce County Forest properties have been selected as areas of Natural and Scientific Interest in both the Life Science and Earth Science categories. Forestry, wildlife, fisheries management and outdoor recreation development will be compatible activities within these areas. Modified harvesting in some areas may be required to ensure the achievement of the County's protection mandate.

Prior to the actual treatment, these areas will be surveyed to determine the location of the significant values. These areas will then be flagged and during silvicultural operations felling into and skidding within these areas may be restricted. Marking guidelines will conform to those as presented in *Section 5.3.*

In the event that Environmental Impact Studies or botanical surveys discover the presence of an extremely exceptional plant species (i.e. a new toxin) or ecosystem then management activities will be abrogated in the area having the significant feature and a suitable buffer will be determined. Forest and wildlife management will then continue on the forest tract in the non-affected areas.

10.0 THE MANAGEMENT OF AGREEMENT FOREST LAND WITHIN THE NIAGARA ESCARPMENT PLANNING AREA

Currently there are no County owned forests within the Niagara Escarpment Plan area but in the future if property does fall within the boundaries, then integrated resource management based on sound forestry, wildlife and recreational principles will be employed. These principles are consistent with the Niagara Escarpment Plan and therefore the relevant provisions of the Plan will be adhered to in all management activities.

11.0 MINERAL, AGGREGATES AND PETROLEUM RESOURCES

The mineral, aggregates and petroleum resources potential on Bruce County forests is at present unknown

Petroleum resource exploration will be permitted on the forest, as long as the limited area required to conduct the preliminary surveys does not conflict with the forestry, recreation and wildlife management activities.

The extraction of mineral aggregate will be considered provided the activity does not remove areas of productive forested land.

12.0 FIRE CONTROL

The suppression of fires in County Forests is the responsibility of the local municipal fire departments and the County will assist with training and other expertise if requested.

12.1 LIVESTOCK CONTROL

The grazing of livestock on forested land is detrimental due to soil compaction and the elimination of seedlings, which are required in order to achieve the fully regulated forest.

In past management periods, fencing to restrict livestock has been a shared effort with neighbouring landowners with the County maintaining one half of the line fence. Action has been taken upon request. This policy will continue throughout this management period.

12.2 INSECTS AND DISEASES

The detection of insects and disease will be the responsibility of the Bruce County forest technician in co-operation with the Province and Federal Departments that deal with Forest Health.

Control action will be the sole responsibility of Bruce County and may be necessary from time to time in order to protect the resources of the County forests. If control action necessitates the use of insecticides, biological agents, or other pesticides then the adjacent landowners and public will be consulted prior to control action.

13.0 MAINTENANCE OF THE PLAN

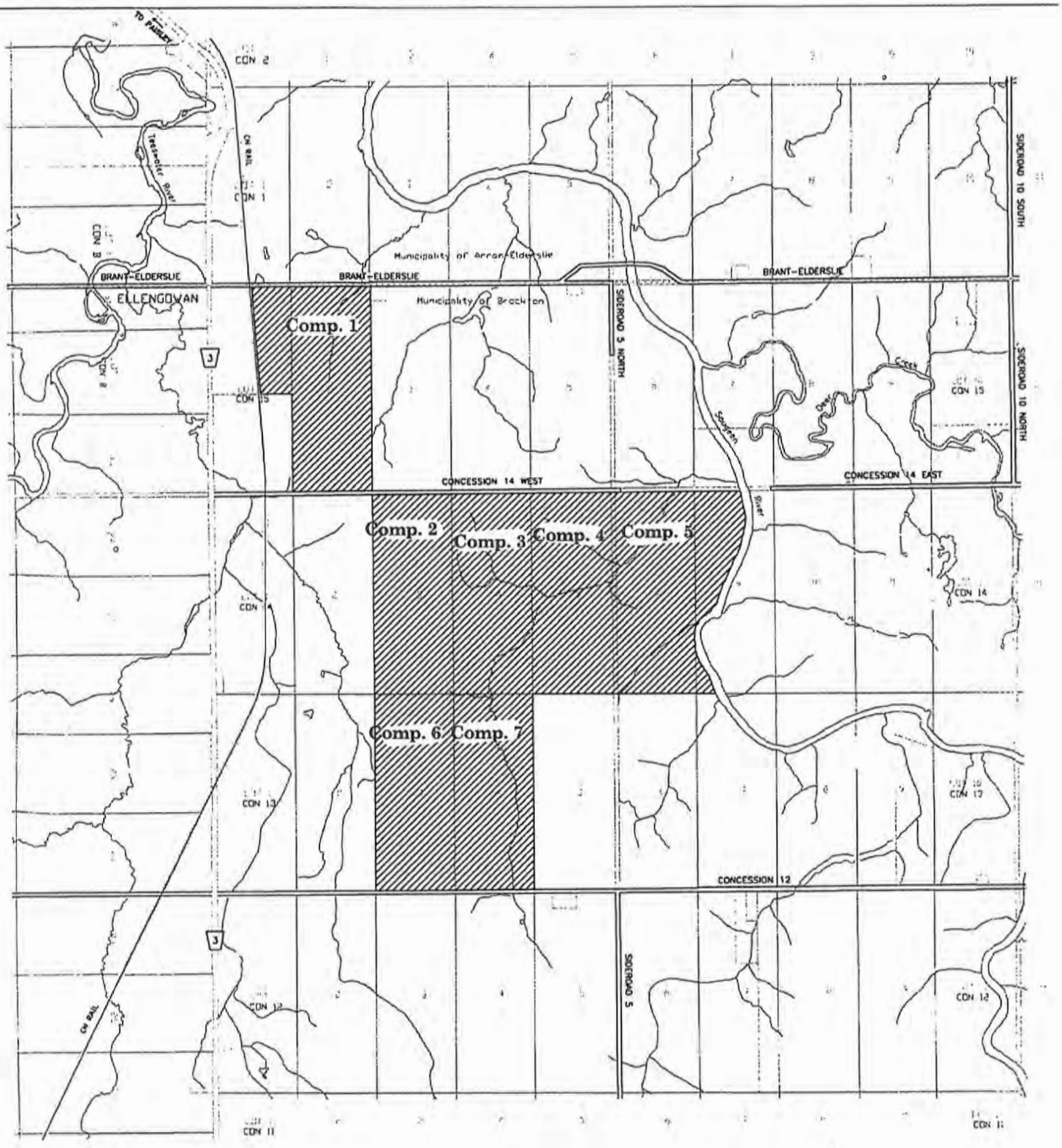
The management period for this plan is January 1, 2001 to December 31, 2021.

There will be four operating plans of equal duration, 2001 to 2005;
2006 to 2010;
2011 to 2015 and
2016 to 2021.
Annual plans will be submitted prior to the beginning of each year.

Work accomplished will be reported to the Bruce County Council following the completion of each operating year. The work will be recorded and maintained by the Bruce County forest technician.

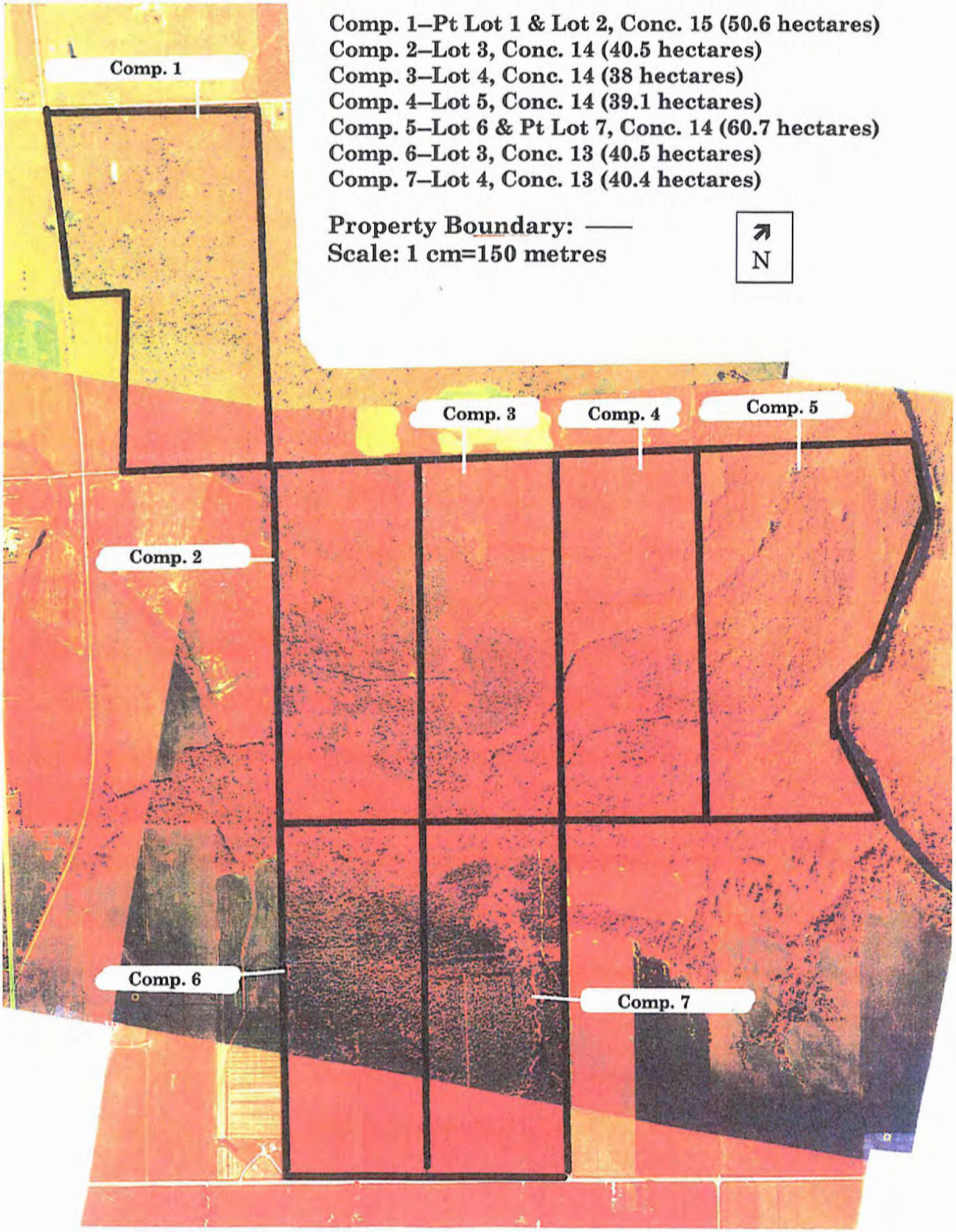
Property Location Map

Municipality of Brockton (Brant), County of Bruce



Bruce County Forest
Arial Compartment Map
Brant Tract

Municipality of Brockton (Brant Twp.), County of Bruce



Comp. 1–Pt Lot 1 & Lot 2, Conc. 15 (50.6 hectares)
Comp. 2–Lot 3, Conc. 14 (40.5 hectares)
Comp. 3–Lot 4, Conc. 14 (38 hectares)
Comp. 4–Lot 5, Conc. 14 (39.1 hectares)
Comp. 5–Lot 6 & Pt Lot 7, Conc. 14 (60.7 hectares)
Comp. 6–Lot 3, Conc. 13 (40.5 hectares)
Comp. 7–Lot 4, Conc. 13 (40.4 hectares)

Property Boundary: ——
Scale: 1 cm=150 metres

N

Bruce County Forest
Compartment Map
Brant Tract

Compartment 1

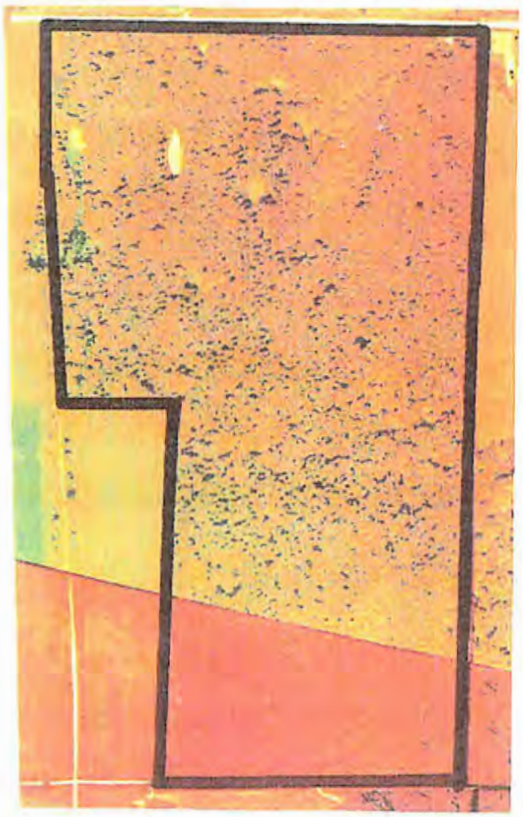
Part Lot 1 & Lot 2, Conc. 15,
Municipality of Brockton (Brant)

N

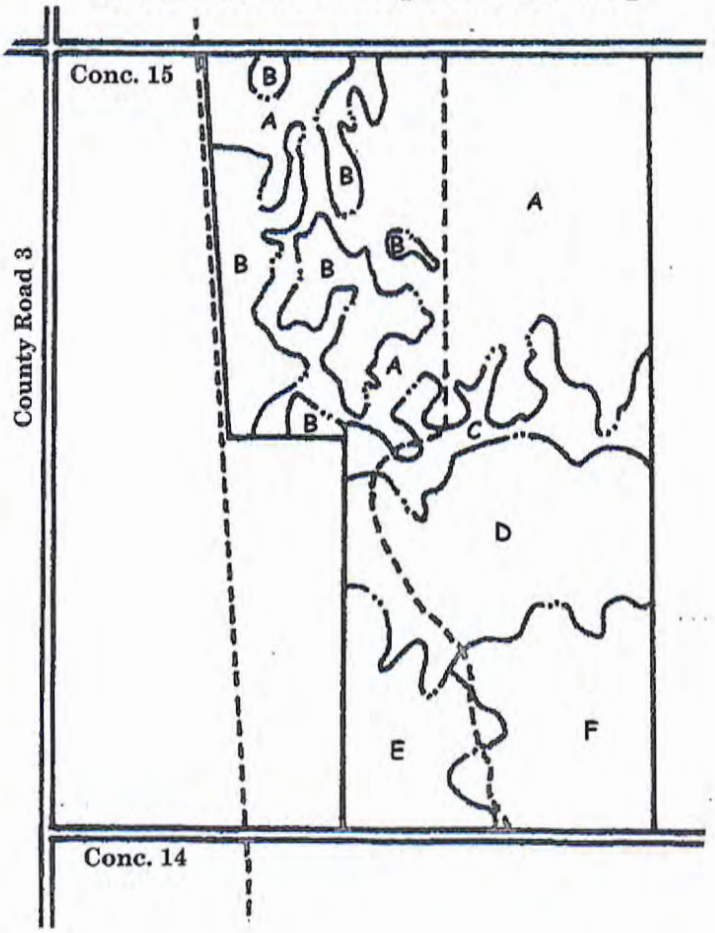
Property Boundary: —— **Compartment Boundary:** ••—••—
Township Roads: ==== **Trails:** —— **Scale: 1 cm=100 m**

Compartment	Species	No. of Hectares
1-A	Pw_7 Sn_3	20.2
1-B	Ms_7 Po_2 Cb_1	6.8
1-C	Po_5 Ms_4 Aw_1	3.9
1-D	Pw_6 Sw_2 Po_1 Oh_1	8.6
1-E	Pw_9 Oh_1	4.8
1-F	Ms_5 Po_2 Cb_1 Aw_1 Oh_1	6.3
Total Hectares		50.6 Hectares

Compartment Arial Map



Hand Drawn Compartment Map



Bruce County Forest
Compartment Map
Brant Tract

Compartment 2

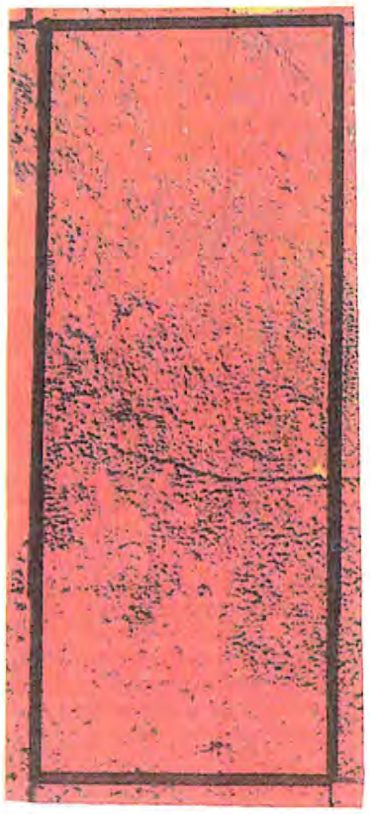
Lot 3, Conc. 14,
Municipality of Brockton (Brant)

N

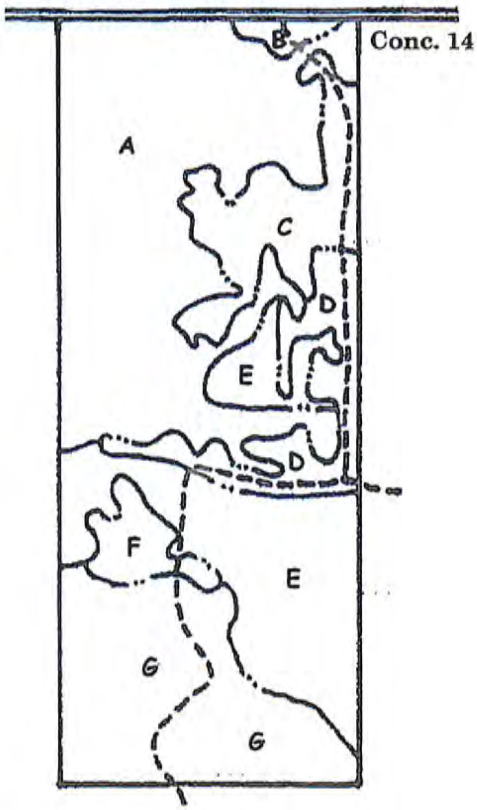
Property Boundary: —— **Compartment Boundary:** ••—••—
Township Roads: ==== **Trails:** —— **Scale: 1 cm=100 m**

Compartment	Species	No. of Hectares
2-A	Ms_5 Po_2 Sw_2 Oh_1	14.1
2-B	Sw_9 Oh_1	0.6
2-C	Pw_7 Sw_3	4.5
2-D	Sw_8 Pw_2	3.6
2-E	Pw_9 Oh_1	8.1
2-F	Ms_9 Po_1	1.3
2-G	Ms_4 Mh_2 Cb_2 Aw_1 Oh_1	8.3
Total Hectares		40.5 Hectares

Compartment Arial Map



Hand Drawn Compartment Map



Bruce County Forest
Compartment Map
Brant Tract

Compartment 3

Lot 4, Conc. 14, Municipality of Brockton (Brant)

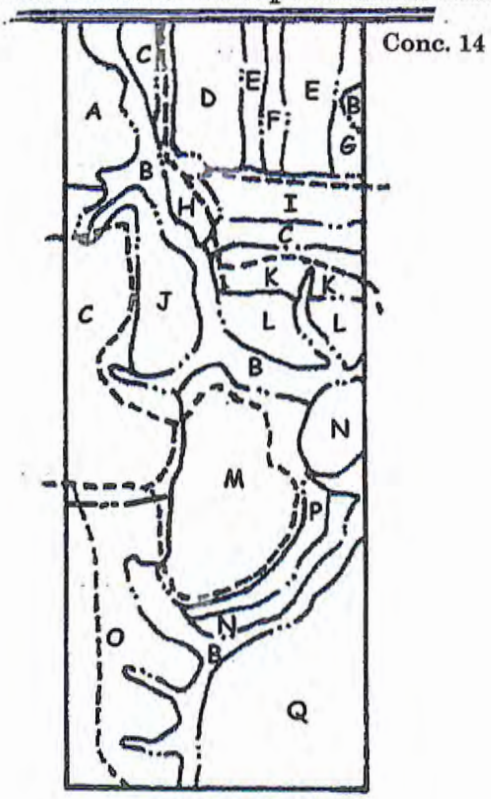
N

Property Boundary: —— **Compartment Boundary:** ••—••—
Township Roads: ==== **Trails:** —— **Scale: 1 cm=100 m**

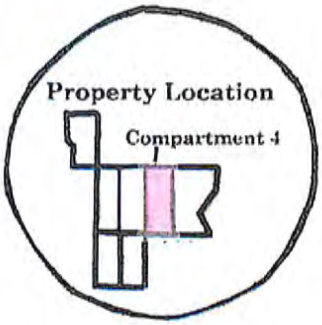
Compartment	Species	No. of Hectares
3-A	Pw_7 Sw_3	1.8
3-B	Mh_3 Po_3 Bd_1 E_1 Pw_1 Oh_1	4.4
3-C	Sw_9 Oh_1	4.1
3-D	Sw_7 Pw_2 Oh_1	1.8
3-E	Ow_4 Pw_3 Or_2 Oh_1	1.7
3-F	Pr_9 Pw_1	0.6
3-G	Pw_7 Aw_1 Ob_1 Oh_1	0.6
3-H	Open	1.0
3-I	Pw_5 Ow_3 Aw_1 Po_1	1.4
3-J	Pr_7 Pw_3	1.8
3-K	Ob_6 Pw_2 Aw_1 Sw_1	0.8
3-L	Pw_6 Pr_4	1.3
3-M	Pr_8 Pw_2	4.4
3-N	Pw_{10}	0.8
3-O	Pw_8 Sw_1 Oh_1	5.6
3-P	Le_{10}	1.1
3-Q	Mh_2 Aw_2 Pw_2 Cb_1 Po_1 Ms_1 Oh_1	4.8
Total Hectares		38 Hectares

Compartment Arial Map

Hand Drawn Compartment Map



Bruce County Forest
Compartment Map
Brant Tract



Compartment 4
Lot 5, Conc. 14,
Municipality of Brockton (Brant)

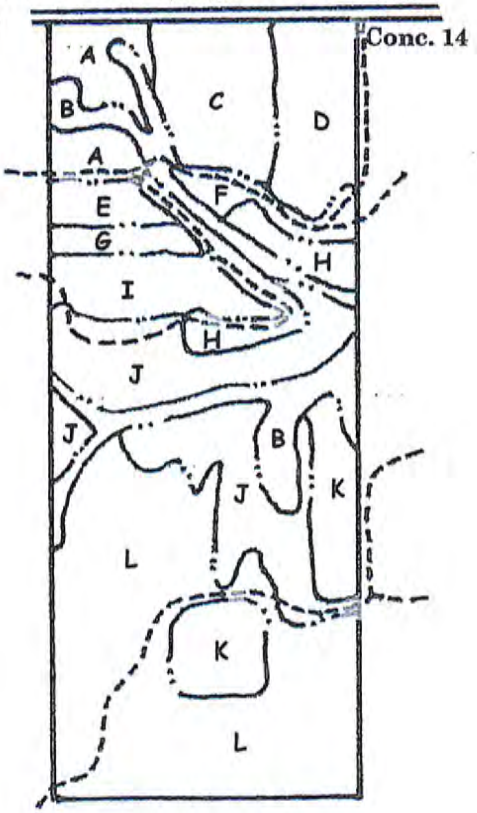
N

Property Boundary: —— **Compartment Boundary:** ••—••—
Township Roads: ==== **Trails:** —— **Scale: 1 cm=100 m**

Compartment	Species	No. of Hectares
4-A	Pw_5 Sw_3 Aw_2	2.3
4-B	Po_7 Ag_2 Oh_1	3.8
4-C	Pw_6 Aw_2 Ps_1 Sw_1	3.0
4-D	Pw_7 Ob_2 Aw_1	2.5
4-E	Pw_7 Ps_1 Ow_1 Aw_1	0.5
4-F	Le_8 Pw_2	0.9
4-G	Sw_{10}	0.6
4-H	Pw_5 Pr_5	2.6
4-I	Pw_6 Ob_2 Sw_1 Aw_1	2.0
4-J	Pw_7 Sw_3	6.6
4-K	Pw_{10}	3.1
4-L	Mh_2 Ms_2 Po_2 Aw_1 Cb_1 Sw_1 Oh_1	11.2
Total Hectares		39.1 Hectares

Compartment Arial Map

Hand Drawn Compartment Map



Bruce County Forest
Compartment Map
Brant Tract

Compartment 5

Lot 6 and Part Lot 7, Conc. 14,
Municipality of Brockton (Brant)

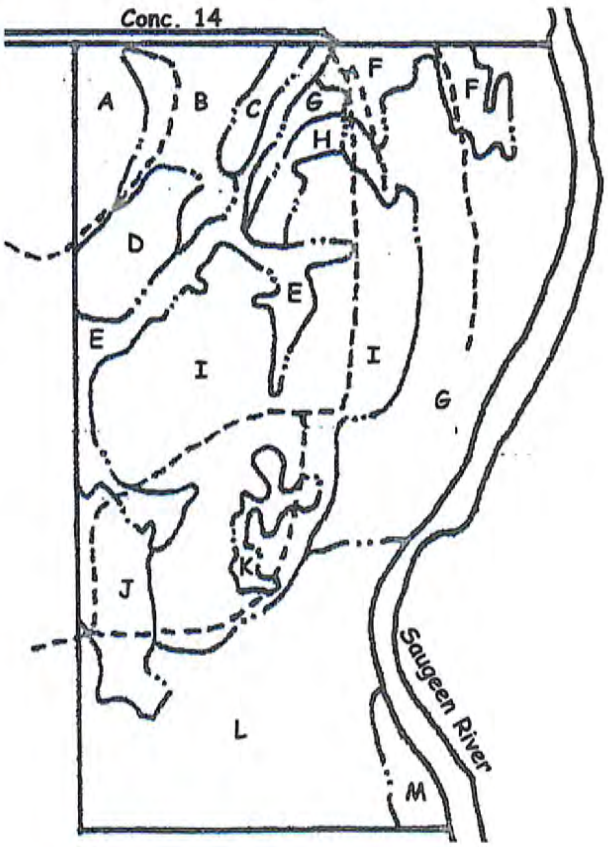
N

Property Boundary: —— **Compartment Boundary:** ••—••—
Township Roads: ==== **Trails:** ——— **Scale: 1 cm=100 m**

Compartment	Species	No. of Hectares
5-A	Pw_{10}	2.1
5-B	Pw_7 Pr_3	3.1
5-C	Sw_{10}	1.6
5-D	Le_9 Oh_1	2.0
5-E	Open	5.0
5-F	Open	2.3
5-G	Ce_9 Pw_1	11.9
5-H	Pw_9 Sw_1	0.9
5-I	Pw_6 Le_4	15.0
5-J	Pw_9 Cb_1	2.7
5-K	Po_8 Ms_2	0.9
5-L	Mh_4 Aw_2 Pw_1 Ms_1 Po_1 Oh_1	12.0
5-M	Sw_6 Aw_3 Oh_1	1.2
Total Hectares		60.7 Hectares

Compartment Arial Map

Hand Drawn Compartment Map



Bruce County Forest
Compartment Map
Brant Tract

N

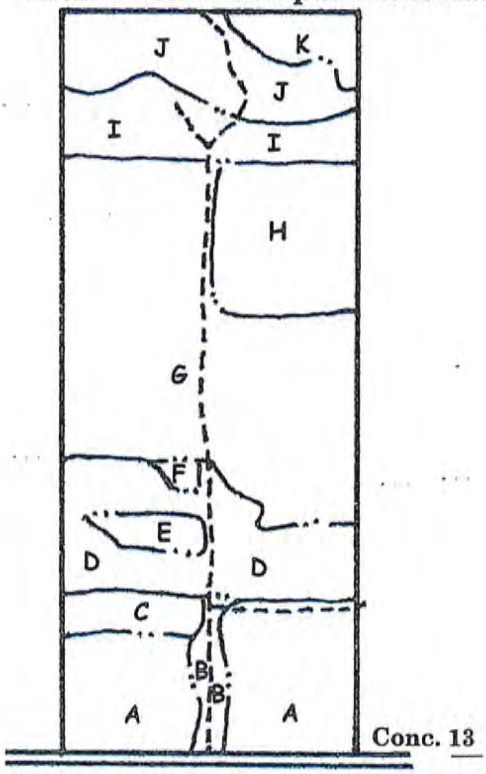
Compartment 6
Lot 3, Conc. 13, Municipality of Brockton (Brant)

Property Boundary: —— **Compartment Boundary:** ••—••—
Township Roads: ==== **Trails:** ---- **Scale: 1 cm=100 m**

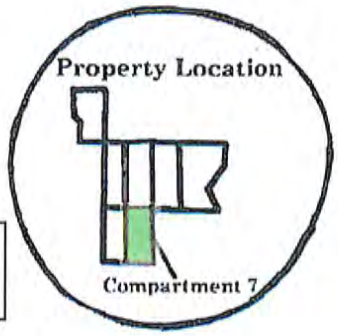
Compartment	Species	No. of Hectares
6-A	Pw_9 Oh_1	6.6
6-B	Open	0.7
6-C	Ce_6 Pw_4	1.2
6-D	Sw_{10}	5.5
6-E	Ce_{10}	0.8
6-F	Po_8 Sw_2	0.4
6-G	Pw_6 Sw_4	13.3
6-H	Pw_5 Ps_3 Sw_1 Pr_1	4.2
6-I	Po_5 Ag_2 Mh_1 Ms_1 Oh_1	3.2
6-J	Ms_5 He_2 Mh_2 Oh_1	3.5
6-K	Mh_5 Ms_3 Aw_1 Cb_1	1.1
Total Hectares		40.5 Hectares

Compartment Arial Map

Hand Drawn Compartment Map



Bruce County Forest
Compartment Map
Brant Tract



Compartment 7

Lot 4, Conc. 13, Municipality of Brockton (Brant)

N

Property Boundary: —— **Compartment Boundary:** ••—••—
Township Roads: ==== **Trails:** – – – **Scale: 1 cm=100 m**

Compartment	Species	No. of Hectares
7-A	$Ce_6\ Pw_4$	5.3
7-B	$Ce_6\ Po_3\ Ms_1$	0.3
7-C	$Ce_6\ Pw_4$	1.6
7-D	$Pw_8\ Sw_2$	12.5
7-E	$Ce_8\ Po_2$	1.3
7-F	$Sw_9\ Cb_1$	4.6
7-G	$Mh_5\ Cb_4\ Oh_1$	0.3
7-H	$Mh_4\ Bd_3\ Aw_2\ Oh_1$	4.3
7-I	$Sw_5\ Pw_2\ Ps_2\ Oh_1$	6.0
7-J	$Mh_6\ Ms_2\ Aw_1\ Cb_1$	2.3
7-K	$Mh_5\ Aw_4\ Oh_1$	1.9
Total Hectares		40.4 Hectares

Compartment Arial Map

Hand Drawn Compartment Map

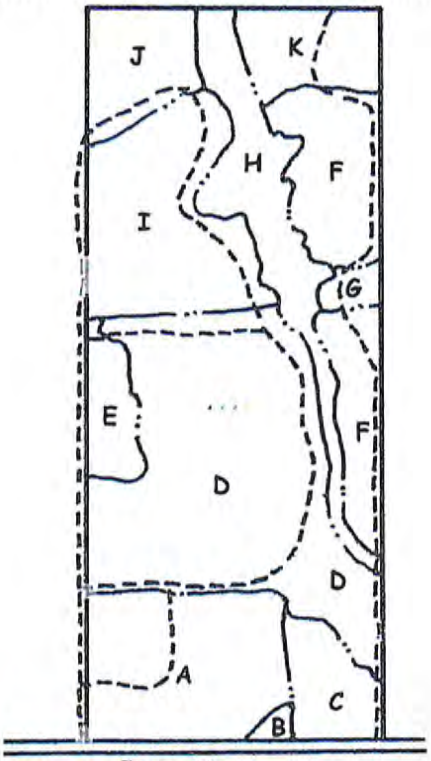


TABLE 1

PRODUCTIVE FOREST LAND

Working Group	Production Forest (Ha)	Total Productive Forest
White Pine	140.7	140.7
Red Pine	6.8	6.8
Norway/White Spruce	29.6	29.6
Cedar	22.4	22.4
European Larch	4.0	4.0
Hardwoods	44.8	44.8
Softwoods	40.3	40.3
Poplar	11.8	11.8
TOTAL	300.4	300.4

NON-PRODUCTIVE FOREST LAND

Open Lands 9.0

*Data from the 2000 Re-inventory

Bruce County Forests

Forest Compartment Summary

for
Brant Tract
Municipality of Brockton (Brant)

Compartment #1-Part Lot 1 & Lot 2, Conc. 15

Compartment	Species	No. of Hectares
1-A	Pw_7 Sn_3	20.2
1-B	Ms_7 Po_2 Cb_1	6.8
1-C	Po_5 Ms_4 Aw_1	3.9
1-D	Pw_6 Sw_2 Po_1 Oh_1	8.6
1-E	Pw_9 Oh_1	4.8
1-F	Ms_5 Po_2 Cb_1 Aw_1 Oh_1	6.3
Total Hectares		50.6 Hectares

Compartment #2-Lot 3, Conc. 14

Compartment	Species	No. of Hectares
2-A	Ms_5 Po_2 Sw_2 Oh_1	14.1
2-B	Sw_9 Oh_1	0.6
2-C	Pw_7 Sw_3	4.5
2-D	Sw_8 Pw_2	3.6
2-E	Pw_9 Oh_1	8.1
2-F	Ms_9 Po_1	1.3
2-G	Ms_4 Mh_2 Cb_2 Aw_1 Oh_1	8.3
Total Hectares		40.5 Hectares

Compartment #3-Lot 4, Conc. 14

Compartment	Species	No. of Hectares
3-A	Pw_7 Sw_3	1.8
3-B	Mh_3 Po_3 Bd_1 E_1 Pw_1 Oh_1	4.4
3-C	Sw_9 Oh_1	4.1
3-D	Sw_7 Pw_2 Oh_1	1.8
3-E	Ow_4 Pw_3 Or_2 Oh_1	1.7
3-F	Pr_9 Pw_1	0.6
3-G	Pw_7 Aw_1 Ob_1 Oh_1	0.6
3-H	Open	1.0
3-I	Pw_5 Ow_3 Aw_1 Po_1	1.4
3-J	Pr_7 Pw_3	1.8
3-K	Ob_6 Pw_2 Aw_1 Sw_1	0.8
3-L	Pw_6 Pr_4	1.3
3-M	Pr_8 Pw_2	4.4
3-N	Pw_{10}	0.8
3-O	Pw_8 Sw_1 Oh_1	5.6
3-P	Le_{10}	1.1
3-Q	Mh_2 Aw_2 Pw_2 Cb_1 Po_1 Ms_1 Oh_1	4.8
Total Hectares		38 Hectares

Compartment #4-Lot 5, Conc. 14

Compartment	Species	No. of Hectares
4-A	Pw_5 Sw_3 Aw_2	2.3
4-B	Po_7 Ag_2 Oh_1	3.8
4-C	Pw_6 Aw_2 Ps_1 Sw_1	3.0
4-D	Pw_7 Ob_2 Aw_1	2.5
4-E	Pw_7 Ps_1 Ow_1 Aw_1	0.5
4-F	Le_8 Pw_2	0.9
4-G	Sw_{10}	0.6
4-H	Pw_5 Pr_5	2.6
4-I	Pw_6 Ob_2 Sw_1 Aw_1	2.0
4-J	Pw_7 Sw_3	6.6
4-K	Pw_{10}	3.1
4-L	Mh_2 Ms_2 Po_2 Aw_1 Cb_1 Sw_1 Oh_1	11.2
Total Hectares		39.1 Hectares

Compartment #5-Lot 6 & Part Lot 7, Conc. 14

Compartment	Species	No. of Hectares
5-A	Pw_{10}	2.1
5-B	Pw_7 Pr_3	3.1
5-C	Sw_{10}	1.6
5-D	Le_9 Oh_1	2.0
5-E	Open	5.0
5-F	Open	2.3
5-G	Ce_9 Pw_1	11.9
5-H	Pw_9 Sw_1	0.9
5-I	Pw_6 Le_4	15.0
5-J	Pw_9 Cb_1	2.7
5-K	Po_8 Ms_2	0.9
5-L	Mh_4 Aw_2 Pw_1 Ms_1 Po_1 Oh_1	12.0
5-M	Sw_6 Aw_3 Oh_1	1.2
Total Hectares		60.7 Hectares

Compartment #6-Lot 3, Conc. 13

Compartment	Species	No. of Hectares
6-A	$Pw_9\ Oh_1$	6.6
6-B	Open	0.7
6-C	$Ce_6\ Pw_4$	1.2
6-D	Sw_{10}	5.5
6-E	Ce_{10}	0.8
6-F	$Po_8\ Sw_2$	0.4
6-G	$Pw_6\ Sw_4$	13.3
6-H	$Pw_5\ Ps_3\ Sw_1\ Pr_1$	4.2
6-I	$Po_5\ Ag_2\ Mh_1\ Ms_1\ Oh_1$	3.2
6-J	$Ms_5\ He_2\ Mh_2\ Oh_1$	3.5
6-K	$Mh_5\ Ms_3\ Aw_1\ Cb_1$	1.1
Total Hectares		40.5 Hectares

Compartment #7-Lot 4, Conc. 13

Compartment	Species	No. of Hectares
7-A	$Ce_6\ Pw_4$	5.3
7-B	$Ce_6\ Po_3\ Ms_1$	0.3
7-C	$Ce_6\ Pw_4$	1.6
7-D	$Pw_8\ Sw_2$	12.5
7-E	$Ce_8\ Po_2$	1.3
7-F	$Sw_9\ Cb_1$	4.6
7-G	$Mh_5\ Cb_4\ Oh_1$	0.3
7-H	$Mh_4\ Bd_3\ Aw_2\ Oh_1$	4.3
7-I	$Sw_5\ Pw_2\ Ps_2\ Oh_1$	6.0
7-J	$Mh_6\ Ms_2\ Aw_1\ Cb_1$	2.3
7-K	$Mh_5\ Aw_4\ Oh_1$	1.9
Total Hectares		40.4 Hectares

BRUCE COUNTY FOREST

FIVE YEAR OPERATING PLAN SUMMARY

White Pine

Comp.	Stand	Area (Hectares)	Species Composition (%)	5 Year Management Plan
1	A	20.2	Pw_7Sn_3	4th row removal and a selective harvest in remaining rows. Rows may vary due to mortality and poor health.
1	D	8.6	$Pw_6Sw_2Po_1Oh_1$	4th row removal and a selective harvest in remaining rows. Rows may vary due to mortality and poor health.
1	E	4.8	Pw_9Oh_1	4th row removal and a selective harvest in remaining rows.
2	C	4.5	Pw_7Sw_3	4th row removal and a selective harvest in remaining rows. Rows may vary due to mortality and poor heath.
2	E	8.1	Pw_9Oh_1	4th row removal and a selective harvest in remaining rows. Rows may vary due to mortality and poor heath.
3	A	1.8	Pw_7Sw_3	4th row removal and a selective harvest in remaining rows.
3	G	0.6	$Pw_7Aw_1Ob_1Oh_1$	4th row removal and a selective harvest in remaining rows.
3	I	1.4	$Pw_5Ow_3Aw_1Po_1$	4th row removal and a selective harvest in remaining rows.
3	L	1.3	Pw_6Pr_4	4th row removal and a selective harvest in remaining rows.
3	N	0.8	Pw_{10}	4th row removal and a selective harvest in remaining rows.
3	O	5.6	$Pw_8Sw_1Oh_1$	Selective harvest.
4	A	2.3	$Pw_5Sw_3Aw_2$	4th row removal and a selective harvest in remaining rows.
4	C	3.0	$Pw_6Aw_2Ps_1Sw_1$	4th row removal and a selective harvest in remaining rows.
4	D	2.5	$Pw_7Ob_2Aw_1$	4th row removal and a selective harvest in remaining rows.

White Pine continued

4	E	0.5	$Pw_7Ps_1Ow_1Aw1$	4th row removal and a selective harvest in remaining rows.
4	H	2.6	Pw_5Pr_5	4th row removal and a selective harvest in remaining rows.
4	I	2.0	$Pw_6Ob_2Sw_1Aw_1$	4th row removal and a selective harvest in remaining rows.
4	J	6.6	Pw_7Sw_3	Improvement harvest and White Pine and White Spruce will have a 4th row removal.
4	K	3.1	Pw_{10}	4th row removal and a selective harvest in remaining rows. White Pine harvested more intensively due to False Pine Webworm
5	A	2.1	Pw_{10}	Leave to grow and develop.
5	B	3.1	Pw_7Pr_3	4th row removal and a selective harvest in remaining rows.
5	H	0.9	Pw_9Sw_1	4th row removal and a selective harvest in remaining rows.
5	I	15.0	Pw_6Le_4	4th row removal and a selective harvest in remaining rows.
5	J	2.7	Pw_9Cb_1	4th row removal and a selective harvest in remaining rows.
6	A	6.6	Pw_9Oh_1	4th row removal and a selective harvest in remaining rows.
6	G	13.3	Pw_6Sw_4	4th row removal and a selective harvest in remaining rows.
6	H	4.2	$Pw_5Ps_3Sw_1Pr_1$	4th row removal and a selective harvest in remaining rows. which will remove the majority of the Scotch Pine.
7	D	12.5	Pw_8Sw_2	4th row removal and a selective harvest in remaining rows.
Total Hectares		140.7		

Hardwoods

Comp.	Stand	Area (Hectares)	Species Composition (%)	5 Year Management Plan
3	B	4.4	$Mh_3Po_3Bd_1Ea_1Pw_1Oh_1$	Leave to grow and develop.
3	E	1.7	$Ow_3Pw_3Or_2Oh_1$	4th row removal and a selective harvest in remaining rows.
3	K	0.8	$Ob_6Pw_2Aw_1Sw_1$	4th row removal and a selective harvest in remaining rows.
3	Q	4.8	$Mh_2Aw_2Pw_2Cb_1Po_1Ms_1Oh_1$	Undergo an improvement harvest.
4	L	11.2	$Mh_2Ms_2Po_1Aw_1Cb_1Sw_1Oh_1$	Undergo an improvement harvest. White Pine and White Spruce will have a 4th row removal and a selective harvest.
5	L	12.0	$Mh_4Aw_2Pw_1Ms_1Po_1Oh_1$	Undergo an improvement harvest. White Pine and White Spruce to have a 4th row removal and a selective harvest in remaining rows.
6	K	1.1	$Mh_5Ms_3Aw_1Cb_1$	Undergo an improvement harvest.
7	G	0.3	$Mh_5Cb_4Oh_1$	Undergo an improvement harvest.
7	H	4.3	$Mh_4Bd_3Aw_2Oh_1$	Undergo a light improvement harvest in the hardwoods.
7	J	2.3	$Mh_6Ms_2Aw_1Cb_1$	Undergo a light improvement harvest in the hardwoods. White Pine will have a 4th row removal and a selective harvest in remaining rows.
7	K	1.9	Mh_5Aw4Oh_1	Undergo a light improvement harvest.
Total hectares		44.8		

Softwoods

Comp.	Stand	Area (Hectares)	Species Composition (%)	5 Year Management Plan
1	B	6.8	$Ms_7Po_2Cb_1$	Leave to grow and develop.
1	F	6.3	$Ms_5Po_2Cb_1Aw_1Oh_1$	Undergo an improvement harvest.
2	A	14.1	$Ms_5Po_2Sw_2Oh_1$	White Pine and White Spruce to undergo a first thinning harvest. Soft Maple to undergo a light improvement harvest.
2	F	1.3	Ms_9Oh_1	Undergo an improvement harvest.
2	G	8.3	$Ms_4Mh_2Cb_1Aw_1Oh_1$	Undergo a light improvement harvest.
6	J	3.5	$Ms_5He_2Mh_2Oh_1$	Undergo an improvement harvest.
Total Hectares		40.3		

Poplar

Comp.	Stand	Area (Hectares)	Species Composition (%)	5 Year Management Plan
1	C	3.9	$Po_5Ms_4Aw_1$	Leave to grow and develop.
4	B	3.8	$Po_7Ag_2Oh_1$	Leave to grow and develop.
5	K	0.9	Po_8Ms_2	Leave to grow and develop.
6	F	3.2	Po_8Sw_2	Leave for wildlife and watershed protection,
Total Hectares		11.8		

Spruce

Comp.	Stand	Area (Hectares)	Species Composition (%)	5 Year Management Plan
2	B	0.6	Sw_9Oh_1	4th row removal and a selective harvest in remaining rows.
2	D	3.6	Sw_8Pw_2	4th row removal and a selective harvest in remaining rows.
3	C	4.1	Sw_9Oh_1	4th row removal and a selective harvest in remaining rows. Some areas will be harvested due to snow damage in 1997.
3	D	1.8	$Sw_7Pw_2Oh_1$	4th row removal and a selective harvest in remaining rows. Some areas will be harvested due to snow damage in 1997.
4	G	0.6	Sw_{10}	4th row removal and a selective harvest in remaining rows.
5	C	1.6	Sw_{10}	4th row removal and a selective harvest in remaining rows.
5	M	1.2	$Sw_6Aw_3Oh_1$	4th row removal and a selective harvest in remaining rows.
6	D	5.5	Sw_{10}	4th row removal and a selective harvest in remaining rows.
7	F	4.6	Sw_9Cb_1	4th row removal and a selective harvest in remaining rows.
7	I	6.0	$Sw_5Pw_2Ps_2Oh_1$	4th row removal and a selective harvest in remaining rows. Majority of Scotch Pine will be removed.
Total Hectares		29.6		

Red Pine

Comp.	Stand	Area (Hectares)	Species Composition (%)	5 Year Management Plan
3	F	0.6	Pr_9Pw_1	4th row removal and a selective harvest in remaining rows..
3	J	1.8	Pr_7Pw_3	4th row removal and a selective harvest in remaining rows.
3	M	4.4	Pr_8Pw_2	4th row removal and a selective harvest in remaining rows.
Total Hectares		6.8		

White Cedar

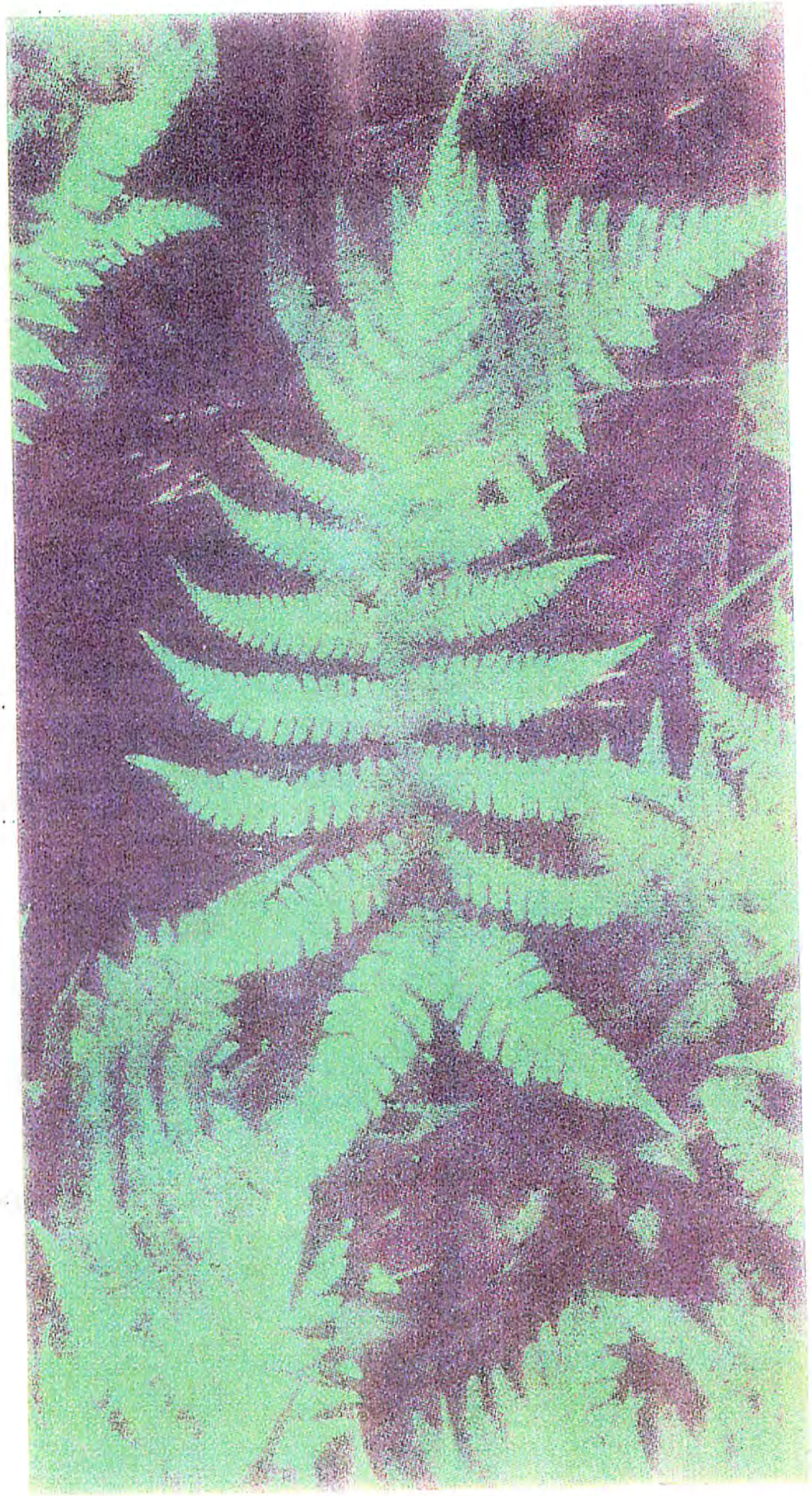
Comp.	Stand	Area (Hectares)	Species Composition (%)	5 Year Management Plan
5	G	11.9	Ce_9Pw_1	Strip-cut Cedar and thin White Pine.
6	C	1.2	Ce_6Pw_4	Undergo a selective thinning.
6	E	0.8	Ce_{10}	Leave to grow and develop.
7	A	5.3	Ce_6Pw_4	4th row removal and selective harvest in remaining rows.
7	B	0.3	$Ce_6Po_3Ms_1$	Leave for wildlife and watershed management.
7	C	1.6	Ce_6Pw_4	4th row removal and selective thinning in remaining rows.
7	E	1.3	Ce_8Po_2	Leave for wildlife and wasteland management.
Total hectares		22.4		

Larch

Comp.	Stand	Area (Hectares)	Species Composition (%)	5 Year Management Plan
3	P	1.1	L_{10}	Undergo an improvement harvest.
4	F	0.9	L_8Pw_2	4th row removal and selective harvest in remaining rows.
5	D	2.0	L_9Oh_1	Undergo an improvement harvest.
Total hectares		4		

Open

Comp.	Stand	Area (Hectares)	Species Composition (%)	5 Year Management Plan
3	H	1.0	Open	Use as landing site for timber harvesting.
5	E	5.0	Open	Leave for stream-bank protection.
5	F	2.3	Open	Leave for wildlife and possible landing site for timber harvesting.
6	B	0.7	Open	Use as landing site for timber harvesting..
Total hectares		9.0		



AMABEL TRACTS

3.0 HISTORY

The County of Bruce began purchasing land in Amabel Township in 1938 and had purchased 1572 acres by 1947.

Large sections of the Amabel Tract consist of light beach sand and are not suitable for farming. The open areas were planted by the Department of Lands and Forests (Ministry of Natural Resources), mostly with Red Pine with some areas of White Pine and Scots Pine.

Over the years thinning operations have taken place over most of the plantation areas.

An area of Red Pine located close to the Rankin Dam became infected with Armillaria Root Rot and in 1985 was clear-cut. The area was then burned to allow for natural regeneration.

A two acre patch of Scots Pine was clear cut and burned in 1991. This area was replanted with White Pine.

Sections of hardwood stands have been thinned periodically by firewood harvesting and some selective harvesting in the Cedar stands.

A major pole harvest occurred in the Red Pine Plantations in 1995.

4.0 FOREST MANAGEMENT

The management of the forest resources in Bruce County Forests will contribute to local and provincial needs.

The wood produced in the Bruce County Forests will be provided predominately from conifer plantations and tolerant upland hardwood stands. The working group areas in the Amabel Tract are presented in *Table One* on the following page.

4.1 PLANTATION ESTABLISHMENT

In the County of Bruce a significant acreage of land initially cleared for agricultural purposes became uneconomical working units due to the advent of more mechanized farm management practices. This land was left unproductive with no foreseeable benefits. In order to demonstrate wise land

use management, the Ontario Government instituted the Agreement Forest Program, which enlisted municipalities to purchase lands for "forestry purposes". Cleared land on the acquired properties was planted to demonstrate the benefits of the reforestation of idle, non-agricultural land.

The species planted consisted predominately of conifers with small quantities of deciduous varieties. Most of the plantations were White Pine and Red Pine. Other species were White Spruce, Norway Spruce, Scots Pine and European Larch. Common mixtures of these species were White Pine-White Spruce and White Pine-Red Pine.

One of the many benefits of plantations is the creation of a more favourable environment for wildlife. During the operational planning, provision for the creation of wildlife openings within the plantations will be designed. Openings will tend to follow areas of lower productivity, such as gravel knolls and wet depressions. The fence rows will be retained as wildlife corridors.

References: Management suggestions, prescriptions and targeted basal areas are based on references from "A Silvicultural Guide for the Tolerant Hardwoods Working Groups in Ontario", published by the Ministry of Natural Resources.

4.2.0 PLANTATION MANAGEMENT

The long-term objective of the plantation is to provide a suitable environment for the establishment of volunteer hardwoods. The role of the conifers is not confined merely to that of a nurse crop, as high-quality raw materials for the area's forest based industries will also result. Species such as White Pine, Norway Spruce, White Spruce and European Larch will produce sawlogs and veneer, with the White Pine showing exceptionally high potential value. Red Pine was planted for its potential as a "hydro pole" as well as for its sawlog qualities.

When plantations are established, trees are planted relatively close together at the rate 2,200-3,200 trees per hectare. The purpose is to suppress ground vegetation, provide mutual shelter and straight growth and, after allowing for casual losses, to leave the forester a large choice from which to select crop trees. The number of trees is successively reduced by a series of thinnings throughout the life of the crop so that the growth of the stand is concentrated progressively onto a smaller number of more vigorous and better-formed trees. The ultimate objective is to obtain the largest possible

financial return of the crop, while maintaining a suitable environment for wildlife, recreation and the establishment of quality deciduous trees.

In order to attempt to maximize the return on investment by the production of quality crop trees in the shortest possible time frame, the crop tree approach to thinning will be employed. This method is best suited to situations where the primary objective is to produce sawlogs or veneer. During each thinning treatment, effort is concentrated on releasing the candidates for the final crop in order that they will grow at the desired rate until the next thinning.

Due to the inter-relationship of stocking and the form of potential crop trees, thinning regimes will be regulated by basal area, to ensure that there will be enough filler trees to train the final crop while maintaining optimum conditions for growth of the superior stems. In general the residual basal area will be between 21 to 30 square metres per hectare depending on the species.

The timing of the thinning is best determined by the rate of growth on the potential crop trees. If the photosynthetic surface of the trees is significantly reduced in proportion to its height, then the diameter increment will decrease. This will occur in the development of the stand when the crowns are undergoing intense competition. The first thinning treatment should occur just prior to this point. The beneficial effect of thinning will gradually decrease, as crown vacancies will be filled by the residual growing stock. Intense competition shall again develop within the canopy and further treatment will be required.

Reference: Management suggestions, prescription and targeted basal areas are based on references from "A Silvicultural Guide for Red and White Pine Working Groups in Ontario", published by the Ministry of Natural Resources.

4.2.1 RED PINE PLANTATION MANAGEMENT

Red Pine was of one the most prominent species planted in the Bruce County Forests. It was a favoured species due to its relatively quick and uniform growth rate, resistance to insects and disease, the wood's pulping properties and hence the potential utilization of thinning material and its high value as a pole and sawlog.

The seedlings on the County properties were planted at a close spacing that usually varied between a squared spacing of 1.7 metres to 2.0 metres. The planned thinning regime for the plantations was a fourth row

mechanical thinning between 25 and 35 years, depending on the actual growth. This would be followed by the removal of the middle row and a selection thinning in the remaining rows or a process of continual selection thinning using the fourth row as access. The silvicultural thinning would take place at regular intervals after a 25-35 year period with the actual timing being dependent on crown expansion resulting in crown closure. The stands would be managed leaving a residual basal area of 25 square metres per hectare. This stocking level was expected to provide the conditions for the maximum production of pole quality material.

In the Bruce County area, demand for softwood products in the decades of the 1960's and 1970's tended to be very limited and as a result the forecasted thinning did not take place. There was some treatment of the older stands in this tract and at the Brant Tract which were thinned on a pre-commercial basis with the material produced utilized by small local markets. The majority of the stands however received no treatment.

The situation at the end of the 1970's was that the older stands, thinned on the pre-commercial basis, have a residual stand of superior-quality trees as compared to the areas not thinned. The stands that were not thinned were identified as having poorly developed trees with small crown and low, live-crown ratios and small average diameters.

In 1983 the demand for conifer thinning material increased significantly. As a result of the rising pressure many of the plantations received a commercial silvicultural thinning. The thinning has a lower diameter constraint as the smaller individuals (less than 13 cm diameter) could not be utilized. The older previously treated stands received a selection thinning and the younger overstocked plantations had every fourth row mechanically thinned with some selection in the remaining three rows. The residual basal area for the older plantations was 25 square metres per hectare and for the younger plantations 28 square metres per hectare.

After the 1983 treatment there now exists three types of Red Pine which can be categorized and managed in the following manner:

Category 1:

These stands are the older plantations established in the late 1930's which were treated in the 1960's and 1970's and again in 1983. These plantations have a significant number of poles per hectare as well as trees that will be removed for pulpwood. Currently crowns are expanding into vacancies created in the last treatment and there should be diameter growth response as a result of the increase in live foliage.

Further management of these stands will consist of an additional crown and low thinning (thinning from below). The residual basal area will be maintained at approximately 25 square metres per hectare. Depending on demand, some poles can be removed over the term of this management period.

Category 2:

The plantations in this class are generally those established in the purchases between 1948 and 1955. At this time there was a significant number of acquisitions and planting maximized in terms of area planted. If conditions were favourable with regards to market conditions for the small dimensional thinning materials, the first thinning would have occurred in the early to mid 1970's. As previously outlined, the treatment did not occur and diameter increment declined significantly. In the early 1980's, these plantations had a mean diameter of 17 cm. and a mean site index of 25. These stands had a basal area between 45-50 square metres per hectare. They were treated in 1983 with a thinning regime of a fourth row mechanical thinning and a crown and selective low thinning in the remaining three rows. The residual basal area was 28 square metres per hectare. (Another treatment of these stands will be required in early 2000's with the main product being pulpwood or small dimensional lumber.)

Category 3:

These areas have not received any treatment to date because they were too young or had too small a mean diameter to thin commercially in 1983. These plantations require thinning now or will in the near future. Depending on market conditions these plantations will be thinned as soon as possible. The thinning regime will be a fourth row mechanical thinning and selection in the remaining three rows. The residual basal area will be 25 square metres per hectare.

A problem has developed in some Red Pine plantations, as pockets of dieback have developed. The mortality tends to occur in the 25-35 year age class. Indications of the eventual mortality are a definite chlorotic appearance and tufted growth. Death of the trees usually occurs within three to seven years after the appearance of the chlorotic foliage. The die-back occurs in groups which resembles mortality caused by Fomes annosus. The exact cause of the decline is at present unknown but current field analysis tends to reveal a macro nutrient deficiency. Mortality appears greater on soils with a shallow depth to carbonates. At the present time there is no solution to the problem and it appears no treatment will be developed.

The plantations where significant mortality has occurred (i.e. greater than 1 hectare) should be under-planted with White Pine or allowed to regenerate naturally with hardwoods. The dead and dying stems will be salvaged where possible or left to serve as standing dead snags for wildlife. White Pine is a moderate shade tolerant species therefore the planted seedlings should grow satisfactorily in that area. Removal of the dead over-story may be considered in areas of high aesthetic value and would occur after the establishment of the new crop. Some of the new openings would be retained for wildlife purposes.

In areas where mortality has not occurred yet symptoms suggest significant losses will occur, clear-cutting with a prescribed burn to clean the site could be applied prior to possible replanting with a more suitable species.

4.2.2 WHITE PINE PLANTATION MANAGEMENT

There are very few pure White Pine plantations in the Bruce County Forests. The majority of the seedlings were planted in mixtures with Red Pine and White Spruce. The management of the White Pine in the mixed stands is discussed in Section 5.2.6.

White Pine was planted with the long-term goal of producing very high-quality sawlog or veneer material. To achieve this objective, the designated crop trees are side-branch pruned to 5.2 metres. The elimination of the side branches is done as soon as the trees have attained the suitable height to allow the retention of 50% of the live crown. Through this process the core diameter of trees not pruned is kept to a minimum and clear lumber is maximized.

Plantations of White Pine vary significantly in terms of individual tree growth. Unlike Red Pine where height growth usually does not have any significant variation from tree to tree, White Pine will stratify into crown classes. This stratification creates difficulties when scheduling silvicultural thinning. Due to the variation in crown class, the diameter increment also varies significantly. Markets for small diameter White Pine have developed since 1998 making the first thinning more economical.

Unlike species with more uniform growth, the development of the stand will not be significantly impaired, as the stratification into crown classes will allow for the continual development of the dominant and co-dominant individuals. Most of the suppressed and a large portion of the intermediates will be retained after the treatment and as a result the thinning regime will constitute a crown and incomplete low thinning. The

target basal area of dominant and co-dominant trees after the initial thinning will be 25 square metres per hectare. The subsequent thinning will take place when crown development is such that crop trees require additional growing area. These additional treatments will maintain the basal area within the 25-30 square metres per hectare range in order to reduce branch diameters in the upper logs. Towards the end of the rotation the basal area will be reduced to 21 square metres in order to maximize diameter increment.

The delayed thinning in the White Pine plantations may also have a beneficial effect on the form. If the plantations are allowed to undergo more intense competition during the early stages of their development, longer bole lengths will develop and branch diameters in the upper crown will be reduced. The reduction of the main stem diameter growth is well compensated for by the greater merchantable height and the increased upper log grades. White Pine's ability to respond to release will allow for a delayed thinning schedule.

4.2.3 SPRUCE PLANTATION MANAGEMENT

Spruce management will deal with the pure plantations of both White and Norway Spruce. The planting on the purchases of the late 1940's to early 1950's had significant Spruce plantings, but the design consisted mainly of White Pine—White or Norway Spruce mixtures.

For the most part, the growth of the early Spruce plantations has been good with some plantations achieving a site index of 24. Poor growth was evidenced on the gravel areas where the site index is as low as 18. Diameter growth has a wide variation because like White Pine the individuals stratified into crown classes and the dominants and co-dominates produced trees with greater diameter increment.

The first thinning will occur later in the rotation in order to raise the average diameter of the material. Due to desirable pulping properties utilization of the smaller individuals is possible. The thinning required for the Spruce plantations will be a fourth or fifth row mechanical row thinning with selection in the remaining rows. The treatment in the remaining rows will be from below. Residual basal areas will be maintained at 23-25 square meters per hectare.

The first thinning on some of the stands was completed in 1983 and the treatment followed the above guidelines.

4.2.4 EUROPEAN LARCH PLANTATION MANAGEMENT

The Bruce County Forests have a limited acreage in European Larch. The initial spacing of this species tended to be similar to the other species, which for European Larch is too close, unless early thinning is undertaken. The species is very intolerant of shade and therefore should have had a wider initial spacing where limited markets for thinning are available. Due to the close arrangement, crown closure occurred early in the rotation. Thinning should have taken place, but lack of markets prevented treatment. With height independent of density, the plantations have excellent height growth but the crowns are poorly developed. The stands did not stratify into crown classes to the extent of the White Pine and White Spruce, so crowns are narrow with a low live crown ratio.

The lack of treatment in these stands will not enable thinning to the desired spacing in one operation. The thinning regime will be crown and thinning from below. The treatment schedules will be accelerated until the desired spacing is achieved. Thinning will not be regulated by basal area but by present crown release of the crop trees. Each individual thinning operation will allow for a 100% crown exposure of the crop tree.

4.2.5 SCOTS PINE PLANTATION MANAGEMENT

Scots Pine was planted on the Agreement Forests for Christmas tree production. Provincial policy changes in the 1950's prevented the further sale of trees from public lands and the Scots Pine plantations were left uncut. The seed source, although satisfactory for the production of Christmas trees, does not produce a mature tree with the qualities suitable for lumber production due to its southern European provenience. The plantations of Scots Pine, although limited in number, will be clear-cut for pulpwood when the trees have attained merchantable size.

After clear-cutting and possible prescribed burning, the area will be reforested to a more suitable species.

4.2.6 MANAGEMENT OF MIXTURES

In the Agreement Forest a significant percentage of the plantations were established in mixtures of two or more species. Mixed stands were considered preferable to pure plantations due to their greater resistance to

insects and disease. In addition, if one species were to become lost through natural mortality then the other species would continue to function as a crop. Plantations could be converted to a pure stand, if required, during thinning treatments.

The variable growth rates of different species may create problems and prevent the achievement of the original goals for the plantation. The more rapid height growth on one species early in the rotation may cause ascendancy over the slower growing species. The inevitable result would be a pure stand of the faster growing species. If the slower growing species is not sufficiently shade tolerant, only the random individual may achieve a position of dominance or co-dominance in the main canopy. This problem may be present if thinning treatments were not conducted prior to the suppression of the slower growing species. The inability or a delay in a thinning treatment is likely to result in the dominance of one species, not necessarily the most desirable one. If this does occur, it is wise to accept the situation as it exists. On the Bruce County Forests this situation has occurred in some instances and no attempt will be made to rescue the suppressed species.

It is impossible to present very precise guidelines on the thinning of mixtures due to the large number of combinations of species in various arrangements. Several guidelines for the most common mixtures are presented in the following sections.

WHITE PINE-RED PINE

In this working group the delayed thinning has allowed the superior initial growth of the Red Pine to dominate. Significant mortality in the White Pine has occurred in most cases as a result of suppression. The species composition, although variable, tends to be 80% Red Pine and 20% White Pine. The complete removal of Red Pine in mid rotation is impossible, as there are not enough quality White Pine stems to fully occupy the site.

Thinning treatments will be a free thinning around the superior quality White Pine in order to maximize their numbers in the final crop. A general crown and low thinning will occur within the remaining Red Pine.

An attempt will be made to maintain the basal area at 25 square metres per hectare in the mid-rotation in order to maximize the number of potential Red Pine poles. However, if the tree thinning of the Pine causes a reduction in the basal area, the reduction of the poles will be accepted in order to maximize White Pine in the final crop. Later in the rotation the

residual basal area will be reduced to 21 square metres to maximize the diameter increment.

WHITE PINE-WHITE SPRUCE

The initial objectives of this mixture was to remove the Spruce in the early rotation and then manage the plantation as a pure White Pine working group in mid to late rotation. Early rapid growth of the White Pine has caused its ascendancy and the Spruce is severely suppressed. The White Spruce is completely overtopped and will not produce the size to facilitate economic thinning. The Spruce will fall out of the stand due to suppression and therefore the result in this mixed working group is similar to an initially wide spaced pure White Pine plantation.

Due to the wide spacing, thinning will not be required until further into the rotation as adequate growing space should be provided for the first forty years. Thinning regimes will be consistent with the guidelines outlined in *Section 5.2.2.* As a result of the lack of stems for training, early pruning will be essential to limit the development of large knots.

EUROPEAN LARCH WITH WHITE PINE OR WHITE SPRUCE

The initial plan for this mixture was to thin the rapidly growing European Larch early in the rotation and then work with a pure stand of either White Pine or White Spruce. Delayed thinning has created an almost pure stand of European Larch with an insignificant number of the other species ascending into the main canopy.

These stands will be managed employing the principles as outlined in the section on European Larch plantations.

MULTIPLE MIXTURES OF THREE OR MORE SPECIES

Mixtures of three or more species cause silvicultural treatment problems as the varying growth rates of the species create operational difficulties.

The general thinning regime for these stands will be a crop tree release of the better quality trees regardless of species. However, if there is a choice between two quality trees then the tree of higher potential value will be favoured.

4.3 TOLERANT HARDWOOD MANAGEMENT

The policy for the management of the tolerant upland hardwood working group, (Sugar Maple, Beech, White Ash, Basswood), will be to create a balanced and uneven-aged stand which will have a stable equilibrium between growth and harvest. The silvicultural system employed to achieve this goal will be the selection system. The managed stands will be brought to the fully regulated situation by regularly spaced cutting cycles.

In the Bruce County area, maturity in the tolerant hardwoods will generally be 50 cm to 60 cm at d.b.h., depending on the productivity of the site. For the less tolerant species such as White Ash, Basswood and Black Cherry, the size at maturity may be slightly less (45 cm-55 cm).

The residual basal area after treatment will be approximately 21 square metres per hectare with 16 square metres in the sawlog size class (+ 25 cm). In order to maximize the saw-timber production an attempt will be made to maintain the stands with a growing stock distribution.

The condition of the growing stock on the Agreement Forests differs considerably from stand to stand. This variation is generally a result of past treatment. Many of the stands were either small polewood or heavily cut prior to the time of purchase. As a result there are no stands that are fully regulated, with the presence of good-quality trees in all diameter classes. All stands have deficiencies and a surplus in certain ranges of the growing stock and it will require several cutting cycles to achieve the fully regulated forest.

Stands on the Agreement Forests may be classified into two main groups. The first is the polewood, which tends to have a narrow range of diameter classes. These stands are a result of clear-cutting and are even-aged. The second type of stand is best designated as irregular uneven-aged that has two or more age classes and a wider diameter distribution. These are the result of high-grade cutting where some residual growing stock was left after past harvesting operations.

Stands of even-aged polewood will be managed on an even-aged system until trees obtain diameters approaching maturity. Only at this point will an attempt be made to create cuttings of enough severity to lead to the

establishment of age classes and the species of reproduction desired. Any attempts earlier in the rotation would sacrifice smaller high-quality sawlog trees that possess the potential to increase in size, grade and value. A low thinning will be done in order to re-distribute the stand growth potential to the individuals of higher quality. The residual basal area will be 21 square metres per hectare, which will be high enough to suppress stump sprouts and prevent epicormic branching. Cutting cycles during this stage of the stands development will range from around seven to twelve years depending on crown closure. When those stands approach maturity an effort will be made to create crown openings large enough to allow for the establishment and development of quality regeneration. At this point the target basal area will be reduced to 18 square metres per hectare and the cutting cycles will lengthen to approximately twelve years. The polewood stands will require 1.5 to 2.0 rotations to establish the regulated forest.

The irregular uneven-aged stands all have deficiencies or surpluses in certain diameter classes, but due to the greater size variation, they can be converted to the balanced uneven-aged situation more readily than the polewood stands through silvicultural treatments. Residual basal areas will be 16 square metres in the saw-timber category and 4.5 square metres in the polewood class. With these stocking levels the poles will have sufficient room to develop into quality sawlog trees and regeneration can be established and will thrive. Cutting cycles will be approximately fifteen to twenty years.

4.4 CEDAR MANAGEMENT

The upland Cedar working groups have received limited silvicultural treatment on the County Forests in the past management periods. Work has consisted of two main types of treatment. One method of cutting has been a selection thinning. This has been difficult as the close spacing of standing trees creates operational difficulties. Thinning that is heavy enough to facilitate the use of large equipment is susceptible to significant losses due to blow-down. As a result of the problems in selection thinning, strip cutting has been attempted with some degree of success. No-cut strips running perpendicular to the prevailing winds have reduced or eliminated losses to wind-throw and provided suitable conditions for economic harvesting. However, natural regeneration in the cutout strips is slow.

A new method of Cedar cutting that will be used in certain instances is small patch clear-cuts. These small patch clear cuts will only be used when conditions or circumstances are not suitable for strip cuts.

Many of the Cedar stands of the Amabel tract are very patchy due to a lack of soil in some locations. If the stand consists of exposed bedrock and low densities, the stand will be classified as Protection Forest Reserve (PFR) and will be managed as such.

In stands where clear-cut strips are proposed the strips may meander around areas of exposed bedrock.

Areas clear cut should be replanted to protect the fragile light soils of the area. White Pine, White Cedar, and Red Oak native to this site, are found throughout the area, therefore a mixture of these trees will be replanted on these areas.

References: "Forest Management Guidelines for Provisions of White-tailed Deer Habitat", published by the Ministry of Natural Resources, 1997

"White-tailed Deer in Ontario" published by the Ministry of Natural Resources, 1983

"Best Management Practices, Fish and Wildlife Habitat Management", published by the Ontario Ministry of Agriculture, Food & Rural Affairs, 1997

"Minnesota Guide to Forest Game Habitat Improvement", published by the Minnesota Department of Conservation, 1969

4.5 LOWLAND HARDWOODS

The policy for the management of the lowland hardwoods (Sugar Maple, Soft Maple, Poplar, White Ash, Basswood, Balsam Fir, Green Ash, Black Ash) will be to create a balanced and uneven-aged stand which will have a stable equilibrium between growth and harvest. The silvicultural system employed to achieve this goal will be the selection system.

Management techniques will be basically the same as those discussed in section 5.3 with one exception. The residual basal area after treatment will be approximately 26 to 31 square metres per hectare. Lowland hardwoods have shallow root systems and are more susceptible to wind throw.

4.6 LOWLAND MIXED-WOOD MANAGEMENT

These areas have very limited potential for timber production and will therefore be managed primarily for their wildlife values. Management

techniques will be aimed at habitat improvement for Deer. The management of these stands will be discussed in *Section 6.1.*

4.7 BROWSE CUTTING

There is a large demand for Cedar and Balsam Fir browse. This material is used for Christmas garlands. Areas of the Lindsay Tract will be sectioned off to allow individuals to remove browse. This will be monitored and controlled by county staff.

5.0 WILDLIFE

Bruce County Forests have been important areas for wildlife as these lands provide varying habitats suitable to a wide variety of species. Hunting has historically been a compatible use in conjunction with forest management and municipal forests have always been available to the public for their use. In the future County forests will be important venues for hunting as private land available for this activity continues to decline.

The County forests contribute to big and small game, waterfowl and trapping.

Due to the unpredictable fluctuations in wildlife population densities, no estimation of hunting opportunities will be presented. It is believed however that significant hunting activity is carried out on County forest properties particularly near population centers. Surveys may be conducted during this management period to determine the pressures of wildlife and hunting on the forests.

In general, County forestry will continue to contribute to wildlife population and habitat improvement work may take place if necessary in order to increase wildlife population in County forests. The only exception will be in regards to the beaver which will be discouraged where its activities create a conflict with timber production or cause distress to adjacent landowners.

References: "Forest Management Guidelines for Provision of White-tailed Deer Habitat", published by the Ontario Ministry of Natural Resources, 1997

"White-tailed Deer in Ontario", published by the Ontario Ministry of Natural Resources, 1983

"Best Management Practices, Fish and Wildlife Habitat Management", published by the Ontario Ministry of Agriculture, Food & Rural Affairs, 1997

"Minnesota Guild to Forest Game Habitat Improvement", published by the Minnesota Department of Conservation, 1969.

5.1 DEER MANAGEMENT

There have been no efforts undertaken in past management periods related to the improvement of either summer or winter habitat. The establishment of conifer plantations and the silvicultural treatment of the upland hardwood working groups have increased habitat indirectly but efforts in this regard have been aimed at the production of quality forest products.

Conifer plantations have the potential to develop into acceptable winter habitat, as the canopy structure possesses the ability to capture snow and reduce the ground snow depth. Later in the rotation, volunteer hardwoods will invade the plantations and food crops will increase. Summer range has also been increased through conifer establishment on abandoned open non-agricultural areas with limited potential for habitat that has been converted back to forest cover. The plantations create additional edge and allow for the establishment of herbaceous plants suitable as summer deer food.

In general, the greater the diversity within the canopy of the forest, the more suitable the habitat is for wildlife. The thinning in the polewood upland hardwood creates favourable conditions for deer, as increased light will filter through the more open canopy and thereby increase the herbaceous growth and allow for the establishment of regeneration of deciduous species. The benefit is temporary as crown expansion by the residual growing stock will eventually suppress the regeneration and reduce the herbaceous growth. Considering that thinning is an on-going process, the suitability of upland hardwoods for deer habitat will fluctuate until the stand receives harvesting operations that are designed for the permanent establishment of regeneration. The harvesting for commercial sawlogs will be of significant severity to allow for the growth and development of the various age classes. When the forest attains the stage of development where there will be a substantial yield of sawlog class individuals, subsequent cutting cycles will include a regeneration-cut. The balanced uneven-aged forest will contain a continual diversity of suitable habitat.

Areas with the greatest potential for winter deer habitat are the lowland mixed wood sites containing significant populations of conifer species (i.e. Balsam Fir, White Spruce, White Cedar). While maintaining suitable winter cover, these sites usually produce food species such as poplar, willow and dogwood. This environment of food species in close proximity to winter cover provides optimum habitat for deer which is critical in maintaining or improving the site's carrying capacity. The maintenance or creation of an ecological diversity within this cover type is essential as forest succession may reduce the food crops, as the stands' deciduous species grow taller and become unsuitable for deer food. In order to maintain the diversity, small patch clear cutting or alternate strip clear cutting may be undertaken to encourage accessible food species. Felling will take place in the areas of deciduous species and the conifers will be retained as cover. Deer will then feed in the cut over areas while the conifers provide adequate shelter.

Areas of pure upland Cedar provide only the cover aspect of the habitat requirement of deer. Food may be close by, but if the area is large, a significant portion of the Cedar stand will go unutilized. In order to improve these areas, alternate row-strip, clear-cutting will be undertaken to break up the cover and encourage the regeneration of food crops in the cleared areas. Through this treatment these areas will provide more suitable winter habitats.

5.2 SMALL GAME

The County forest's contribution to small game hunting opportunities is not calculable due to the inordinate number of variables. However, these areas will contribute to a considerable degree. There has been no effort to directly improve small game habitat during post management periods although benefits have occurred during silvicultural treatments for the production of forest products. For example, thinned plantations provide excellent roost trees for Wild Turkeys.

During this management period there will be no proactive management to improve small game production, but, during silvicultural treatment and Deer range enhancement projects, small game habitats should be improved.

The following guidelines will be adhered to during silvicultural treatments to ensure a continuation of small game production.

a) a maintenance of species diversity in upland and lowland hardwood working groups;
b) maintenance or expansion of the existing forest edge;

c) during harvesting operations catkin producing trees will be retained where possible;
d) 6-8 cavity trees, where present, will be retained per hectare during commercial and stand improvement treatment;
e) as many trees as possible will be retained;
f) fence rows will be retained as travel corridors;
g) all stick nest trees will be retained;
h) drum logs will be laid down in areas of grouse habitat;
i) standing snags will be left standing where possible;
j) fallen woody debris will be left when possible.

5.3 WATERFOWL

Areas of potential waterfowl productions in County forests are extremely limited and therefore increases in their population will be insignificant.

Optimum habitat for waterfowl is open water interspersed with aquatic vegetation. Accompanying the open water there should be suitable nesting sites.

Sites exhibiting the potential as waterfowl production areas will be surveyed and if appropriate will be developed in cooperation with interest groups (i.e Ducks Unlimited) or through community involvement programs.

5.4 TRAPPING

Trapping opportunities for wetland fur-bearers in County forests are limited due to lack of habitat. The areas traditionally suitable for habitat will be maintained while in the newly flooded areas the nuisance beaver will be trapped.

Upland fur-bearers such as raccoon will be enhanced by den tree retention and fox and coyote dens will be left undisturbed.

6.0 FISHERIES

The contribution of the County forests to fisheries is insignificant as there are very few critical cold water and warm water sites. Protection is required in these areas to resume the preservation of the cold water habitat.

In general, stream degradation occurs in proximity to open agricultural fields and heavily cut forested land where the penetration of the sun allows water temperatures to rise significantly. Also, places of human settlement and cattle watering areas can be sources of pollutants that again may have severe detrimental effects.

The municipal forests in many respects demonstrate the proper management of cold water sites. Silvicultural treatments have occurred during past management periods yet adequate cover has been maintained to preserve the thermal integrity of the cold water fishery. This integrated approach to the management of two important resources on the same area will continue during the next management period. The following are general guidelines aimed at the protection of all streams and watercourses.

a) maintenance of 22-25 square metres per hectare of forest cover within 50 metres of streams;
b) no logging debris is to be deposited in streambeds;
c) harvesting will not occur during critical fish spawning periods in cold water sites;
d) properly designed and installed dredges or culverts at all major stream crossing; construction will not take place during spawning periods.

7.0 OUTDOOR RECREATION

The policy since the inception of the County Forests program has been to allow and encourage passive recreational opportunities. The rising demand for venues for outdoor recreational pursuits will mean an increased use of these properties during this management period.

Recreational activities such as cross-country skiing, snowmobiling, hiking, mountain biking and all terrain vehicle activities are compatible uses with wildlife, fisheries and forest management.

There are no targets for various out-door recreational opportunities. It is not possible to estimate the significance of the municipal forests current contribution however it is possible that surveys will be undertaken in this management period to determine use. Currently most of the compartments

have some organized and approved activity (i.e. snowmobile trail, hiking trail, cross-country trail). Future user strategy will be to develop the properties in co-operation with various user groups.

It may be necessary to restrict the use of one recreation endeavor to ensure the integrity of another. For example, cross-county skiing and snowmobile activities are not compatible uses on the same trail system.

Letters of authorization by the County will be used as the vehicle to allow the development of organized recreational activities.

7.1 CROSS-COUNTY SKIING

Demand for cross-county skiing opportunities are expected to rise significantly, especially as the County promotes tourism.

The sport may be classified into three main types; backcountry, in-track skiing and skate skiing (freestyle) all performed on groomed trails. The intrack skiing is characterized by a wider trail in order to facilitate the maneuvering of track setting equipment. The skate skiing trail requires near interior road width conditions for rolling, subsequent packing and grooming with no tracks set into the surface. No type of skiing will be given priority as the advantages of the less impacting backcountry skiing is offset by the greater demand for groomed trails and hence the creation of more recreational opportunities.

The type of trail development will be influenced by the significance of the individual forest tract. The backcountry skiing will be considered a more suitable form of development in areas designated as Areas of Natural and Scientific Interest established for their life science values. The less developed trail right-of-ways will have a less visual impact and more importantly create fewer disturbances to the botanical communities. Groomed trails will be more desirable on forested areas not containing important life science values. In these tracts an attempt will be made to maximize the recreational opportunities. (ie. Mountain Biking)

7.2 SNOWMOBILE TRAILS

Snowmobile trail development has been stabilized and there is not expected to be a significant increase in new trail development during the next

management period. Existing trails may be maintained or improved in partnership with local snowmobile clubs and the County.

Future trail development will be approved on the basis of providing lineal linkage between established points of interest to create a more intensive network of interconnecting passages.

7.3 HIKING

Hiking has always been encouraged in the County forests both on organized trails and general hikes through the woods. Recreational demand for hiking is low and during this management period efforts will attempt to intensify this activity.

The strategy to increase the hiking opportunities will be to develop interpretive trails on the more diverse properties. The trails will be self-guiding and will illustrate forest management, wildlife habitat as well as other areas of significance. Public education in regards to intensive forest management techniques displayed in the County forests will be given higher priority during the next management period through the system of interpretive trails.

7.4 ALL-TERRAIN VEHICLES

The fastest growing recreational use of County forests may be all-terrain vehicles. At present all-terrain vehicles outsell snowmobiles 4 to 1. New all-terrain vehicle clubs are forming across the province. Unorganized activities by all-terrain vehicles have a significant potential for site damage caused by compaction and erosion.

The County of Bruce will develop a strategy to ensure recreational opportunities by these all-terrain vehicles are compatible with County policies and procedures.

All-terrain vehicle clubs will be invited to make formal proposals to the County. Existing trails will be used where possible and in conjunction with other established users.

7.5 OTHER RECREATIONAL VEHICLE TRAILS

Trail development for 4 x 4 trucks and motorcycles will not be permitted. These activities have a significant potential for site damage caused by compaction and erosion.

7.6 MOUNTAIN BIKING

Mountain biking which is an ever increasing and physically demanding sport will be encouraged in County forests by using the cross-country ski and snowmobile trails. These sports can work well together as mountain biking is a non-snow activity while skiing and snowmobiling are winter activities. Some single track, technically demanding trails could also be developed with input from local clubs. With all season trail activities the maintenance for any one group could be kept to a minimum.

7.7 HUNTING, FISHING AND TRAPPING

As well as recreational and tourism activities, hunting, fishing and trapping are integral parts of resource management. They will continue to be allowed on most of the County forests. Exceptions will be near areas of high residential population. Properties will continue to be dealt with on an individual basis.

8.0 MANAGEMENT OF AREA OF NATURAL AND SCIENTIFIC INTEREST

These are lands containing landscapes or features that have been identified as having values related to protection, natural heritage appreciation, scientific study or education.

Some of the Bruce County Forests have been identified as such and the management treatments will ensure the protection of the designated interest.

Bruce County Forest properties have been selected as areas of Natural and Scientific Interest in both the Life Science and Earth Science categories. Forestry, wildlife, fisheries management and outdoor recreation development will be compatible activities within these areas. Modified harvesting in some

areas may be required to ensure the achievement of the County's protection mandate.

Prior to the actual treatment, these areas will be surveyed to determine the location of the significant values. These areas will then be flagged and during silvicultural operations felling into and skidding within these areas may be restricted. Marking guidelines will conform to those as presented in *Section 5.3.*

In the event that Environmental Impact Studies or botanical surveys discover the presence of an extremely exceptional plant species (i.e. a new toxin) or ecosystem then management activities will be abrogated in the area having the significant feature and a suitable buffer will be determined. Forest and wildlife management will then continue on the forest tract in the non-affected areas.

9.0 THE MANAGEMENT OF AGREEMENT FOREST LAND WITHIN THE NIAGARA ESCARPMENT PLANNING AREA

Currently there are not any County owned forests within the Niagara Escarpment Plan area but in the future if property does fall within the boundaries, then integrated resource management based on sound forestry, wildlife and recreational principles will be employed. These principles are consistent with the Niagara Escarpment Plan and therefore the relevant provisions of the Plan will be adhered to in all management activities.

10.0 FIRE CONTROL

The suppression of fires in County Forests is the responsibility of the local municipal fire departments and the County will assist with training and other expertise if requested.

10.1 LIVESTOCK CONTROL

The grazing of livestock on forested land is detrimental due to soil compaction and the elimination of seedlings, which are required in order to achieve the fully regulated forest.

In past management periods, fencing to restrict livestock has been a shared effort with neighbouring landowners with the County maintaining one half of the line fence. This policy will continue throughout this management period.

10.2 INSECTS AND DISEASES

The detection of insects and disease will be the responsibility of the Bruce County forest technician in co-operation with the Province and Federal Departments that deal with Forest Health.

Control action will be the sole responsibility of Bruce County and may be necessary from time to time in order to protect the resources of the County forests. If control action necessitates the use of insecticides, biological agents, or other pesticides the adjacent landowners and public will be consulted prior to control action.

11.0 MAINTENANCE OF THE PLAN

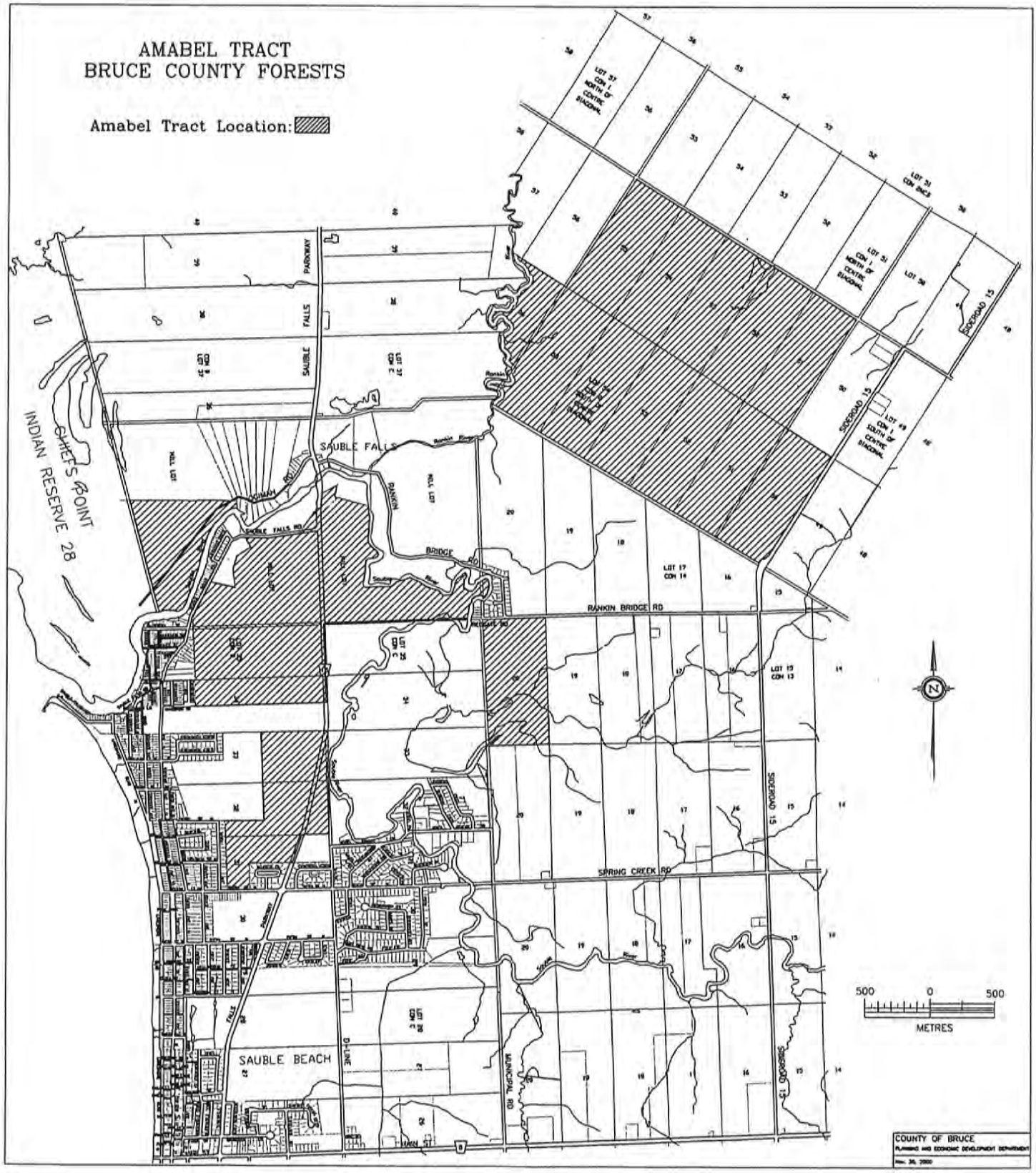
The management period for this plan is January 1, 2002 to December 31, 2021.

There will be four operating plans of equal duration, 2002 to 2006;
2007 to 2011;
2012 to 2016
and 2017 to 2021.
Annual plans will be submitted prior to the beginning of each year.

Work accomplished will be reported to Bruce County Council following the completion of each operating year. The work will be recorded and maintained by the Bruce County forest technician.

Property Location Map

Town of South Bruce Peninsula (Amabel), County of Bruce



Productive Forest Land

Working Group	Productive Forest (Hectares)
Red Pine	111.5
White Pine	32.1
Jack Pine	5.1
Scots Pine	22.9
White Spruce	10.5
Cedar	381.6
Hard Maple	24.9
Soft Maple	24.9
White Birch	33.2
Total	646.7

Non-Productive Forest Land

Working Group	Non-Productive Forest (Hectares)
Cedar	1.2
Balsam Fir	8.4
Hard Maple	4.2
Black Ash	4.0
White Birch	42.7
Group Camp (Open Area)	20.2
Marsh/Wetland	40.2
Total	120.9

Table 1

Bruce County Forests
Stand Summary
for
Amabel Tract
Town of South Bruce Peninsula (Amabel)

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in	
						5 years	20 years
1	Ce_4 Bf_2 Oh_3 Oc_1	34.5	183.6	40	40	yes	yes
2	Ce_6 Oc_3 Oh_1	38.1	195.7	40	40	yes	yes
3	Bw_3 Mh_2 Oh_3 Oc_2	31.6	17.8	35	50		yes
4	Pw_9 Oh_1	38.3	21.3	30	60	yes	yes
5	Pr_{10}	35.6	7.4	30	60	yes	yes
6	N/A (Wetland)	N/A	21.2				
7	N/A (Open Field)	N/A	20.0				
8	Bw_3 Mh_2 Ms_2 Oh_2 Oc_1	25.0	29.0	60	60		
9	Pr_9 Oh_1	45.4	14.3	60	55	yes	yes
10	Ce_5 Bw_1 Bf_1 Po_1 Mh_1 Oc_1	32.0	1.2	65	50		
11	Pr_{10}	62.0	1.2	60	60	yes	yes
12	Sw_8 Po_1 Oh_1	37.5	8.0	60	60	yes	yes
13	Pr_9 Mh_1	44.0	3.0	60	65	yes	yes
14	Pw_8 Mh_1 Cb_1	37.0	1.0	60	60	yes	yes
15	Mh_5 Sw_1 Id_1 Ms_1 Bw_1 Cb_1	28.0	3.5	40	50		yes
16	Mh_5 Pw_3 Sw_1 Cb_1	34.0	0.7	60	55		yes
17	Mh_7 Cb_1 Aw_1 Sw_1	30.8	4.9	40	60		yes
18	Sw_7 Mh_2 Oh_1	30.0	1.3	60	60	yes	yes
19	Ms_2 Bw_2 Ce_1 Po_1 Mh_1 Sw_1 Oh_1 Oc_1	24.9	24.9	65	70	yes	yes
20	Pr_{10}	36.0	0.8	60	70	yes	yes
21	Mh_6 Aw_1 Cb_1 Id_1 Oh_1	25.0	0.5	40	60	yes	yes
22	Pr_6 Mh_2 Sw_1 Cb_1	18.0	8.1	60	50	yes	yes
23	Pr_{10}	24.0	3.3	60	50	yes	yes
24	Pr_9 Ps_1	34.5	7.4	60	65	yes	yes
25	Pr_{10}	19.0	2.4	60	60	yes	yes
26	Mh_5 Aw_2 Cb_1 Bw_1 Id_1	19.6	3.7	65	65	yes	yes
27	Bw_2 Po_2 Bf_1 Mh_1 Ms_1 Aw_1 Sw_1 Oh_1	21.2	13.7	65	70		
28	Pr_7 Mh_1 Ps_1 Oh_1	39.2	8.6	60	75	yes	yes
29	Ps_5 Mh_4 Oh_1	36.0	3.7	60	55	yes	yes
	Sub Total Hectares		612.2				

Stand Summary for Amabel Tract continued:

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in	
						5 years	20 years
30	Ps_7 Pj_3	27.7	16.0	60	65	yes	yes
31	Pr_7 Ps_3	34.0	5.0	60	70	yes	yes
32	Pj_7 Ps_3	35.0	3.2	60	60	yes	yes
33	Pw_{10}	(800/acre)	0.4	15	15		yes
34	Pr_7 Ps_3	31.0	2.6	60	65	yes	yes
35	Pr_{10}	29.2	8.0	60	55	yes	yes
36	Pj_6 Pr_4	32.0	1.4	45	60	yes	yes
37	Mh_9 Oh_1	23.0	1.0	40	65		yes
38	Pr_6 Ps_2 Mh_1 Cb_1	30.0	1.6	60	60	yes	yes
39	Ps_{10}	31.0	3.2	60	70	yes	yes
40	Mh_{10}	17.0	0.6	65	70		yes
41	Sw_8 Mh_1 Ps_1	39.0	0.5	60	70	yes	yes
42	Pr_{10}	45.0	3.2	60	70	yes	yes
43	Bf_3 Bw_2 Ms_2 Oc_2 Oh_1	24.0	8.4	65	65		
44	N/A (Group Camp)		0.2				
45	Mh_8 Aw_1 Oh_1	27.5	4.2	115	100		
46	Pr_9 Oh_1	37.6	32.6	60	70	yes	yes
47	Bw_4 Mh_3 Cb_1 Po_1 Oh_1	28.8	15.4	65	60	yes	yes
48	Mh_4 Pr_4 Oh_2	34.0	2.5	65	65		yes
49	Pw_6 Bw_2 Ms_1 Cb_1	30.0	0.9	40	60	yes	yes
50	Pw_6 Pr_4	26.6	7.0	50	65		yes
51	Pr_7 Pw_3	29.0	1.2	50	60	yes	yes
52	Pj_6 Pr_4	32.0	0.5	50	55	yes	yes
53	Ce_9 Bw_1	53.0	2.3	50	30		yes
54	Sw_7 Po_2 Pw_1	32.0	0.7	50	55	yes	yes
55	Mh_8 Oh_2	35.1 & 20.4	7.5	65	70	yes	yes
56	Pr_8 Mh_2	54.0	0.8	50	70	yes	yes
57	Pw_8 Sw_2	52.0	1.5	48	60	yes	yes
58	Ab_3 Po_2 Ew_1 Aw_1 Mh_1 Oh_1 Oc_1	25.5	4.0	65	60		
59	N/A (Marsh/Wetland)		19.0				
	Sub Total Hectares		155.4				
	Previous Page Total Hectares		612.2				
	Total Hectares		**767.6**				

BRUCE COUNTY FORESTS

FIVE-YEAR OPERATING PLAN SUMMARY

for

Amabel Tract

Red Pine

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
5	7.4	Pr_{10}	selective thinning
9	14.3	Pr_9 Oh_1	4th row removal and a selective thinning in the remaining rows
11	1.2	Pr_{10}	4th row removal and a selective thinning in the remaining rows
20	0.8	Pr_{10}	4th row removal and a selective thinning in the remaining rows
22	8.1	Pr_6 Mh_2 Sw_1 Cb_1	selective thinning
23	3.3	Pr_{10}	4th row removal and a selective thinning in the remaining rows
24	7.4	Pr_9 Ps_1	4th row removal and a selective thinning in the remaining rows
25	2.4	Pr_{10}	4th row removal and a selective thinning in the remaining rows
28	8.6	Pr_7 Mh_1 Ps_1 Oh_1	selective thinning
31	5.0	Pr_7 Ps_3	4th row removal and a selective thinning in the remaining rows
35	8.0	Pr_{10}	selective thinning
38	1.6	Pr_6 Ps_2 Mh_1 Cb_1	selective thinning
42	3.2	Pr_{10}	selective thinning
46	32.6	Pr_9 Oh_1	4th row removal and a selective thinning in the remaining rows

Red Pine Continued:

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
51	1.2	Pr_7 Pw_3	4th row removal and a selective thinning in the remaining rows
56	0.8	Pr_8 Mh_2	selective thinning

Scots Pine

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
29	3.7	Ps_5 Mh_4 Oh_1	removal of Scots Pine
30	16.0	Ps_7 Pj_3	4th row removal and a selective thinning in the remaining rows
39	3.2	Ps_{10}	selective thinning

White Pine

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
4	21.3	Pw_9 Oh_1	4th row removal and a selective thinning in the remaining rows
14	1.0	Pw_8 Mh_1 Cb_1	selective thinning
49	0.9	Pw_6 Bw_3 Ms_1 Cb_1	selective thinning
57	1.5	Pw_8 Sw_2	4th row removal and a selective thinning in the remaining rows

Cedar

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
1	183.6	Ce_4 Bf_2 Oh_3 Oc_1	small patch clear-cuts and small areas of strip-cutting
2	195.7	Ce_6 Oc_3 Oh_1	small patch clear-cuts and small areas of strip-cutting

Jack Pine

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
32	3.2	Pj_7 Ps_3	4th row removal and a selective thinning in the remaining rows
36	31.4	Pj_6 Pr_4	4th row removal and a selective thinning in the remaining rows
52	0.5	Pj_6 Pr_4	4th row removal and a selective thinning in the remaining rows

White Spruce

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
12	8.0	Sw_8 Po_1 Oh_1	selective thinning
18	1.3	Sw_7 Mh_2 Oh_1	selective thinning
41	0.5	Sw_8 Mh_1 Ps_1	selective thinning
54	0.7	Sw_7 Po_2 Pw_1	4th row removal and a selective thinning in the remaining rows

White Birch

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
47	15.4	Bw_4 Mh_3 Cb_1 Po_1 Oh_1	selective thinning

Hardwoods

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
19	24.9	Ms_2 Bw_2 Ce_1 Po_1 Mh_1 Sw_1 Oh_1 Oc_1	an improvement thinning
21	0.5	Mh_6 Aw_1 Cb_1 Id_1 Oh_1	an improvement thinning
55	7.5	Mh_8 Oh_2	an improvement thinning in this section that has not been thinned

LINDSAY TRACT

3.0 HISTORY

The first land purchased by the county in Lindsay Township occurred in 1944. Since that time the holdings in Lindsay Township have increased to slightly over 7000 acres. A major part of this forest has a natural forest cover. In many places the already thin soil has been further reduced by past forest fires.

The open land was planted with pine and spruce in 1947 and 1948, totaling 125,000 trees. One interesting feature of this forest is the fact that Spring Creek surfaces in the forest and almost all of its entire course is through wooded portions of the land owned by the county.

The Ministry of Natural Resources formerly managed this property. Hardwoods, White Pine, White Spruce and Cedar have been harvested on a selective basis since the mid 1950's. The firebreaks and roads have been maintained. Snowmobile clubs and numerous hunters have also maintained many of the roads and trails. This area has, and continues to be used heavily for hunting purposes.

The County of Bruce in co-operation with the Department of Lands and Forests secured 13,500 acres and were committed to re-establishing the area as permanent forestland.

The Ministry of Natural Resources actively managed the Bruce County Forests until mid 1990's. At the beginning of the new millenium the Ministry of Natural Resources returned the responsibility of managing the County Forests back to Bruce County.

The early management activities of the Bruce Forest consisted of reforestation efforts and thinning in the upland hardwood working groups.

Tree planting projects concentrated mainly on the establishment of conifer plantations, which would later act as a nurse crop for quality hardwood regeneration. The preferred species for planting were White Pine and Red Pine and significant amounts of White Spruce, Norway Spruce, Jack Pine and European Larch. These species were planted as homogeneous plantations or varying mixtures.

At the time of purchase most of the upland hardwood working groups had been severely high-graded prior to acquisition which resulted in many of the stands having even-aged polewood with a remnant stand of dominant low-grade trees. Forest management work was comprised of the removal of the low-grade material for logs followed by crown thinning in the even-aged polewood stands. Because of the limited markets available for small

dimensional logs and fuelwood during the 1940's through to the early 1970's, the poor-quality trees were girdled to allow further development of the best-quality trees. Side-branch pruning of White Pine and some small conifer thinning operations occurred until the early 1990's.

At the beginning of the 1980's, markets for fuelwood and small dimensional conifer logs increased significantly. Activity in the Bruce County Forests rose with the markets and major thinning in the hardwood and conifer stands began.

4.0 PROTECTION FOREST RESERVE

The Lindsay Tract (or Miller Lake Tract) consists mainly of Breypen soil type. The Breypen soil type consists of exposed limestone bedrock with pockets of shallow loam and sandy soils. Forest fires have burned most of this area in the past causing erosion on this fragile site. Most of the soil in these areas is found in lower elevations. Forests found in the lower elevations tend to be denser and healthier. Forests on the upper areas tend to be scattered amongst barren bedrock. Forests on these shallow soils tend to be more susceptible to drought and high wind conditions. The forests on these sites will be left to help build up the soils. Harvesting on these sites will be restricted to a very light selection thinning in denser pockets. Harvesting will be discouraged on most of these sites.

5.0 FOREST MANAGEMENT

The management of the forest resources in Bruce County Forests will contribute to local and provincial needs.

The wood produced in the Bruce County Forests will be provided predominately from conifer plantations and tolerant upland hardwood stands. The working group areas in the Lindsay Tract are presented in *Table One* on the following page.

5.1 PLANTATION ESTABLISHMENT

In the County of Bruce a significant acreage of land initially cleared for agricultural purposes became uneconomical working units due to the advent

of more mechanized farm management practices. This land was left unproductive with no foreseeable benefits. In order to demonstrate wise land use management, the Ontario Government instituted the Agreement Forest Program, which enlisted municipalities to purchase lands for "forestry purposes". Cleared land on the acquired properties was planted to demonstrate the benefits of the reforestation of idle, non-agricultural land.

The species planted consisted predominately of conifers with small quantities of deciduous varieties. Most of the plantations were White Pine and Red Pine. Other species were White Spruce, Norway Spruce, Scotch Pine and European Larch. Common mixtures of these species were White Pine-White Spruce and White Pine-Red Pine.

One of the many benefits of plantations is the creation of a more favourable environment for wildlife. During the operational planning, provision for the creation of wildlife openings within the plantations will be designed. Openings will tend to follow areas of lower productivity, such as gravel knolls and wet depressions. The fence rows will be retained as wildlife corridors.

References: Management suggestions, prescriptions and targeted basal areas are based on references from "A Silvicultural Guide for the Tolerant Hardwoods Working Groups in Ontario", published by the Ministry of Natural Resources.

5.2.0 PLANTATION MANAGEMENT

The long-term objective of the plantation is to provide a suitable environment for the establishment of volunteer hardwoods. The role of the conifers is not confined merely to that of a nurse crop, as high-quality raw materials for the area's forest based industries will also result. Species such as White Pine, Norway Spruce, White Spruce and European Larch will produce sawlogs and veneer, with the White Pine showing exceptionally high potential value. Red Pine was planted for its potential as a "hydro pole" as well as for its sawlog qualities.

When plantations are established, trees are planted relatively close together at the rate 2,200-3,200 trees per hectare. The purpose is to suppress ground vegetation, provide mutual shelter and straight growth and, after allowing for casual losses, to leave the forester a large choice from which to select crop trees. The number of trees is successively reduced by a series of thinnings throughout the life of the crop so that the growth of the stand is concentrated progressively onto a smaller number of more vigorous and

better-formed trees. The ultimate objective is to obtain the largest possible financial return of the crop, while maintaining a suitable environment for wildlife, recreation and the establishment of quality deciduous trees.

In order to attempt to maximize the return on investment by the production of quality crop trees in the shortest possible time frame, the crop tree approach to thinning will be employed. This method is best suited to situations where the primary objective is to produce sawlogs or veneer. During each thinning treatment, effort is concentrated on releasing the candidates for the final crop in order that they will grow at the desired rate until the next thinning.

Due to the inter-relationship of stocking and the form of potential crop trees, thinning regimes will be regulated by basal area, to ensure that there will be enough filler trees to train the final crop while maintaining optimum conditions for growth of the superior stems. In general the residual basal area will be between 21 to 30 square metres per hectare depending on the species.

The timing of the thinning is best determined by the rate of growth on the potential crop trees. If the photosynthetic surface of the trees is significantly reduced in proportion to its height, then the diameter increment will decrease. This will occur in the development of the stand when the crowns are undergoing intense competition. The first thinning treatment should occur just prior to this point. The beneficial effect of thinning will gradually decrease, as crown vacancies will be filled by the residual growing stock. Intense competition shall again develop within the canopy and further treatment will be required.

Reference: Management suggestions, prescription and targeted basal areas are based on references from "A Silvicultural Guide for Red and White Pine Working Groups in Ontario", published by the Ministry of Natural Resources.

5.2.1 RED PINE PLANTATION MANAGEMENT

Red Pine was of one the most prominent species planted in the Bruce County Forests. It was a favoured species due to its relatively quick and uniform growth rate, resistance to insects and disease, the wood's pulping properties and hence the potential utilization of thinning material and its high value as a pole and sawlog.

The seedlings on the County properties were planted at a close spacing that usually varied between a squared spacing of 1.7 metres to 2.0 metres.

The planned thinning regime for the plantations was a fourth row mechanical thinning between 25 and 35 years, depending on the actual growth. This would be followed by the removal of the middle row and a selection thinning in the remaining rows or a process of continual selection thinning using the fourth row as access. The silvicultural thinning would take place at regular intervals after a 25-35 year period with the actual timing being dependent on crown expansion resulting in crown closure. The stands would be managed leaving a residual basal area of 25 square metres per hectare. This stocking level was expected to provide the conditions for the maximum production of pole quality material.

In the Bruce County area, demand for softwood products in the decades of the 1960's and 1970's tended to be very limited and as a result the forecasted thinning did not take place. There was some treatment of the older stands near Sauble and at the Brant Tract which were thinned on a pre-commercial basis with the material produced utilized by small local markets. The majority of the stands however received no treatment.

The situation at the end of the 1970's was that the older stands, thinned on the pre-commercial basis, have a residual stand of superior-quality trees as compared to the areas not thinned. The stands that were not thinned were identified as having poorly developed trees with small crown and low, live-crown ratios and small average diameters.

In 1983 the demand for conifer thinning material increased significantly. As a result of the rising pressure many of the plantations received a commercial silvicultural thinning. The thinning has a lower diameter constraint as the smaller individuals (less than 13 cm diameter) could not be utilized. The older previously treated stands received a selection thinning and the younger overstocked plantations had every fourth row mechanically thinned with some selection in the remaining three rows. The residual basal area for the older plantations was 25 square metres per hectare and for the younger plantations 28 square metres per hectare.

After the 1983 treatment there now exists three types of Red Pine which can be categorized and managed in the following manner:

<u>Category 1:</u>

These stands are the older plantations established in the late 1930's which were treated in the 1960's and 1970's and again in 1983. These plantations have a significant number of poles per hectare as well as trees that will be removed for pulpwood. Currently crowns are expanding into vacancies created in the last treatment and there should be diameter growth response as a result of the increase in live foliage.

Further management of these stands will consist of an additional crown and low thinning (thinning from below). The residual basal area will be maintained at approximately 25 square metres per hectare. Depending on demand, some poles can be removed over the term of this management period.

Category 2:

The plantations in this class are generally those established in the purchases between 1948 and 1955. At this time there was a significant number of acquisitions and planting maximized in terms of area planted. If conditions were favourable with regards to market conditions for the small dimensional thinning materials, the first thinning would have occurred in the early to mid 1970's. As previously outlined, the treatment did not occur and diameter increment declined significantly. In the early 1980's, these plantations had a mean diameter of 17 cm. and a mean site index of 25. These stands had a basal area between 45-50 square metres per hectare. They were treated in 1983 with a thinning regime of a fourth row mechanical thinning and a crown and selective low thinning in the remaining three rows. The residual basal area was 28 square metres per hectare. (Another treatment of these stands will be required in early 2000's with the main product being pulpwood or small dimensional lumber.)

Category 3:

These areas have not received any treatment to date because they were too young or had too small a mean diameter to thin commercially in 1983. These plantations require thinning now or will in the near future. Depending on market conditions these plantations will be thinned as soon as possible. The thinning regime will be a fourth row mechanical thinning and selection in the remaining three rows. The residual basal area will be 25 square metres per hectare.

A problem has developed in some Red Pine plantations, as pockets of dieback have developed. The mortality tends to occur in the 25-35 year age class. Indications of the eventual mortality are a definite chlorotic appearance and tufted growth. Death of the trees usually occurs within three to seven years after the appearance of the chlorotic foliage. The die-back occurs in groups which resembles mortality caused by Fomes annosus. The exact cause of the decline is at present unknown but current field analysis tends to reveal a macro nutrient deficiency. Mortality appears greater on soils with a shallow depth to carbonates. At the present time there is no solution to the problem and it appears no treatment will be developed.

The plantations where significant mortality has occurred (i.e. greater than 1 hectare) should be under-planted with White Pine or allowed to regenerate naturally with hardwoods. The dead and dying stems will be salvaged where possible or left to serve as standing dead snags for wildlife. White Pine is a moderate shade tolerant species therefore the planted seedlings should grow satisfactorily in that area. Removal of the dead over-story may be considered in areas of high aesthetic value and would occur after the establishment of the new crop. Some of the new openings would be retained for wildlife purposes.

In areas where mortality has not occurred yet symptoms suggest significant losses will occur, clear-cutting with a prescribed burn to clean the site could be applied prior to possible replanting with a more suitable species.

5.2.2 WHITE PINE PLANTATION MANAGEMENT

There are very few pure White Pine plantations in the Bruce County Forests. The majority of the seedlings were planted in mixtures with Red Pine and White Spruce. The management of the White Pine in the mixed stands is discussed in Section 5.2.6.

White Pine was planted with the long-term goal of producing very high-quality sawlog or veneer material. To achieve this objective, the designated crop trees are side-branch pruned to 5.2 metres. The elimination of the side branches is done as soon as the trees have attained the suitable height to allow the retention of 50% of the live crown. Through this process the core diameter of trees not pruned is kept to a minimum and clear lumber is maximized.

Plantations of White Pine vary significantly in terms of individual tree growth. Unlike Red Pine where height growth usually does not have any significant variation from tree to tree, White Pine will stratify into crown classes. This stratification creates difficulties when scheduling silvicultural thinning. Due to the variation in crown class, the diameter increment also varies significantly. Markets for small diameter White Pine have developed since 1998 making the first thinning more economical.

Unlike species with more uniform growth, the development of the stand will not be significantly impaired, as the stratification into crown classes will allow for the continual development of the dominant and co-dominant individuals. Most of the suppressed and a large portion of the intermediates will be retained after the treatment and as a result the thinning regime will constitute a crown and incomplete low thinning. The

target basal area of dominant and co-dominant trees after the initial thinning will be 25 square metres per hectare. The subsequent thinning will take place when crown development is such that crop trees require additional growing area. These additional treatments will maintain the basal area within the 25-30 square metres per hectare range in order to reduce branch diameters in the upper logs. Towards the end of the rotation the basal area will be reduced to 21 square metres in order to maximize diameter increment.

The delayed thinning in the White Pine plantations may also have a beneficial effect on the form. If the plantations are allowed to undergo more intense competition during the early stages of their development, longer bole lengths will develop and branch diameters in the upper crown will be reduced. The reduction of the main stem diameter growth is well compensated for by the greater merchantable height and the increased upper log grades. White Pine's ability to respond to release will allow for a delayed thinning schedule.

5.2.3 SPRUCE PLANTATION MANAGEMENT

Spruce management will deal with the pure plantations of both White and Norway Spruce. The planting on the purchases of the late 1940's to early 1950's had significant Spruce plantings, but the design consisted mainly of White Pine—White or Norway Spruce mixtures.

For the most part, the growth of the early Spruce plantations has been good with some plantations achieving a site index of 24. Poor growth was evidenced on the gravel areas where the site index is as low as 18. Diameter growth has a wide variation because like White Pine the individuals stratified into crown classes and the dominants and co-dominates produced trees with greater diameter increment.

The first thinning will occur later in the rotation in order to raise the average diameter of the material. Due to desirable pulping properties utilization of the smaller individuals is possible. The thinning required for the Spruce plantations will be a fourth or fifth row mechanical row thinning with selection in the remaining rows. The treatment in the remaining rows will be from below. Residual basal areas will be maintained at 23-25 square meters per hectare.

The first thinning on some of the stands was completed in 1983 and the treatment followed the above guidelines.

5.2.4 EUROPEAN LARCH PLANTATION MANAGEMENT

The Bruce County Forests have a limited acreage in European Larch. The initial spacing of this species tended to be similar to the other species, which for European Larch is too close, unless early thinning is undertaken. The species is very intolerant of shade and therefore should have had a wider initial spacing where limited markets for thinning are available. Due to the close arrangement, crown closure occurred early in the rotation. Thinning should have taken place, but lack of markets prevented treatment. With height independent of density, the plantations have excellent height growth but the crowns are poorly developed. The stands did not stratify into crown classes to the extent of the White Pine and White Spruce, so crowns are narrow with a low live crown ratio.

The lack of treatment in these stands will not enable thinning to the desired spacing in one operation. The thinning regime will be crown and thinning from below. The treatment schedules will be accelerated until the desired spacing is achieved. Thinning will not be regulated by basal area but by present crown release of the crop trees. Each individual thinning operation will allow for a 100% crown exposure of the crop tree.

5.2.5 SCOTCH PINE PLANTATION MANAGEMENT

Scotch Pine was planted on the Agreement Forests for Christmas tree production. Provincial policy changes in the 1950's prevented the further sale of trees from public lands and the Scotch Pine plantations were left uncut. The seed source, although satisfactory for the production of Christmas trees, does not produce a mature tree with the qualities suitable for lumber production due to its southern European provenience. The plantations of Scotch Pine, although limited in number, will be clear-cut for pulpwood when the trees have attained merchantable size.

After clear-cutting and possible prescribed burning, the area will be reforested to a more suitable species.

5.2.6 MANAGEMENT OF MIXTURES

In the Agreement Forest a significant percentage of the plantations were established in mixtures of two or more species. Mixed stands were considered preferable to pure plantations due to their greater resistance to

insects and disease. In addition, if one species were to become lost through natural mortality then the other species would continue to function as a crop. Plantations could be converted to a pure stand, if required, during thinning treatments.

The variable growth rates of different species may create problems and prevent the achievement of the original goals for the plantation. The more rapid height growth on one species early in the rotation may cause ascendancy over the slower growing species. The inevitable result would be a pure stand of the faster growing species. If the slower growing species is not sufficiently shade tolerant, only the random individual may achieve a position of dominance or co-dominance in the main canopy. This problem may be present if thinning treatments were not conducted prior to the suppression of the slower growing species. The inability or a delay in a thinning treatment is likely to result in the dominance of one species, not necessarily the most desirable one. If this does occur, it is wise to accept the situation as it exists. On the Bruce County Forests this situation has occurred in some instances and no attempt will be made to rescue the suppressed species.

It is impossible to present very precise guidelines on the thinning of mixtures due to the large number of combinations of species in various arrangements. Several guidelines for the most common mixtures are presented in the following sections.

WHITE PINE-RED PINE

In this working group the delayed thinning has allowed the superior initial growth of the Red Pine to dominate. Significant mortality in the White Pine has occurred in most cases as a result of suppression. The species composition, although variable, tends to be 80% Red Pine and 20% White Pine. The complete removal of Red Pine in mid rotation is impossible, as there is not enough quality White Pine stems to fully occupy the site.

Thinning treatments will be a free thinning around the superior quality White Pine in order to maximize their numbers in the final crop. A general crown and low thinning will occur within the remaining Red Pine.

An attempt will be made to maintain the basal area at 25 square metres per hectare in the mid-rotation in order to maximize the number of potential Red Pine poles. However, if the tree thinning of the Pine causes a reduction in the basal area, the reduction of the poles will be accepted in order to maximize White Pine in the final crop. Later in the rotation the

residual basal area will be reduced to 21 square metres to maximize the diameter increment.

WHITE PINE-WHITE SPRUCE

The initial objectives of this mixture was to remove the Spruce in the early rotation and then manage the plantation as a pure White Pine working group in mid to late rotation. Early rapid growth of the White Pine has caused its ascendancy and the Spruce is severely suppressed. The White Spruce is completely overtopped and will not produce the size to facilitate economic thinning. The Spruce will fall out of the stand due to suppression and therefore the result in this mixed working group is similar to an initially wide spaced pure White Pine plantation.

Due to the wide spacing, thinning will not be required until further into the rotation as adequate growing space should be provided for the first forty years. Thinning regimes will be consistent with the guidelines outlined in *Section 5.2.2.* As a result of the lack of stems for training, early pruning will be essential to limit the development of large knots.

EUROPEAN LARCH WITH WHITE PINE OR WHITE SPRUCE

The initial plan for this mixture was to thin the rapidly growing European Larch early in the rotation and then work with a pure stand of either White Pine or White Spruce. Delayed thinning has created an almost pure stand of European Larch with an insignificant number of the other species ascending into the main canopy.

These stands will be managed employing the principles as outlined in the section on European Larch plantations.

MULTIPLE MIXTURES OF THREE OR MORE SPECIES

Mixtures of three or more species cause silvicultural treatment problems as the varying growth rates of the species create operational difficulties.

The general thinning regime for these stands will be a crop tree release of the better quality trees regardless of species. However, if there is a choice between two quality trees then the tree of higher potential value will be favoured.

5.3 TOLERANT HARDWOOD MANAGEMENT

The policy for the management of the tolerant upland hardwood working group, (Sugar Maple, Beech, White Ash, Basswood), will be to create a balanced and uneven-aged stand which will have a stable equilibrium between growth and harvest. The silvicultural system employed to achieve this goal will be the selection system. The managed stands will be brought to the fully regulated situation by regularly spaced cutting cycles.

In the Bruce County area, maturity in the tolerant hardwoods will generally be 50 cm to 60 cm at d.b.h., depending on the productivity of the site. For the less tolerant species such as White Ash, Basswood and Black Cherry, the size at maturity may be slightly less (45 cm-55 cm).

The residual basal area after treatment will be approximately 21 square metres per hectare with 16 square metres in the sawlog size class (+ 25 cm). In order to maximize the saw-timber production an attempt will be made to maintain the stands with a growing stock distribution.

The condition of the growing stock on the Agreement Forests differs considerably from stand to stand. This variation is generally a result of past treatment. Many of the stands were either small polewood or heavily cut prior to the time of purchase. As a result there are no stands that are fully regulated, with the presence of good-quality trees in all diameter classes. All stands have deficiencies and a surplus in certain ranges of the growing stock and it will require several cutting cycles to achieve the fully regulated forest.

Stands on the Agreement Forests may be classified into two main groups. The first is the polewood, which tends to have a narrow range of diameter classes. These stands are a result of clear-cutting and are even-aged. The second type of stand is best designated as irregular uneven-aged that has two or more age classes and a wider diameter distribution. These are the result of high-grade cutting where some residual growing stock was left after past harvesting operations.

Stands of even-aged polewood will be managed on an even-aged system until trees obtain diameters approaching maturity. Only at this point will an attempt be made to create cuttings of enough severity to lead to the

establishment of age classes and the species of reproduction desired. Any attempts earlier in the rotation would sacrifice smaller high-quality sawlog trees that possess the potential to increase in size, grade and value. A low thinning will be done in order to re-distribute the stand growth potential to the individuals of higher quality. The residual basal area will be 21 square metres per hectare, which will be high enough to suppress stump sprouts and prevent epicormic branching. Cutting cycles during this stage of the stands development will range from around seven to twelve years depending on crown closure. When those stands approach maturity an effort will be made to create crown openings large enough to allow for the establishment and development of quality regeneration. At this point the target basal area will be reduced to 18 square metres per hectare and the cutting cycles will lengthen to approximately twelve years. The polewood stands will require 1.5 to 2.0 rotations to establish the regulated forest.

The irregular uneven-aged stands all have deficiencies or surpluses in certain diameter classes, but due to the greater size variation, they can be converted to the balanced uneven-aged situation more readily than the polewood stands through silvicultural treatments. Residual basal areas will be 16 square metres in the saw-timber category and 4.5 square metres in the polewood class. With these stocking levels the poles will have sufficient room to develop into quality sawlog trees and regeneration can be established and will thrive. Cutting cycles will be approximately fifteen to twenty years.

5.4 CEDAR MANAGEMENT

The upland Cedar working groups have received limited silvicultural treatment on the County Forests in the past management periods. Work has consisted of two main types of treatment. One method of cutting has been a selection thinning. This has been difficult as the close spacing of standing trees creates operational difficulties. Thinning that is heavy enough to facilitate the use of large equipment is susceptible to significant losses due to blow-down. As a result of the problems in selection thinning, strip cutting has been attempted with some degree of success. No-cut strips running perpendicular to the prevailing winds have reduced or eliminated losses to wind-throw and provided suitable conditions for economic harvesting. However, natural regeneration in the cutout strips is slow.

A new method of Cedar cutting that will be used in certain instances is small patch clear-cuts. These small patch clear cuts will only be used when conditions or circumstances are not suitable for strip cuts.

Many of the Cedar stands of the Lindsay tract are very patchy due to a lack of soil in some locations. If the stand consists of exposed bedrock and low densities, the stand will be classified as Protection Forest Reserve (PFR) and will be managed as such.

In stands where clear-cut strips are proposed the strips may meander around areas of exposed bedrock.

Areas clear cut should be replanted to protect the fragile light soils of the area. White Pine, White Cedar, and Red Oak native to this site, are found throughout the area, therefore a mixture of these trees will be replanted on these areas.

References: "Forest Management Guidelines for Provisions of White-tailed Deer Habitat", published by the Ministry of Natural Resources, 1997

"White-tailed Deer in Ontario" published by the Ministry of Natural Resources, 1983

"Best Management Practices, Fish and Wildlife Habitat Management", published by the Ontario Ministry of Agriculture, Food & Rural Affairs, 1997

"Minnesota Guide to Forest Game Habitat Improvement", published by the Minnesota Department of Conservation, 1969

5.5 LOWLAND HARDWOODS

The policy for the management of the lowland hardwoods (Sugar Maple, Soft Maple, Poplar, White Ash, Basswood, Balsam Fir, Green Ash, Black Ash) will be to create a balanced and uneven-aged stand which will have a stable equilibrium between growth and harvest. The silvicultural system employed to achieve this goal will be the selection system.

Management techniques will be basically the same as those discussed in section 5.3 with one exception. The residual basal area after treatment will be approximately 26 to 31 square metres per hectare. Lowland hardwoods have shallow root systems and are more susceptible to wind throw.

5.6 LOWLAND MIXED-WOOD MANAGEMENT

These areas have very limited potential for timber production and will therefore be managed primarily for their wildlife values. Management

techniques will be aimed at habitat improvement for Deer. The management of these stands will be discussed in *Section 6.1.*

5.7 BROWSE CUTTING

There is a large demand for Cedar and Balsam Fir browse. This material is used for Christmas garlands. Areas of the Lindsay Tract will be sectioned off to allow individuals to remove browse. This will be monitored and controlled by county staff.

6.0 WILDLIFE

Bruce County Forests have been important areas for wildlife as these lands provide varying habitats suitable to a wide variety of species. Hunting has historically been a compatible use in conjunction with forest management and municipal forests have always been available to the public for their use. In the future County forests will be important venues for hunting as private land available for this activity continues to decline.

The County forests contribute to big and small game, waterfowl and trapping.

Due to the unpredictable fluctuations in wildlife population densities, no estimation of hunting opportunities will be presented. It is believed however that significant hunting activity is carried out on County forest properties particularly near population centers. Surveys may be conducted during this management period to determine the pressures of wildlife and hunting on the forests.

In general, County forestry will continue to contribute to wildlife population and habitat improvement work may take place if necessary in order to increase wildlife population in County forests. The only exception will be in regards to the beaver which will be discouraged where its activities create a conflict with timber production or cause distress to adjacent landowners.

References: "Forest Management Guidelines for Provision of White-tailed Deer Habitat", published by the Ontario Ministry of Natural Resources, 1997

"White-tailed Deer in Ontario", published by the Ontario Ministry of Natural Resources, 1983

"Best Management Practices, Fish and Wildlife Habitat Management", published by the Ontario Ministry of Agriculture, Food & Rural Affairs, 1997

"Minnesota Guild to Forest Game Habitat Improvement", published by the Minnesota Department of Conservation, 1969.

6.1 DEER MANAGEMENT

There have been no efforts undertaken in past management periods related to the improvement of either summer or winter habitat. The establishment of conifer plantations and the silvicultural treatment of the upland hardwood working groups have increased habitat indirectly but efforts in this regard have been aimed at the production of quality forest products.

Conifer plantations have the potential to develop into acceptable winter habitat, as the canopy structure possesses the ability to capture snow and reduce the ground snow depth. Later in the rotation, volunteer hardwoods will invade the plantations and food crops will increase. Summer range has also been increased through conifer establishment on abandoned open non-agricultural areas with limited potential for habitat that has been converted back to forest cover. The plantations create additional edge and allow for the establishment of herbaceous plants suitable as summer deer food.

In general, the greater the diversity within the canopy of the forest, the more suitable the habitat is for wildlife. The thinning in the polewood upland hardwood creates favourable conditions for deer, as increased light will filter through the more open canopy and thereby increase the herbaceous growth and allow for the establishment of regeneration of deciduous species. The benefit is temporary as crown expansion by the residual growing stock will eventually suppress the regeneration and reduce the herbaceous growth. Considering that thinning is an on-going process, the suitability of upland hardwoods for deer habitat will fluctuate until the stand receives harvesting operations that are designed for the permanent establishment of regeneration. The harvesting for commercial sawlogs will be of significant severity to allow for the growth and development of the various age classes. When the forest attains the stage of development where there will be a substantial yield of sawlog class individuals, subsequent cutting cycles will include a regeneration-cut. The balanced uneven-aged forest will contain a continual diversity of suitable habitat.

Areas with the greatest potential for winter deer habitat are the lowland mixed wood sites containing significant populations of conifer species (i.e. Balsam Fir, White Spruce, White Cedar). While maintaining suitable winter cover, these sites usually produce food species such as poplar, willow and dogwood. This environment of food species in close proximity to winter cover provides optimum habitat for deer which is critical in maintaining or improving the site's carrying capacity. The maintenance or creation of an ecological diversity within this cover type is essential as forest succession may reduce the food crops, as the stands' deciduous species will grow taller and become unsuitable for deer food. In order to maintain the diversity, small patch clear cutting or alternate strip clear cutting may be undertaken to encourage accessible food species. Felling will take place in the areas of deciduous species and the conifers will be retained as cover. Deer will then feed in the cut over areas while the conifers provide adequate shelter.

Areas of pure upland Cedar provide only the cover aspect of the habitat requirement of deer. Food may be close by, but if the area is large, a significant portion of the Cedar stand will go unutilized. In order to improve these areas, alternate row-strip, clear-cutting will be undertaken to break up the cover and encourage the regeneration of food crops in the cleared areas. Through this treatment these areas will provide more suitable winter habitats.

6.2 SMALL GAME

The County forest's contribution to small game hunting opportunities is not calculable due to the inordinate number of variables. However, these areas will contribute to a considerable degree. There has been no effort to directly improve small game habitat during post management periods although benefits have occurred during silvicultural treatments for the production of forest products. For example, thinned plantations provide excellent roost trees for Wild Turkeys.

During this management period there will be no proactive management to improve small game production, but, during silvicultural treatment and Deer range enhancement projects, small game habitats should be improved.

The following guidelines will be adhered to during silvicultural treatments to ensure a continuation of small game production.

a) a maintenance of species diversity in upland and lowland hardwood working groups;
b) maintenance or expansion of the existing forest edge;

c) during harvesting operations catkin producing trees will be retained where possible;
d) 6-8 cavity trees, where present, will be retained per hectare during commercial and stand improvement treatment;
e) as many trees as possible will be retained;
f) fence rows will be retained as travel corridors;
g) all stick nest trees will be retained;
h) drum logs will be laid down in areas of grouse habitat;
i) standing snags will be left standing where possible;
j) fallen woody debris will be left when possible.

6.3 WATERFOWL

Areas of potential waterfowl productions in County forests are extremely limited and therefore increases in their population will be insignificant.

Optimum habitat for waterfowl is open water interspersed with aquatic vegetation. Accompanying the open water there should be suitable nesting sites.

Sites exhibiting the potential as waterfowl production areas will be surveyed and if appropriate will be developed in cooperation with interest groups (i.e Ducks Unlimited) or through community involvement programs.

6.4 TRAPPING

Trapping opportunities for wetland fur-bearers in County forests are limited due to lack of habitat. The areas traditionally suitable for habitat will be maintained while in the newly flooded areas the nuisance beaver will be trapped.

Upland fur-bearers such as raccoon will be enhanced by den tree retention and fox and coyote dens will be left undisturbed.

6.5 MASSASAUGA RATTLESNAKE

Massasauga Rattlesnakes tend to hibernate in damp or water saturated sites or in areas of fractured bedrock. This habitat is found throughout this property along Spring Creek and throughout the western portion of the properties. Following spring emergence (May-June) pregnant females move toward open rocky gestation sites. Many of these sites on this property are located close to the wetland hibernation areas. These areas are classified as Protection Forest primarily because of the lack of top soil and fragile growing conditions for trees. Males and non-pregnant females move out and utilize a variety of vegetation communities throughout the area.

Harvesting activities will be restricted to the fall and winter periods, after the rattlesnakes have returned to there winter locations (after August-September). Where possible, wetlands and Protection Forest Reserves will be restricted from any harvesting activities.

For more information see Appendix A

7.0 FISHERIES

The contribution of the County forests to fisheries is insignificant as there are very few critical cold water and warm water sites. Protection is required in these areas to resume the preservation of the cold water habitat.

In general, stream degradation occurs in proximity to open agricultural fields and heavily cut forested land where the penetration of the sun allows water temperatures to rise significantly. Also, places of human settlement and cattle watering areas can be sources of pollutants that again may have severe detrimental effects.

The municipal forests in many respects demonstrate the proper management of cold water sites. Silvicultural treatments have occurred during past management periods yet adequate cover has been maintained to preserve the thermal integrity of the cold water fishery. This integrated approach to the management of two important resources on the same area will continue during the next management period. The following are general guidelines aimed at the protection of all streams and watercourses.

a) maintenance of 22-25 square metres per hectare of forest cover within 50 metres of streams;
b) no logging debris is to be deposited in streambeds;
c) harvesting will not occur during critical fish spawning periods in cold water sites;

d) properly designed and installed dredges or culverts at all major stream crossing; construction will not take place during spawning periods.

8.0 OUTDOOR RECREATION

The policy since the inception of the County Forests program has been to allow and encourage passive recreational opportunities. The rising demand for venues for outdoor recreational pursuits will mean an increased use of these properties during this management period.

Recreational activities such as cross-country skiing, snowmobiling, hiking, mountain biking and all terrain vehicle activities are compatible uses with wildlife, fisheries and forest management.

There are no targets for various out-door recreational opportunities. It is not possible to estimate the significance of the municipal forests current contribution however it is possible that surveys will be undertaken in this management period to determine use. Currently most of the compartments have some organized and approved activity (i.e. snowmobile trail, hiking trail, cross-country trail). Future user strategy will be to develop the properties in co-operation with various user groups.

It may be necessary to restrict the use of one recreation endeavor to ensure the integrity of another. For example, cross-county skiing and snowmobile activities are not compatible uses on the same trail system.

Letters of authorization by the County will be used as the vehicle to allow the development of organized recreational activities.

8.1 CROSS-COUNTY SKIING

Demand for cross-county skiing opportunities are expected to rise significantly, especially as the County promotes tourism.

The sport may be classified into three main types; backcountry, in-track skiing and skate skiing (freestyle) all performed on groomed trails. The intrack skiing is characterized by a wider trail in order to facilitate the maneuvering of track setting equipment. The skate skiing trail requires near interior road width conditions for rolling, subsequent packing and grooming with no tracks set into the surface. No type of skiing will be given priority as

the advantages of the less impacting backcountry skiing is offset by the greater demand for groomed trails and hence the creation of more recreational opportunities.

The type of trail development will be influenced by the significance of the individual forest tract. The backcountry skiing will be considered a more suitable form of development in areas designated as Areas of Natural and Scientific Interest established for their life science values. The less developed trail right-of-ways will have a less visual impact and more importantly create fewer disturbances to the botanical communities. Groomed trails will be more desirable on forested areas not containing important life science values. In these tracts an attempt will be made to maximize the recreational opportunities. (ie. Mountain Biking)

8.2 SNOWMOBILE TRAILS

Snowmobile trail development has been stabilized and there is not expected to be a significant increase in new trail development during the next management period. Existing trails may be maintained or improved in partnership with local snowmobile clubs and the County.

Future trail development will be approved on the basis of providing lineal linkage between established points of interest to create a more intensive network of interconnecting passages.

8.3 HIKING

Hiking has always been encouraged in the County forests both in organized trails and general hikes through the woods. Recreational demand for hiking is low and during this management period efforts will attempt to intensify this activity.

The strategy to increase the hiking opportunities will be to develop interpretive trails on the more diverse properties. The trails will be self-guiding and will illustrate forest management, wildlife habitat as well as other areas of significance. Public education in regards to intensive forest management techniques displayed in the County forests will be given higher priority during the next management period through the system of interpretive trails.

8.4 ALL-TERRAIN VEHICLES

The fastest growing recreational use of County forests may be all-terrain vehicles. At present all-terrain vehicles outsell snowmobiles 4 to 1. New all-terrain vehicle clubs are forming across the province. Unorganized activities by all-terrain vehicles have a significant potential for site damage caused by compaction and erosion.

The County of Bruce will develop a strategy to ensure recreational opportunities by these all-terrain vehicles are compatible with County policies and procedures.

All-terrain vehicle clubs will be invited to make formal proposals to the County. Existing trails will be used where possible and in conjunction with other established users.

8.5 OTHER RECREATIONAL VEHICLE TRAILS

Trail development for 4 x 4 trucks and motorcycles will not be permitted. These activities have a significant potential for site damage caused by compaction and erosion.

8.6 MOUNTAIN BIKING

Mountain biking which is an ever increasing and physically demanding sport will be encouraged in County forests by using the cross-country ski and snowmobile trails. These sports can work well together as mountain biking is a non-snow activity while skiing and snowmobiling are winter activities. Some single track, technically demanding trails could also be developed with input from local clubs. With all season trail activities the maintenance for any one group could be kept to a minimum.

8.7 HUNTING, FISHING AND TRAPPING

As well as recreational and tourism activities, hunting, fishing and trapping are integral parts of resource management. They will continue to be allowed on most of the County forests. Exceptions will be near areas of high

residential population. Properties will continue to be dealt with on an individual basis.

9.0 MANAGEMENT OF AREA OF NATURAL AND SCIENTIFIC INTEREST

These are lands containing landscapes or features that have been identified as having values related to protection, natural heritage appreciation, scientific study or education.

Some of the Bruce County Forests have been identified as such and the management treatments will ensure the protection of the designated interest.

Bruce County Forest properties have been selected as areas of Natural and Scientific Interest in both the Life Science and Earth Science categories. Forestry, wildlife, fisheries management and outdoor recreation development will be compatible activities within these areas. Modified harvesting in some areas may be required to ensure the achievement of the County's protection mandate.

Prior to the actual treatment, these areas will be surveyed to determine the location of the significant values. These areas will then be flagged and during silvicultural operations felling into and skidding within these areas may be restricted. Marking guidelines will conform to those as presented in *Section 5.3*.

In the event that Environmental Impact Studies or botanical surveys discover the presence of an extremely exceptional plant species (i.e. a new toxin) or ecosystem then management activities will be abrogated in the area having the significant feature and a suitable buffer will be determined. Forest and wildlife management will then continue on the forest tract in the non-affected areas.

9.1 SIGNIFICANT ECOLOGICAL SITES

This property contains Fens and Alvars.

Ira Lake Fen

This area is classified as a Twig-Rush Open Fen Type, Provincial Rank S3 which is considered rare to uncommon and globally very rare.

Alvar

This property contains two Alvar sites. These sites are small, limited and of poor quality for any significant flora/fauna species.

The sites identified include: Dry Annual Open Alvar Pavement Type, Provincial Rank S3 and Common Juniper Carbonate Shrub Rock Barren Type, Provincial Rank S3. Both are considered to be rare to uncommon and globally very rare.

The environment of alvar areas is too harsh, in fact, for most trees to grow. When the summer sun shines, alvars are hot, temperatures can reach 43°C at the rock surface. When the winter winds blow, they are cold, so cold that needle ice crystals churn up what little soil there is.

In spring, most alvars collect water in shallow pools and bedrock pockets, and some areas remain flooded for weeks. By early summer, with the pools long gone, the shallow soils dry to a crisp and many of the flowering plants begin to turn brown.

This combination of flooding and drought holds off the invading trees. Spring flooding and shallow soils discourage trees and shrubs from taking root, and summer drought, especially during a very dry year, finishes off those that have begun to get established. Some alvars also have a recorded history of past fires, and the presence of charcoal on many sites indicates that wildfires also may have contributed to their open character.

Reference: "Great Lakes Alvars", published by the Federation of Ontario Naturalists and The Nature Conservancy

Reference: Rankings are based on "Ecological Land Classification for Southern Ontario", published by the Ontario Ministry of Natural Resources.

For further information see Appendix B.

10.0 THE MANAGEMENT OF AGREEMENT FOREST LAND WITHIN THE NIAGARA ESCARPMENT PLANNING AREA

Currently there are not any County owned forests within the Niagara Escarpment Plan area but in the future if property does fall within the boundaries, then integrated resource management based on sound forestry, wildlife and recreational principles will be employed. These principles are

consistent with the Niagara Escarpment Plan and therefore the relevant provisions of the Plan will be adhered to in all management activities.

11.0 MINERAL, AGGREGATE AND PETROLEUM RESOURCES

The mineral, aggregate and petroleum resources potential on Bruce County forests is at present unknown

Petroleum resource exploration will be permitted in the forest, as long as the limited area required to conduct the preliminary surveys does not conflict with the forestry, recreation and wildlife management activities.

The extraction of mineral aggregate will be considered provided the activity does not remove areas of productive forested land.

12.0 FIRE CONTROL

The suppression of fires in County Forests is the responsibility of the local municipal fire departments and the County will assist with training and other expertise if requested.

12.1 LIVESTOCK CONTROL

The grazing of livestock on forested land is detrimental due to soil compaction and the elimination of seedlings, which are required in order to achieve the fully regulated forest.

In past management periods, fencing to restrict livestock has been a shared effort with neighbouring landowners with the County maintaining one half of the line fence. This policy will continue throughout this management period.

12.2 INSECTS AND DISEASES

The detection of insects and disease will be the responsibility of the Bruce County forest technician in co-operation with the Province and Federal Departments that deal with Forest Health.

Control action will be the sole responsibility of Bruce County and may be necessary from time to time in order to protect the resources of the County forests. If control action necessitates the use of insecticides, biological agents, or other pesticides the adjacent landowners and public will be consulted prior to control action.

13.0 MAINTENANCE OF THE PLAN

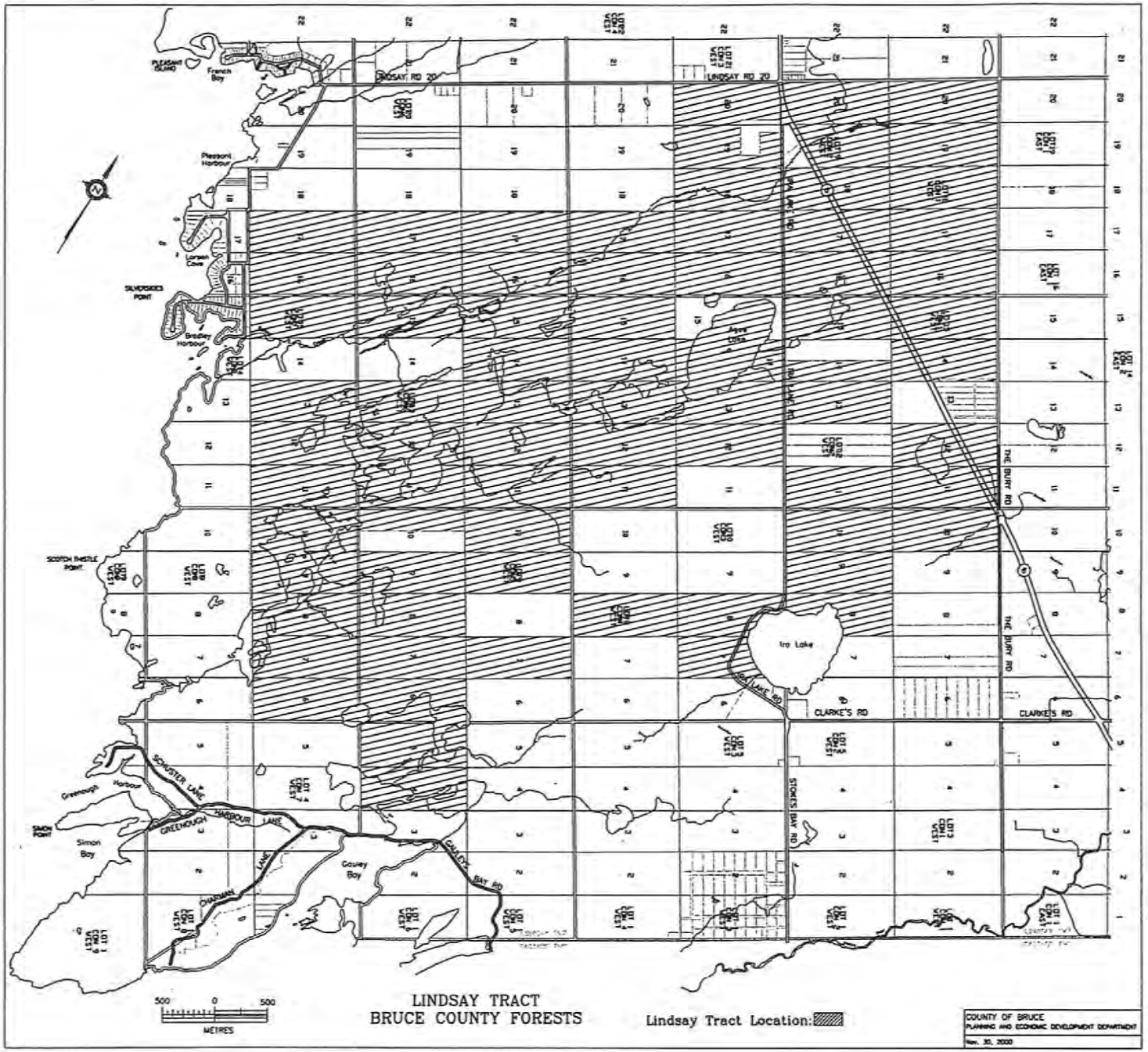
The management period for this plan is January 1, 2002 to December 31, 2021.

There will be four operating plans of equal duration, 2002 to 2006;
2007 to 2011;
2012 to 2016
and 2017 to 2021.
Annual plans will be submitted prior to the beginning of each year.

Work accomplished will be reported to Bruce County Council following the completion of each operating year. The work will be recorded and maintained by the Bruce County forest technician.

Property Location Map

Municipality of Northern Bruce Peninsula (Lindsay), County of Bruce



Productive Forest Land

Working Group	Productive Forest (Hectares)
White Pine	22
Red Pine/Jack Pine	36
White Spruce	7
Cedar	1235
Balsam Fir	7
Poplar	33
Hard Maple	144
White Birch	2
Total	**1486**

Non-Productive Forest Land

Working Group	Non-Productive Forest (Hectares)
White/Jack/Scots Pine	24
Cedar	642
White Spruce	74
Balsam Fir	49
Poplar	75
Hardwoods	77
Wetland	390.5
Barren & Scattered Area	2
Ducks Unlimited Pond	7.5
Total	**1341**

Table One

Bruce County Forests
Stand Summary
for
Lindsay Tract
Municipality of Northern Bruce Peninsula

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in		PFR
						5 years	20 years	
1	Mh_7 Be_1 Oh_1 Oc_1	22.9	13	50	55		yes	
2	Ce_5 Mh_2 Bf_1 He_1 Oh_1	25.2	20	30	45			yes
3	Ms_5 Ab_4 Ce_1	37	4	50	60			
4	Mh_6 Oh_2 Po_1 Oc_1	21	20	50	55		yes	
5	Mh_5 Po_2 Oh_2 Oc_1	21.6	4	30	60		yes	
6	Ce_7 Po_1 Oc_1 Oh_1	26.1	25	25	25			yes
7	Ce_6 Bw_1 Sw_1 Bf_1 Oh_1	18	22	25	40			yes
8	Mh_7 Po_1 Oh_2	23.2	25	50	80			yes
9	Ce_6 Sw_2 Bf_1 Po_1	32.8	198	25	40	yes	yes	
10	$Ce_7Bw_1O_2$	27.1	12	50	50	yes	yes	
11	Sw_4 Ce_3 Oh_3	6	39	25	25			yes
12	Sw_4 Ce_3 Po_2 Bf_1	20.5	5	25	50		yes	
13	Sw_6 Ce_4	10	4	25	25			yes
14	Mh_6 Pw_2 O_2	17	2	50	60		yes	
15	Po_{10}	15	4	25	50			
16	Ce_4 Po_2 Bf_2 O_2	17.6	40	50	50	yes	yes	
17	Ce_7 Sw_1 Ab_1 Oh_1	21.2	13	25	40			yes
18	Sw_4 Bf_3 Po_2 Oh_1	9.75	8	25	50			yes
19	Ce_6 Ab_4	14	6	25	40			yes
20	Ce_7 Bw_1 Oh_1 Oc_1	35.5	36	25	40	yes	yes	
21	Ce_8 Ab_1 Oh_1	30	10	50	60	yes		
22	Ce_5 Po_2 Bf_1 Oc_1 Oh_1	17	24	25	40			yes
23	Pj_6 Ce_1 Sw_1 Po_1 Bw_1	18	12	25	40			yes
24	Ce_8 Mh_1 Aw_1	4	9	25	40			yes
25	Pw_6 Sw_4	38	4	35	60	yes	yes	
26	Po_4 Ce_3 Sw_2 Oc_1	13.9	18	25	40			yes
27	Sw_5 Ce_3 Oc_1 Oh_1	6.6	11	25	30			yes
28	Pw_8 Sw_1 Oc_1	43	5	25	40	yes	yes	

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in		PFR
						5 years	20 years	
29	Po_7 Pw_2 Sw_1	23	4	25	40			yes
30	Ce_5 Pj_2 Po_2 Sw_1	34.6	12	25	40	yes	yes	
31	Ce_6 Sw_2 Po_1 Bf_1	25.4	98	25	30	yes	yes	
32	Pj_8 Pr_1 Oh_1	29	2	25	50	yes	yes	
33	Ce_6 Po_2 Sw_1 Oh_1	27.4	46	25	50			yes
34	Ce_{10}	4	7	25	20			yes
35	N/A (B & S)		2					yes
36	Ce_6 Po_2 Bf_1 Bw_1	25	46	25	50			yes
37	Ce_6 Bw_4	7	8	25	30			yes
38	Po_7 Ce_1 Bw_1 Bf_1	12	3	25	50			yes
39	Ps_6 Pr_3 Ce_1	17	7	25	40			yes
40	Ce_{10}	18	1	25	40			yes
41	Pw_5 Sw_3 Ce_2	28.7	3	25	60			
42	Sw_3 Bf_2 Po_2 Ce_1 Oh_2	22.7	6	25	50			
43	Ce_6 Po_2 Sw_1 Bf_1	22	4	25	40			yes
44	Ce_5 Po_2 Bw_1 Mh_1 Oh_1	24	13	30	35		yes	
45	Mh_6 Bw_2 By_1 Oh_1	18	5	75	40			yes
46	Ce_6 Ab_2 Po_1 Oh_1	24.8	10	30	30	yes		yes
47	Ab_5 Ce_2 Ms_2 Ta_1	12	8	25	25			yes
48	Bw_3 Sw_2 Bf_2 Ce_2 Po_1	15.2	5	25	40			yes
49	Ce_3 Ab_3 Ms_3 By_1	18.2	10	30	50			yes
50	Mh_4 Bw_3 Be_1 Oh_2	20	2	30	40		yes	
51	Po_4 Bf_3 Ce_1 Bw_1 Oc_1	16.4	6	25	50			
52	Pj_4 Pw_4 Sw_1 Mh_1	30	4	25	50	yes	yes	
53	Po_7 Mh_2 Bw_1	4.5	4	33	60			yes
54	Mh_5 Bw_1 Bd_1 Aw_1 Po_1 Oc_1	22.5	4	33	60	yes	yes	
55	Bf_4 Bw_3 Po_1 Ce_1 Aw_1	23.8	8	25	50			
56	Bf_5 Po_2 Mh_1 Bw_1 Oc_1	25	3	25	50			
57	Pr_5 Pj_5	46.6	2	40	50	yes	yes	
58	Po_8 Ce_1 Oh_1	14.5	12	25	40			yes
59	Pj_8 Pr_2	23	2	25	40		yes	

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in		PFR
						5 years	20 years	
60	Ce_{10}	8.7	6	25	18		yes	yes
61	Ce_5 Po_3 Sw_1 Oh_1	15.9	30	25	45		yes	
62	Pj_7 Mh_1 Bw_2	21	2	40	40			yes
63	Pr_7 Pj_3	24	5	30	40		yes	
64	Mh_8 Oh_2	21.2	92	50	75		yes	
65	Pr_5 Pw_4 Oh_1	29	14	40	50	yes	yes	
66	Ce_8 Ab_1 La_1	24.6	8	40	40			yes
67	Po_5 Ce_5	4	1	25	20			yes
68	Po_6 Mh_2 Oh_2	8	2	40	50			yes
69	Pw_7 Sw_2 Pr_1	52.7	5	50	60	yes	yes	
70	Sw_3 Cw_3 Bw_2 Bf_1 Oh_1		3	20	20			yes
71	Po_5 Bw_2 Oh_2 Bf_1	15.6	6	40	40			yes
72	Po_4 Ce_4 Bf_1 Oh_1	24	7	50	60	yes	yes	
73	Pj_4 Pw_2 Ps_2 Sw_2	28.3	4	50	55	yes	yes	
74	Pw_5 Pr_3 Sw_1 Oh_1	42	4	40	50	yes	yes	
75	Sw_{10}	40	2	25	40	yes		
76	Ce_5 Ab_4 Bw_1	13.6	23	30	50			
77	Ab_{10} (Beaver flood)		11	15	30			
78	Po_3 Bf_3 Ce_2 Bw_1 Oh_1	21	4	25	60			
79	Pw_4 Pr_3 Sw_3	37	2	40	40	yes	yes	
80	Po_6 Ab_2 Mh_1 Oh_1	18.4	5	30	30			
81	Pw_7 La_2 Sw_1	31	2	50	60	yes	yes	
82	Po_5 Ce_2 Bw_2 Bf_1	32.6	3	25	55			
83	(Ducks Unlimited Pond)		7.5					
84	Mh_6 Po_2 Id_1 Oh_1	19.5	7	50	50		yes	
85	Bf_3 Bw_3 Oh_2 Ce_1 Sw_1	30.9	7	25	40	yes	yes	
86	Ce_4 Bf_2 Po_2 Bw_1 Sw_1	32	10	25	30	yes	yes	
87	Ce_4 Bf_2 Bw_2 Sw_1 Po_1	22.2	36	25	40	yes	yes	
88	Pj_7 Pw_3	22	1	25	40	yes	yes	
89	Ce_4 Bf_2 Bw_2 Sw_1 Po_1	18.4	41	25	40	yes	yes	
90	Bf_5 Po_2 Bw_2 Sw_1	20.3	8	25	50			

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in		PFR
						5 years	20 years	
91	Ce_5 Po_2 Bf_1 Sw_1 Oh_1	43.6	51	25	40	yes	yes	
92	Ce_6 Sw_1 Bf_1 Po_1 Bw_1	31.7	108	25	40	yes	yes	
93	Ce_5 Po_2 Sw_1 Bf_1 Bw_1	38.3	24	25	40	yes	yes	
94	Ce_6 Po_3 Sw_1	40	7	25	40	yes	yes	
95	Ce_5 Po_2 Sw_1 Bf_1 Bw_1	34.3	70	25	40	yes	yes	
96	Ce_7 Sw_2 Oh_1	23.5	80	25	40			yes
97	Pr_8 Sw_2	40	2	40	60	yes	yes	
98	Ce_5 Oc_2 Pr_1 Sw_1 Oh_1	24	20	25	40		yes	
99	Ce_4 Pw_3 Pr_2 Oc_1	39.3	7	25	40	yes	yes	
100	Ce_6 Sw_2 Po_1 Oc_1	29.3	36	25	25	yes	yes	
101	Ce_9 Oc_1	14	2	25	30			yes
102	Ce_6 Sw_4	5	4	25	20			yes
103	Ce_8 Bf_1 Oh_1	17.7	26	50	30	yes	yes	
104	Ce_6 Sw_2 Bw_1 Bf_1	26.9	62	25	40	yes	yes	
105	Ce_6 Sw_3 Bw_1	18.5	8	25	30			yes
106	Ce_6 Bf_2 Bw_1 Sw_1	20.5	8	25	30		yes	
107	Ce_7 Sw_2 Oc_1	49.5	7	25	40	yes	yes	
108	Ce_8 Sw_2	27	11	25	30			yes
109	Ce_8 Sw_1 Bf_1	14.6	5	25	30	yes	yes	
110	Ce_4 Sw_3 Bw_2 Oc_1	18	1	25	30			yes
111	Bw_4 Bf_2 Po_2 Ce_1 Sw_1	30	2	25	40		yes	
112	Ce_6 Sw_3 La_1	3.3	11	25	20			yes
113	Ce_3 Bw_2 Sw_2 Bf_2 Pr_1	14	11	25	40			yes
114	Ce_5 Po_2 Bf_2 Sw_1	23	4	25	30			yes
115	Bf_5 Bw_3 Ce_1 Sw_1	16.7	11	25	40			yes
116	Sw_3 Bw_3 Bf_3 Po_1	19	3	25	30			yes
117	Ce_6 Sw_2 Oc_1 Bw_1	14.8	10	25	20			yes
118	Ce_4 Sw_3 Bw_2 Bf_1	13.7	13	25	30			yes
119	Ce_6 Sw_2 Bw_1 Bf_1	12.9	21	25	30			yes
120	Ce_5 Sw_4 Oh_1	22.9	17	25	40	yes	yes	
121	Bf_4 Bw_3 Sw_2 Ce_1	16.7	3	25	30			yes

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in		PFR
						5 years	20 years	
122	Ce_5 Sw_2 Bw_2 Po_1	19.2	32	25	30	yes	yes	
123	Ce_9 Oc_1	4.3	8	25	20			yes
*124	Ce_5 Bw_2 Po_2 Bf_1		31					
125	Bw_3 Sw_3 Sb_2 Oc_2	13.4	7	25	30			yes
126	Ce_4 Po_3 Sw_2 Bf_1	23.3	6	25	30		yes	
*127	Ce_{10} (B & S)		3					yes
*128	Ce_3 Po_3 Bf_2 Sw_1 Bw_1		18					
*129	Bw_8 Bf_1 Ce_1		5					
*130	Ce_{10} (B & S)		3					yes
131	Ce_5 Po_2 Sw_1 Bf_1 Bw_1	32	40	25	40	yes	yes	
*132	Ce_4 Bw_2 Po_1 Ab_1 Sw_1 Bf_1		3					yes
133	Ce_7 Sw_1 Bf_1 Oh_1	19	8	25	30		yes	
134	Ab_4 Ce_4 Po_1 Oc_1	13	7	25	30			yes
135	Ce_4 Po_3 Sw_2 Bf_1	26.6	6	25	30	yes	yes	
136	Po_4 Ce_4 Sw_1 Bf_1	21	26	50	60	yes	yes	
137	Po_7 Bf_2 Bw_1	36	3	25	30			
138	Bw4 Bf2 Sw2 Ce2	20.6	16	25	30			yes
139	Ce_7 Sw_1 Bf_1 Bw_1	14.3	31	25	30			yes
140	Ce_5 Sw_2 Bf_1 Po_1 Bw_1	13.5	72	25	30			yes
141	Ce_7 Sw_3	32	3	25	30			yes
142	Ce_6 Sw_3 Bf_1	16	3	25	30			yes
143	Ce_4 Sw_3 Bw_2 Bf_1	22.3	16	25	30	yes	yes	
144	Ce_5 Po_2 Sw_1 Bf_1 Oh_1	32.3	38	25	40	yes	yes	
145	Ce_4 Po_3 Bf_1 Ab_1 Sw_1	25.3	16	25	30	yes	yes	
146	Ce_4 Po_3 Sw_1 Bf_1 Bw_1	44	2	25	30		yes	
147	Ce_5 Po_2 Sw_1 Bf_1 Bw_1	28.5	40	25	40	yes	yes	
148	Ce_3 Sw_2 Bf_2 Bw_2 Po_1	20.6	17	25	40		yes	
149	Ce_3 Bf_3 Po_2 Sw_1 Oh_1	17.7	17	25	40			yes
*150	Ce_8 Bw_2		2					
151	Ce_6 Po_2 Sw_1 Bf_1	17.3	14	25	30		yes	
152	Wetland		390.5					
Total Hectares			***2827***					

* To be completed in winter of 2002
* "Species Content" is from previous data obtained from the Ministry of Natural Resouces.

BRUCE COUNTY FORESTS

FIVE YEAR OPERATING PLAN SUMMARY

for

Lindsay Tract

White Pine

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
25	4	Pw_6 Sw_4	4th row removal and a selective thinning in remaining rows
28	5	Pw_8 Sw_1 Oc_1	4th row removal and a selective thinning in remaining rows
69	5	Pw_7 Sw_2 Pr_1	4th row removal and a selective thinning in remaining rows
74	4	Pw_5 Pr_3 Sw_1 Oh_1	4th row removal and a selective thinning in remaining rows
79	2	Pw_4 Pr_3 Sw_3	4th row removal and a selective thinning in remaining rows
81	2	Pw_7 La_2 Sw_1	4th row removal and a selective thinning in remaining rows

Red Pine

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
57	2	Pr_5 Pj_5	4th row removal and a selective thinning in remaining rows
65	14	Pr_5 Pw_4 Oh_1	4th row removal and a selective thinning in remaining rows
97	2	Pr_8 Sw_2	4th row removal and a selective thinning in remaining rows

Jack Pine

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
32	2	Pj_8 Pr_1 Oh_1	4th row removal and a selective thinning in remaining rows
52	4	Pj_4 Pw_4 Sw_1 Mh_1	4th row removal and a selective thinning in remaining rows
73	4	Pj_4 Pw_2 Ps_2 Sw_2	4th row removal and a selective thinning in remaining rows
88	1	Pj_7 Pw_3	4th row removal and a selective thinning in remaining rows

White Spruce

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
75	2	Sw_{10}	4th row removal and a selective thinning in remaining rows

Balsam Fir

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
85	7	Bf_3 Bw_3 Oh_2 Ce_1 Sw_1	A light improvement thinning

Hardwoods

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
54	4	Mh_5 Bw_1 Bd_1 Aw_1 Po_1 Oc_1	A light improvement thinning
72	7	Po_4 Ce_4 Bf_1 Oh_1	A harvest of Cedar
136	26	Po_4 Ce_4 Sw_1 Bf_1	A Cedar clear-cut

Cedar

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
9	198	Ce_6 Sw_2 Bf_1 Oh_1	Cedar strip cut
10	12	Ce_7 Bw_1 O_2	Cedar strip cut
16	40	Ce_4 Po_2 Bf_2 O_2	Cedar strip cut
20	36	Ce_7 Bw_1 Oh_1 Oc_1	Cedar strip cut
21	10	Ce_8 Ab_1 Oh_1	Cedar patch cut
30	12	Ce_5 Pj_2 Po_2 Sw_1	Cedar strip cut
31	98	Ce_6 Sw_2 Po_1 Bf_1	Cedar strip cut
46	10	Ce_6 Ab_2 Po_1 Oh_1	Selection Harvest of dying Cedar
86	10	Ce_4 Bf_2 Po_2 Bw_1 Sw_1	Cedar strip cut
87	36	Ce_4 Bf_2 Bw_2 Sw_1 Po_1	Cedar strip cut
89	41	Ce_4 Bf_2 Bw_2 Sw_1 Po_1	Cedar strip cut
91	51	Ce_5 Po_2 Bf_1 Sw_1 Oh_1	Cedar strip cut
92	108	Ce_6 Sw_1 Bf_1 Po_1 Bw_1	Cedar strip cut
93	24	Ce_5 Po_2 Sw_1 Bf_1 Bw_1	Cedar strip cut
94	7	Ce_6 Po_3 Sw_1	Cedar strip cut
95	70	Ce_5 Po_2 Sw_1 Bf_1 Bw_1	Cedar strip cut
99	7	Ce_4 Pw_3 Pr_2 Oc_1	4th row removal and selective thinning of Pine
100	36	Ce_6 Sw_2 Po_1 Oc_1	Cedar strip cut
103	26	Ce_8 Bf_1 Oh_1	Cedar strip cut
104	62	Ce_6 Sw_2 Bw_1 Bf_1	Cedar strip cut
107	7	Ce_7 Sw_2 Oc_1	Cedar strip cut
109	5	Ce_8 Sw_1 Bf_1	Cedar strip cut
120	17	Ce_5 Sw_4 Oh_1	Cedar strip cut
122	32	Ce_5 Sw_2 Bw_2 Po_1	Cedar strip cut

Cedar (continued)

Comp. #	*Area (hectares)*	*Species Composition*	*5-year management plan*
131	40	Ce_5 Po_2 Sw_1 Bf_1 Bw_1	Cedar strip cut
135	6	Ce_4 Po_3 Sw_2 Bf_1	Cedar strip cut
143	16	Ce_4 Sw_3 Bw_2 Bf_1	Cedar strip cut
144	38	Ce_5 Po_2 Sw_1 Bf_1 Oh_1	Cedar strip cut
145	16	Ce_4 Po_3 Bf_1 Ab_1 Sw_1	Cedar strip cut
147	40	Ce_5 Po_2 Sw_1 Bf_1 Bw_1	Cedar strip cut

ALBEMARLE TRACT

CARRICK TRACTS

CULROSS TRACTS

HURON TRACTS

KINLOSS TRACTS

3.0 HISTORY

The first land purchased by the county occurred in 1944. Since that time the holdings have increased to slightly over 7000 acres. A major part of this forest has a natural forest cover. In many places the already thin soil has been further reduced by past forest fires.

The open land was planted with pine and spruce in 1947 and 1948, totaling 125,000 trees. One interesting feature of this forest is the fact that Spring Creek surfaces in the forest and almost all of its entire course is through wooded portions of the land owned by the county.

The Ministry of Natural Resources formerly managed this property. Hardwoods, White Pine, White Spruce and Cedar have been harvested on a selective basis since the mid 1950's. The firebreaks and roads have been maintained. Snowmobile clubs and numerous hunters have also maintained many of the roads and trails. This area has, and continues to be used heavily for hunting purposes.

The County of Bruce in co-operation with the Department of Lands and Forests secured 13,500 acres and were committed to re-establishing the area as permanent forestland.

The Ministry of Natural Resources actively managed the Bruce County Forests until mid 1990's. At the beginning of the new millenium the Ministry of Natural Resources returned the responsibility of managing the County Forests back to Bruce County.

The early management activities of the Bruce Forest consisted of reforestation efforts and thinning in the upland hardwood working groups.

Tree planting projects concentrated mainly on the establishment of conifer plantations, which would later act as a nurse crop for quality hardwood regeneration. The preferred species for planting were White Pine and Red Pine and significant amounts of White Spruce, Norway Spruce, Jack Pine and European Larch. These species were planted as homogeneous plantations or varying mixtures.

At the time of purchase most of the upland hardwood working groups had been severely high-graded prior to acquisition which resulted in many of the stands having even-aged polewood with a remnant stand of dominant low-grade trees. Forest management work was comprised of the removal of the low-grade material for logs followed by crown thinning in the even-aged polewood stands. Because of the limited markets available for small dimensional logs and fuelwood during the 1940's

through to the early 1970's, the poor-quality trees were girdled to allow further development of the best-quality trees. Side-branch pruning of White Pine and some small conifer thinning operations occurred until the early 1990's.

At the beginning of the 1980's, markets for fuelwood and small dimensional conifer logs increased significantly. Activity in the Bruce County Forests rose with the markets and major thinning in the hardwood and conifer stands began.

4.0 FOREST MANAGEMENT

The management of the forest resources in Bruce County Forests will contribute to local and provincial needs.

The wood produced in the Bruce County Forests will be provided predominately from conifer plantations and tolerant upland hardwood stands. The working group areas in each Tract are presented in *Table One (Productive Forest Land)*, which is located at the beginning of each municipal section.

4.1 PLANTATION ESTABLISHMENT

In the County of Bruce a significant acreage of land initially cleared for agricultural purposes became uneconomical working units due to the advent of more mechanized farm management practices. This land was left unproductive with no foreseeable benefits. In order to demonstrate wise land use management, the Ontario Government instituted the Agreement Forest Program, which enlisted municipalities to purchase lands for "forestry purposes". Cleared land on the acquired properties was planted to demonstrate the benefits of the reforestation of idle, non-agricultural land.

The species planted consisted predominately of conifers with small quantities of deciduous varieties. Most of the plantations were White Pine and Red Pine. Other species were White Spruce, Norway Spruce, Scots Pine and European Larch. Common mixtures of these species were White Pine-White Spruce and White Pine-Red Pine.

One of the many benefits of plantations is the creation of a more favourable environment for wildlife. During the operational planning, provision for the creation of wildlife openings within the plantations will be designed. Openings will tend to follow areas of lower productivity,

such as gravel knolls and wet depressions. The fence rows will be retained as wildlife corridors.

4.2.0 PLANTATION MANAGEMENT

The long-term objective of the plantation is to provide a suitable environment for the establishment of volunteer hardwoods. The role of the conifers is not confined merely to that of a nurse crop, as high-quality raw materials for the area's forest based industries will also result. Species such as White Pine, Norway Spruce, White Spruce and European Larch will produce sawlogs and veneer, with the White Pine showing exceptionally high potential value. Red Pine was planted for its potential as a "hydro pole" as well as for its sawlog qualities.

When plantations are established, trees are planted relatively close together at the rate 2,200-3,200 trees per hectare. The purpose is to suppress ground vegetation, provide mutual shelter and straight growth and, after allowing for casual losses, to leave the forester a large choice from which to select crop trees. The number of trees is successively reduced by a series of thinning throughout the life of the crop so that the growth of the stand is concentrated progressively onto a smaller number of more vigorous and better-formed trees. The ultimate objective is to obtain the largest possible financial return of the crop, while maintaining a suitable environment for wildlife, recreation and the establishment of quality deciduous trees.

In order to attempt to maximize the return on investment by the production of quality crop trees in the shortest possible time frame, the crop tree approach to thinning will be employed. This method is best suited to situations where the primary objective is to produce sawlogs or veneer. During each thinning treatment, effort is concentrated on releasing the candidates for the final crop in order that they will grow at the desired rate until the next thinning.

Due to the inter-relationship of stocking and the form of potential crop trees, thinning regimes will be regulated by basal area, to ensure that there will be enough filler trees to train the final crop while maintaining optimum conditions for growth of the superior stems. In general the residual basal area will be between 21 to 30 square metres per hectare depending on the species.

The timing of the thinning is best determined by the rate of growth on the potential crop trees. If the photosynthetic surface of the trees is significantly reduced in proportion to its height, then the diameter increment will decrease. This will occur in the development of the stand

when the crowns are undergoing intense competition. The first thinning treatment should occur just prior to this point. The beneficial effect of thinning will gradually decrease, as crown vacancies will be filled by the residual growing stock. Intense competition shall again develop within the canopy and further treatment will be required.

4.2.1 RED PINE PLANTATION MANAGEMENT

Red Pine was of one the most prominent species planted in the Bruce County Forests. It was a favoured species due to its relatively quick and uniform growth rate, resistance to insects and disease, the wood's pulping properties and hence the potential utilization of thinning material and its high value as a pole and sawlog.

The seedlings on the County properties were planted at a close spacing that usually varied between a squared spacing of 1.7 metres to 2.0 metres. The planned thinning regime for the plantations was a fourth row mechanical thinning between 25 and 35 years, depending on the actual growth. This would be followed by the removal of the middle row and a selection thinning in the remaining rows or a process of continual selection thinning using the fourth row as access. The silvicultural thinning would take place at regular intervals after a 25-35 year period with the actual timing being dependent on crown expansion resulting in crown closure. The stands would be managed leaving a residual basal area of 25 square metres per hectare. This stocking level was expected to provide the conditions for the maximum production of pole quality material.

In the Bruce County area, demand for softwood products in the decades of the 1960's and 1970's tended to be very limited and consequently the forecasted thinning did not take place. There was some treatment of the older stands near Sauble and at the Brant Tract which were thinned on a pre-commercial basis with the material produced utilized by small local markets. The majority of the stands however received no treatment.

The situation at the end of the 1970's was that the older stands thinned on the pre-commercial basis had superior-quality trees to the un-thinned areas, but now required additional treatment and those plantations not treated were overstocked and badly in need of treatment. High stock, poorly developed trees with small crowns and low, live-crown ratios and small average diameters resulted from not thinning.

In 1983 the demand for conifer thinning material increased significantly. As a result of the rising pressure many of the plantations

received a commercial silvicultural thinning. The thinning has a lower diameter constraint as the smaller individuals (less than 13 cm diameter) could not be utilized. The older previously treated stands received a selection thinning and the younger overstocked plantations were fourth row mechanically thinned with some selection in the remaining three rows. The residual basal area for the older plantations was 25 square metres per hectare and for the younger plantations 28 square metres per hectare.

After the 1983 treatment there now exists three types of Red Pine which can be categorized and managed in the following manner:

Category 1:

These stands are the older plantations established in the late 1930's which were treated in the 1960's and 1970's and again in 1983. These plantations have a significant number of poles per hectare as well as trees that will be removed for pulpwood. Currently crowns are expanding into vacancies created in the last treatment and there should be diameter growth response as a result of the increase in live foliage.

Further management of these stands will consist of an additional crown and low thinning (thinning from below). The residual basal area will be maintained at approximately 25 square metres per hectare. Depending on demand, some poles can be removed over the term of this management period.

Category 2:

The plantations in this class are generally those established in the purchases between 1948 and 1955. At this time there was a significant number of acquisitions and planting maximized in terms of area planted. If conditions were favourable with regards to market conditions for the small dimensional thinning materials, the first thinning would have occurred in the early to mid 1970's. As previously outlined, the treatment did not occur and diameter increment declined significantly. In the early 1980's, these plantations had a mean diameter of 17 cm. and a mean site index of 25. These stands had a basal area between 45-50 square metres per hectare. They were treated in 1983 with a thinning regime of a fourth row mechanical thinning and a crown and incomplete low thinning in the remaining three rows. The residual basal area was 28 square metres per hectare. (Another treatment of these stands will be required in early 2000's with the main product being pulpwood or small dimensional lumber.)

Category 3:

These areas have not received any treatment to date because they were too young or had too small a mean diameter to thin commercially in 1983. These plantations require thinning now or will in the near future. Depending on market conditions these plantations will be thinned as soon as possible. The thinning regime will be a fourth row mechanical thinning and selection in the remaining three rows. The residual basal area will be 25 square metres per hectare.

A problem has developed in some Red Pine plantations, as pockets of dieback have developed. The mortality tends to occur in the 25-35 year age class. Indications of the eventual mortality are a definite chlorotic appearance and tufted growth. Death of the trees usually occurs within three to seven years after the appearance of the chlorotic foliage. The die-back occurs in groups which resembles mortality caused by Fomes annosus. The exact cause of the decline is at present unknown but current field analysis tends to reveal a macro nutrient deficiency. Mortality appears greater on soils with a shallow depth to carbonates. At the present time there is no solution to the problem and it appears no treatment will be developed.

The plantations where significant mortality has occurred (i.e. greater than 1 hectare) should be under-planted with White Pine or allowed to regenerate naturally with hardwoods. The dead and dying stems will be salvaged where possible or left to serve as standing dead snags for wildlife. White Pine is a moderate shade tolerant species therefore the planted seedlings should grow satisfactorily in that area. Removal of the dead over-story may be considered in areas of high aesthetic value and would occur after the establishment of the new crop. Some of the new opening would be retained for wildlife purposes.

In areas where mortality has not occurred, yet symptoms suggest significant losses will occur, clear-cutting with a prescribed burn to clean the site could be applied prior to possible replanting with a more suitable species.

4.2.2 WHITE PINE PLANTATION MANAGEMENT

There are very few pure White Pine plantations in the Bruce County Forests. The majority of the seedlings were planted in mixtures with Red Pine and White Spruce. The management of the White Pine in the mixed stands is discussed in Section 4.2.6.

White Pine was planted with the long-term goal of producing very high-quality sawlog or veneer material. To achieve this objective, the designated crop trees are side-branch pruned to 5.2 metres. The elimination of the side branches is done as soon as the trees have attained the suitable height to allow the retention of 50% of the live crown. Through this process the core diameter of trees not pruned is kept to a minimum and clear lumber is maximized.

Plantations of White Pine vary significantly in terms of individual tree growth. Unlike Red Pine where height growth usually does not have any significant variation from tree to tree, White Pine will stratify into crown classes. This stratification creates difficulties when scheduling silvicultural thinning. Due to the variation in crown class, the diameter increment also varies significantly. Markets for small diameter White Pine has developed since 1998 making the first thinning more economical.

Unlike species with more uniform growth, the development of the stand will not be significantly impaired, as the stratification into crown classes will allow for the continual development of the dominant and co-dominant individuals. Most of the suppressed and a large portion of the intermediates will be retained after the treatment and as a result the thinning regime will constitute a crown and incomplete low thinning. The target basal area of dominant and co-dominant trees after the initial thinning will be 25 square metres per hectare. The subsequent thinning will take place when crown development is such that crop trees require additional growing area. These additional treatments will maintain the basal area within the 25-30 square metres per hectare range in order to reduce branch diameters in the upper logs. Towards the end of the rotation the basal area will be reduced to 21 square metres in order to maximize diameter increment.

The delayed thinning in the White Pine plantations may also have a beneficial effect on the form. If the plantations are allowed to undergo more intense competition during the early stages of their development, longer bole lengths will develop and branch diameters in the upper crown will be reduced. The reduction of the main stem diameter growth is well compensated for by the greater merchantable height and the increased upper log grades. White Pine's ability to respond to release will allow for a delayed thinning schedule.

4.2.3 SPRUCE PLANTATION MANAGEMENT

Spruce management will deal with the pure plantations of both White and Norway Spruce. The planting on the purchases of the late 1940's to

early 1950's had significant Spruce plantings, but the design consisted mainly of White Pine—White or Norway Spruce mixtures.

For the most part, the growth of the early Spruce plantations has been good with some plantations achieving a site index of 24. Poor growth was evidenced on the gravel areas where the site index is as low as 18. Diameter growth has a wide variation because like White Pine the individuals stratified into crown classes and the dominants and co-dominates produced trees with greater diameter increment.

The first thinning will occur later in the rotation in order to raise the average diameter of the material. Due to desirable pulping properties utilization of the smaller individuals is possible. The thinning required for the Spruce plantations will be a fourth or fifth row mechanical row thinning with selection in the remaining rows. The treatment in the remaining rows will be from below. Residual basal areas will be maintained 23-25 square metres per hectare.

The first thinning on some of the stands was completed in 1983 and the treatment followed the above guidelines.

4.2.4 EUROPEAN LARCH PLANTATION MANAGEMENT

The Bruce County Forests have a limited acreage in European Larch. The initial spacing of this species tended to be similar to the other species, which for European Larch is too close, unless early thinning is undertaken. The species is very intolerant of shade and therefore should have had a wider initial spacing where limited markets for thinning are available. Due to the close arrangement, crown closure occurred early in the rotation. Thinning should have taken place, but lack of markets prevented treatment. With height independent of density, the plantations have excellent height growth but the crowns are poorly developed. The stands did not stratify into crown classes to the extent of the White Pine and White Spruce, so crowns are narrow with a low live crown ratio.

The lack of treatment in these stands will not enable thinning to the desired spacing in one operation. The thinning regime will be crown and thinning from below. The treatment schedules will be accelerated until the desired spacing is achieved. Thinning will not be regulated by basal area but by present crown release of the crop trees. Each individual thinning operation will allow for a 100% crown exposure of the crop tree.

4.2.5 SCOTCH PINE PLANTATION MANAGEMENT

Scotch Pine was planted on the Agreement Forests for Christmas tree production. Provincial policy changes in the 1950's prevented the further sale of trees from public lands and the Scotch Pine plantations were left uncut. The seed source, although satisfactory for the production of Christmas trees, does not produce a mature tree with the qualities suitable for lumber production due to its southern European provenience. The plantations of Scotch Pine, although limited in number, will be clear-cut for pulpwood when the trees have attained merchantable size.

After clear-cutting and possible prescribed burning, the area will be reforested to a more suitable species.

4.2.6 MANAGEMENT OF MIXTURES

In the Agreement Forest a significant percentage of the plantations were established in mixtures of two or more species. Mixed stands were considered preferable to pure plantations due to their greater resistance to insects and disease. In addition, if one species were to become lost through natural mortality then the other species would continue to function as a crop. Plantations could be converted to a pure stand, if required, during thinning treatments.

The variable growth rates of different species may create problems and prevent the achievement of the original goals for the plantation. The more rapid height growth on one species early in the rotation may cause ascendancy over the slower growing species. The inevitable result would be a pure stand of the faster growing species. If the slower growing species is not sufficiently shade tolerant, only the random individual may achieve a position of dominance or co-dominance in the main canopy. This problem may be present if thinning treatments were not conducted prior to the suppression of the slower growing species. The inability or a delay in a thinning treatment is likely to result in the dominance of one species, not necessarily the most desirable one. If this does occur, it is wise to accept the situation as destruction of the crop trees. On the Bruce County Forests this situation has occurred in some instances and no attempt will be made to rescue the suppressed species.

It is impossible to present very precise guidelines on the thinning of mixtures due to the large number of combinations of species in various arrangements. Several guidelines for the most common mixtures are presented in the following sections.

WHITE PINE-RED PINE

In this working group the delayed thinning has allowed the superior initial growth of the Red Pine to cause it to ascend to a position of dominance. Significant mortality in the White Pine has occurred in most cases as a result of suppression. The species composition, although variable, tends to be 80% Red Pine and 20% White Pine. The complete removal of Red Pine in mid rotation is impossible, as there is not enough quality White Pine stems to fully occupy the site.

Thinning treatments will be a free thinning around the superior quality White Pine in order to maximize their numbers in the final crop. A general crown thinning will occur within the remaining Red Pine and thinning from below.

An attempt will be made to maintain the basal area at 25 square metres per hectare in the mid-rotation in order to maximize the number of potential Red Pine poles. However, if the tree thinning of the Pine causes a reduction in the basal area, the reduction of the poles will be accepted in order to maximize White Pine in the final crop. Later in the rotation the residual basal area will be reduced to 21 square metres to maximize the diameter increment.

WHITE PINE-WHITE SPRUCE

The initial objectives of this mixture was to remove the Spruce in the early rotation and then manage the plantation as a pure White Pine working group in mid to late rotation. Early rapid growth of the White Pine has caused its ascendancy and the Spruce is severely suppressed. The White Spruce is completely overtopped and will not produce the size to facilitate economic thinning. The Spruce will fall out of the stand due to suppression and therefore the result in this mixed working group is similar to an initially wide spaced pure White Pine plantation.

Due to the wide spacing, thinning will not be required until further into the rotation as adequate growing space should be provided for the first forty years. Thinning regimes will be consistent with the guidelines outlined in *Section 4.2.2.* As a result of the lack of stems for training, early pruning will be essential to limit the development of large knots.

EUROPEAN LARCH WITH WHITE PINE OR WHITE SPRUCE

The initial plan for this mixture was to thin the rapidly growing European Larch early in the rotation and then work with a pure stand of either White Pine or White Spruce. Delayed thinning has created an

almost pure stand of European Larch with an insignificant number of the other species ascending into the main canopy.

These stands will be managed employing the principles as outlined in the section on European Larch plantations.

MULTIPLE MIXTURES OF THREE OR MORE SPECIES

Mixtures of three or more species cause silvicultural treatment problems as the varying growth rates of the species create operational difficulties.

The general thinning regime for these stands will be a crop tree release of the better quality trees regardless of species. However, if there is a choice between two quality trees then the tree of higher potential value will be favoured.

4.3 TOLERANT HARDWOOD MANAGEMENT

The policy for the management of the tolerant upland hardwood working group, (Sugar Maple, Beech, White Ash, Basswood), will be to create a balanced and uneven-aged stand which will have a stable equilibrium between growth and harvest. The silvicultural system employed to achieve this goal will be the selection system. The managed stands will be brought to the fully regulated situation by regularly spaced cutting cycles.

In the Bruce County area, maturity in the tolerant hardwoods will generally be 50 cm to 60 cm at d.b.h., depending on the productivity of the site. For the less tolerant species such as White Ash, Basswood and Black Cherry, the size at maturity may be slightly less (45 cm-55 cm).

The residual basal area after treatment will be approximately 21 square metres per hectare with 16 square metres in the sawlog size class (+ 25 cm). In order to maximize the saw-timber production an attempt will be made to maintain the stands with a growing stock distribution.

The condition of the growing stock on the Agreement Forests differs considerably from stand to stand. This variation is generally a result of past treatment. Many of the stands were either small polewood or heavily cut prior to the time of purchase. As a result there are no stands that are fully regulated, with the presence of good-quality trees in all diameter classes. All stands have deficiencies and a surplus in certain ranges of the growing stock and it will require several cutting cycles to achieve the fully regulated forest.

Stands on the Agreement Forests may be classified into two main groups. The first is the polewood, which tends to have a narrow range of diameter classes. These stands are a result of clear-cutting and are even-aged. The second type of stand is best designated as irregular uneven-aged that has two or more age classes and a wider diameter distribution. These are the result of high-grade cutting where some residual growing stock was left after past harvesting operations.

Stands of even-aged polewood will be managed on an even-aged system until trees obtain diameters approaching maturity. Only at this point will an attempt be made to create cuttings of enough severity to lead to the establishment of age classes and the species of reproduction desired. Any attempts earlier in the rotation would sacrifice smaller high-quality sawlog trees that possess the potential to increase in size, grade and value. A low thinning will be done in order to re-distribute the stand growth potential to the individuals of higher quality. The residual basal area will be 21 square metres per hectare, which will be high enough to suppress stump sprouts and prevent epicormic branching. Cutting cycles during this stage of the stands development will range from around seven to twelve years depending on crown closure. When those stands approach maturity an effort will be made to create crown openings large enough to allow for the establishment and development of quality regeneration. At this point the target basal area will be reduced to 18 square metres per hectare and the cutting cycles will lengthen to approximately twelve years. The polewood stands will require 1.5 to 2.0 rotations to establish the regulated forest.

The irregular uneven-aged stands all have deficiencies or surpluses in certain diameter classes, but due to the greater size variation, they can be converted to the balanced uneven-aged situation more readily than the polewood stands. Silvicultural treatment will attempt to reduce the number of stems in the size classes with the surplus and facilitate the rapid movement of individuals into the deficient size classes. Residual basal areas will be 16 square metres in the saw-timber category and 4.5 square metres in the polewood class. With these stocking levels the poles will have sufficient room to develop into quality sawlog trees and regeneration can be established and will thrive. Cutting cycles will be approximately fifteen to twenty years.

4.4 CEDAR MANAGEMENT

The upland Cedar working groups have received limited silvicultural treatment on the County Forests in the past management periods. Work has consisted of two main types of treatment. One method of cutting has

REVISION to Cedar management where Breypen soil is a factor

4.4.1 CEDAR MANAGEMENT-IN BREYPEN SOIL

Sites containing Breypen soil do not react the same to the normally accepted Cedar management practices. Shallow soiled areas that are thinned will regenerate much faster than on deeper soiled areas.

To accommodate this feature areas of Cedar containing Breypen soils in Bruce County Forests will be selectively harvested in a manner similar to a two stage or three stage shelter belt system.

Mature trees will be marked for removal on a selective basis. All trees over a predetermined diameter will be removed. This will vary depending on the stand, normally around eight inches Dbh. In areas where the trees are all above the removal diameter will be left.

Approximately every forty feet an access trail will be located throughout the stand for equipment movement.

Small patches of mature trees may be clear-cut in areas of deeper soils these will be limited in size to less than two acres. Immature trees will be left on site to provide cover and seed sources. The residual basal area will be maintained at 12 to 16m^2/ha.

Areas of bare rock will be avoided.

On sites containing mixed wood species, most Poplar, White Birch, Balsam Fir and mature Cedar will be removed. Healthy White Pine, Red Pine, White Spruce and immature Cedar will be retained. Some mature Cedar will also be retained to maintain desired stocking levels uniformly over the stand.

been a selection thinning. This has been difficult as the close spacing of standing trees creates operational difficulties. Thinning that is heavy enough to facilitate the use of large equipment is susceptible to significant losses due to blow-down. As a result of the problems in selection thinning, strip cutting has been attempted with some degree of success. No-cut strips running perpendicular to the prevailing winds have reduced or eliminated losses to wind-throw and provided suitable conditions for economic harvesting. However, natural regeneration in the cutout strips is slow.

A new method of Cedar cutting that will be used in certain instances is small patch clear-cuts. These small patch clear cuts will only be used when conditions or circumstances are not suitable for strip cuts.

Areas clear cut should be replanted to protect the fragile light soils of the area. White Pine, White Cedar, and Red Oak native to this site and are found throughout the area, therefore a mixture of these trees will be replanted on these areas.

4.5 LOWLAND HARDWOODS

The policy for the management of the lowland hardwoods (Sugar Maple, Soft Maple, Poplar, White Ash, Basswood, Balsam Fir, Green Ash, Black Ash) will be to create a balanced and uneven-aged stand which will have a stable equilibrium between growth and harvest. The silvicultural system employed to achieve this goal will be the selection system.

Management techniques will be the same as those discussed in *Section 4.3* with one exception. The residual basal area after treatment will be approximately 26 to 31 square metres per hectare. Lowland hardwoods have shallow root systems and are more susceptible to wind throw.

4.6 LOWLAND MIXED-WOOD MANAGEMENT

These areas have very limited potential for timber production and will therefore be managed primarily for their wildlife values. Management techniques will be aimed at habitat improvement for Deer. The management of these stands will be discussed in *Section 5.1*.

4.7 BROWSE CUTTING

If there is a demand for Cedar and Balsam Fir browse material for Christmas garlands, areas of the specific Tracts will be sectioned off to allow individuals to remove browse. This will be monitored and controlled by County staff.

5.0 WILDLIFE

Bruce County Forests have been important areas for wildlife as these lands provide varying habitats suitable to a variety of species. Hunting has historically been a compatible use in conjunction with forest management and municipal forests have always been available to the public for their use. In the future County forests will be important venues for hunting as private land available for this activity continues to decline.

The County forests contribute to big and small game, waterfowl and trapping.

Due to the unpredictable fluctuations in wildlife population densities, no estimation of hunting opportunities will be presented. It is believed however that significant hunting activity is carried out on County forest properties particularly near population centers. Surveys may be conducted during this management period to determine the pressures of wildlife and hunting on the forests.

In general, County forestry will continue to contribute to wildlife population and habitat improvement work may take place if necessary in order to increase wildlife population in County forests. The only exception will be in regards to the beaver which will be discouraged where it's activities create a conflict with timber production or cause distress to adjacent landowners.

5.1 DEER MANAGEMENT

There have been no efforts undertaken in past management periods related to the improvement of either summer or winter habitat. The establishment of conifer plantations and the silvicultural treatment of the upland hardwood working groups have increased habitat indirectly but efforts in this regard have been aimed at the production of quality forest products.

Conifer plantations have the potential to develop into acceptable winter habitat, as the canopy structure possesses the ability to capture snow and reduce the ground snow depth. Later in the rotation, volunteer hardwoods will invade the plantations and food crops will increase. Summer range has also been increased through conifer establishment on abandoned open non-agricultural areas with limited potential for habitat that has been converted back to forest cover. The plantations create additional edge and allow for the establishment of herbaceous plants suitable as summer deer food.

In general, the greater the diversity within the canopy of the forest, the more suitable the habitat is for wildlife. The thinning in the polewood upland hardwood creates favourable conditions for deer, as increased light will filter through the more open canopy and thereby increase the herbaceous growth and allow for the establishment of regeneration of deciduous species. The benefit is temporary as crown expansion by the residual growing stock will eventually suppress the regeneration and reduce the herbaceous growth. Considering that thinning is an on-going process, the suitability of upland hardwoods for deer habitat will fluctuate until the stand receives harvesting operations that are designed for the permanent establishment of regeneration. The harvesting for commercial sawlogs will be of significant severity to allow for the growth and development of the various age classes. When the forest attains the stage of development where there will be a substantial yield of sawlog class individuals, subsequent cutting cycles will include a regeneration-cut. The balanced uneven-aged forest will contain a continual diversity of suitable habitat.

Areas with the greatest potential for winter deer habitat are the lowland mixed wood sites containing significant populations of conifer species (i.e. Balsam Fir, White Spruce, White Cedar). While maintaining suitable winter cover, these sites usually produce food species such as poplar, willow and dogwood. This environment of food species in close proximity to winter cover provides optimum habitat for deer which is critical in maintaining or improving the site's carrying capacity. The maintenance or creation of an ecological diversity within this cover type is essential as forest succession may reduce the food crops, as the stands' deciduous species will grow taller and become unsuitable for deer food. In order to maintain the diversity, small patch clear cutting or alternate strip clear cutting may be undertaken to encourage accessible food species. Felling will take place in the areas of deciduous species and the conifers will be retained as cover. Deer will then feed in the cut over areas while the conifers provide adequate shelter.

Areas of pure upland Cedar provide only the cover aspect of the habitat requirement of deer. Food may be close by, but if the area is

large, a significant portion of the Cedar stand will go unutilized. In order to improve these areas, alternate row-strip, clear-cutting will be undertaken to break up the cover and encourage the regeneration of food crops in the cleared areas. Through this treatment these areas will provide more suitable winter habitats.

5.2 SMALL GAME

The County forest's contribution to small game hunting opportunities is not calculable due to the inordinate number of variables. However, these areas will contribute to a considerable degree. There has been no effort to directly improve small game habitat during post management periods although benefits have occurred during silvicultural treatments for the production of forest products. For example, thinned plantations provide excellent roost trees for Wild Turkeys.

During this management period there will be no proactive management to improve small game production, but, during silvicultural treatment and Deer range enhancement projects, small game habitats should be improved.

The following guidelines will be adhered to during silvicultural treatments to ensure a continuation of small game production.

a) a maintenance of species diversity in upland and lowland hardwood working groups;
b) maintenance or expansion of the existing forest edge;
c) during harvesting operations catkin producing trees will be retained where possible;
d) 6-8 cavity trees, where present, will be retained per hectare during commercial and stand improvement treatment;
e) as many trees as possible will be retained;
f) fence rows will be retained as travel corridors;
g) all stick nest trees will be retained;
h) drum logs will be laid down in areas of grouse habitat;
i) standing snags will be left standing where possible;
j) fallen woody debris will be left when possible.

5.3 WATERFOWL

Areas of potential waterfowl productions in County forests are extremely limited and therefore increase in their population will be insignificant.

Optimum habitat for waterfowl is open water interspersed with aquatic vegetation. Accompanying the open water there should be suitable nesting sites.

Sites exhibiting the potential as waterfowl production areas will be surveyed and if appropriate will be developed in cooperation with interest groups (i.e Ducks Unlimited) or through community involvement programs.

5.4 TRAPPING

Trapping opportunities for wetland fur-bearers in County forests are limited due to lack of habitat. The areas traditionally suitable for habitat will be maintained while in the newly flooded areas the nuisance beaver will be trapped.

Upland fur-bearers such as raccoon will be enhanced by den tree retention and fox and coyote dens will be left undisturbed.

6.0 FISHERIES

The contribution of the County forests to fisheries is insignificant as there are very few critical cold water and warm water sites. Protection is required in these areas to resume the preservation of the cold water habitat.

In general stream degradation occurs in proximity to open agricultural fields and heavily cut forested land where the sun's penetration allows water temperatures to rise significantly. Also, places of human settlement and cattle watering areas can be sources of pollutants that again may have severe detrimental effects.

The municipal forests in many respects demonstrate the proper management of cold water sites. Silvicultural treatments have occurred during past management periods yet adequate cover has been maintained to preserve the thermal integrity of the cold water fishery. This integrated approach to the management of two important resources on the same area will continue during the next management period. The following are general guidelines aimed at the protection of all streams and watercourses.

a) maintenance of 22-25 square metres per hectare of forest cover within 50 metres of streams;
b) no logging debris is to be deposited in streambeds;

c) harvesting will not occur during critical fish spawning periods in cold water sites;
d) properly designed and installed dredges or culverts at all major stream crossing; construction will not take place during spawning periods.

7.0 OUTDOOR RECREATION

The policy since the inception of the County Forests program has been to allow and encourage passive recreational opportunities. The rising demand for venues for outdoors recreational pursuits will mean an increased use of these properties during this management period.

Recreational activities such as cross-country skiing, snowmobiling, hiking, mountain biking and all terrain vehicle activities are compatible uses with wildlife, fisheries and forest management.

There is no targets for various out-door recreational opportunities. It is not possible to estimate the significance of the municipal forests current contribution however it is possible that surveys will be undertaken in this management period to determine use. Currently most of the compartments have some organized and approved activity (i.e. snowmobile trail, hiking trail, cross-country trail). Future user strategy will be to develop the properties in co-operation with various user groups.

It may be necessary to restrict the use of one recreation endeavor to ensure the integrity of another. For example, cross-county skiing and snowmobile activities are not compatible uses on the same trail system.

Letters of authorization by the County will be used as the vehicle to allow the development of organized recreational activities.

7.1 CROSS-COUNTY SKIING

Demand for cross-county skiing opportunities are expected to rise significantly, especially as the County promotes tourism.

The sport may be classified into three main types; backcountry, in-track skiing and skate skiing (freestyle) all performed on groomed trails. The intrack skiing is characterized by a wider trail in order to facilitate the maneuvering of track setting equipment. The skate skiing trail requires near interior road width conditions for rolling, subsequent

packing and grooming with no tracks set into the surface. No type of skiing will be given priority as the advantages of the less impacting back-country skiing is offset by the greater demand for groomed trails and hence the creation of more recreational opportunities.

The type of trail development will be influenced by the significance of the individual forest tract. The backcountry skiing will be considered a more suitable form of development in areas designated as Areas of Natural and Scientific Interest established for their life science values. The less developed trail right-of-ways will have a less visual impact and more importantly create fewer disturbances to the botanical communities. Groomed trails will be more desirable on forested areas not containing important life science values. On these tracts an attempt will be made to maximize the recreational opportunities. (ie. Mountain Biking)

7.2 SNOWMOBILE TRAILS

Snowmobile trail development has been stabilized and there is not expected to be a significant increase in new trail development during the next management period. Existing trails may be maintained or improved in partnership with local snowmobile clubs and the County.

Future trail development will be approved on the basis of providing lineal linkage between established points of interest to create a more intensive network of interconnecting passages.

7.3 HIKING

Hiking has always been encouraged in the County forests both in organized trails and general hikes through the woods. Recreational demand for hiking is low and during this management period efforts will attempt to intensify this activity.

The strategy to increase the hiking opportunities will be to develop interpretive trails on the more diverse properties. The trails will be self-guiding and will illustrate forest management, wildlife habitat and well as other areas of significance. Public education in regards to intensive forest management techniques displayed in the County forests will be given higher priority during the next management period through the system of interpretive trails.

7.4 ALL-TERRAIN VEHICLES

The fastest growing recreational use of County forests may be all-terrain vehicles. At present all-terrain vehicles outsell snowmobiles four to one. New all-terrain vehicle clubs are forming across the province. Unorganized activities by all-terrain vehicles have a significant potential for site damage caused by compaction and erosion.

The County of Bruce will develop a strategy to ensure recreational opportunities by these all-terrain vehicles are compatible with County policies and procedure.

All-terrain vehicle clubs will be invited to make formal proposals to the County. Existing trails will be used where possible and in conjunction with other established users.

7.5 OTHER RECREATIONAL VEHICLE TRAILS

Trail development for 4 x 4 trucks and motorcycles will not be permitted. These activities have a significant potential for site damage caused by compaction and erosion.

7.6 MOUNTAIN BIKING

Mountain biking which is an ever increasing and physically demanding sport will be encouraged in County forests by using the cross-country ski and snowmobile trails. These sports can work well together as mountain biking is a non-snow activity while skiing and snowmobiling are winter activities. Some single track, technically demanding trails could also be developed with input from local clubs. With all season trail activities the maintenance for any one group could be kept to a minimum.

7.7 HUNTING, FISHING AND TRAPPING

Hunting, fishing and trapping are integral parts of resource management as well as recreational and tourism activities they will continue to be allowed on most of the County forests. Exceptions will be areas of high residential populations and will continue to be dealt with on an individual basis.

8.0 MANAGEMENT OF AREA OF NATURAL AND SCIENTIFIC INTEREST

These are lands containing landscapes or features that have been identified as having values related to protection, natural heritage appreciation, scientific study or education.

Some of the Bruce County Forests have been identified as such and the management treatments will ensure the protection of the designated interest.

Bruce County Forest properties have been selected as areas of Natural and Scientific Interest in both the Life Science and Earth Science categories. Forestry, wildlife, fisheries management and outdoor recreation development will be compatible activities within these areas. Modified harvesting in some areas may be required to ensure the achievement of the County's protection mandate.

Prior to the actual treatment, these areas will be surveyed to determine the location of the significant values. These areas will then be flagged and during silvicultural operations felling into and skidding within these areas may be restricted. Marking guidelines will conform to those as presented in *Section 4.3*.

In the event that Environmental Impact Studies or botanical surveys discover the presence of an extremely exceptional plant species (i.e. a new toxin) or ecosystem then management activities will be abrogated in the area having the significant feature and a suitable buffer will be determined. Forest and wildlife management will then continue on the forest tract in the non-affected areas.

9.0 THE MANAGEMENT OF AGREEMENT FOREST LAND WITHIN THE NIAGARA ESCARPMENT PLANNING AREA

Currently there are not any County owned forests within the Niagara Escarpment Plan area but in the future if property does fall within the boundaries, then integrated resource management based on sound forestry, wildlife and recreational principles will be employed. These principles are consistent with the Niagara Escarpment Plan and therefore the relevant provisions of the Plan will be adhered to in all management activities.

10.0 MINERAL, AGGREGATES AND PETROLEUM RESOURCES

The mineral, aggregates and petroleum resources potential on Bruce County forests is at present unknown

Petroleum resource exploration will be permitted on the forest, as long as the limited area required to conduct the preliminary surveys does not conflict with the forestry, recreation and wildlife management activities.

The extraction of mineral aggregate will be considered provided the activity does not remove areas of productive forested land.

11.0 FIRE CONTROL

The suppression of fires in County Forests is the responsibility of the local municipal fire departments and the County will assist with training and other expertise if requested.

11.1 LIVESTOCK CONTROL

The grazing of livestock on forested land is detrimental due to soil compaction and the elimination of seedlings, which are required in order to achieve the fully regulated forest.

In past management periods, fencing to restrict livestock has been a shared effort with neighbouring landowners with the County maintaining one half of the line fence. Action has been taken upon request. This policy will continue throughout this management period.

11.2 INSECTS AND DISEASES

The detection of insects and disease will be the responsibility of the Bruce County forest technician in co-operation with the Province and Federal Departments that deal with Forest Health.

Control action will be the sole responsibility of Bruce County and may be necessary from time to time in order to protect the resources of the County forests. If control action necessitates the use of insecticides,

biological agents, or other pesticides then the adjacent landowners and public will be consulted prior to control action.

12.0 MAINTENANCE OF THE PLAN

The management period for this plan is January 1, 2002 to December 31, 2021.

There will be four operating plans of equal duration, 2002 to 2006;
2007 to 2011;
2012 to 2016
and 2017 to 2021.

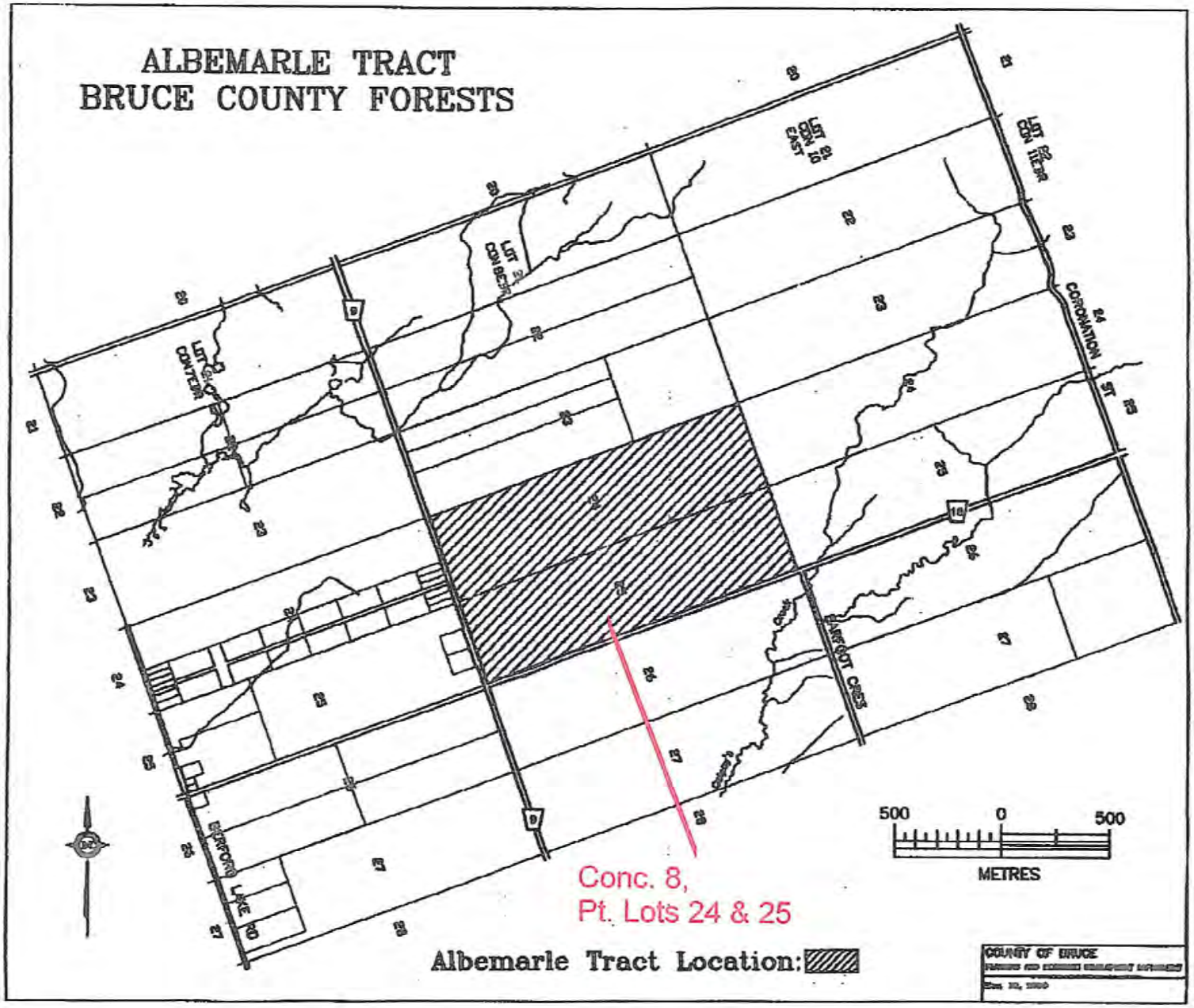
Annual plans will be submitted prior to the beginning of each year.

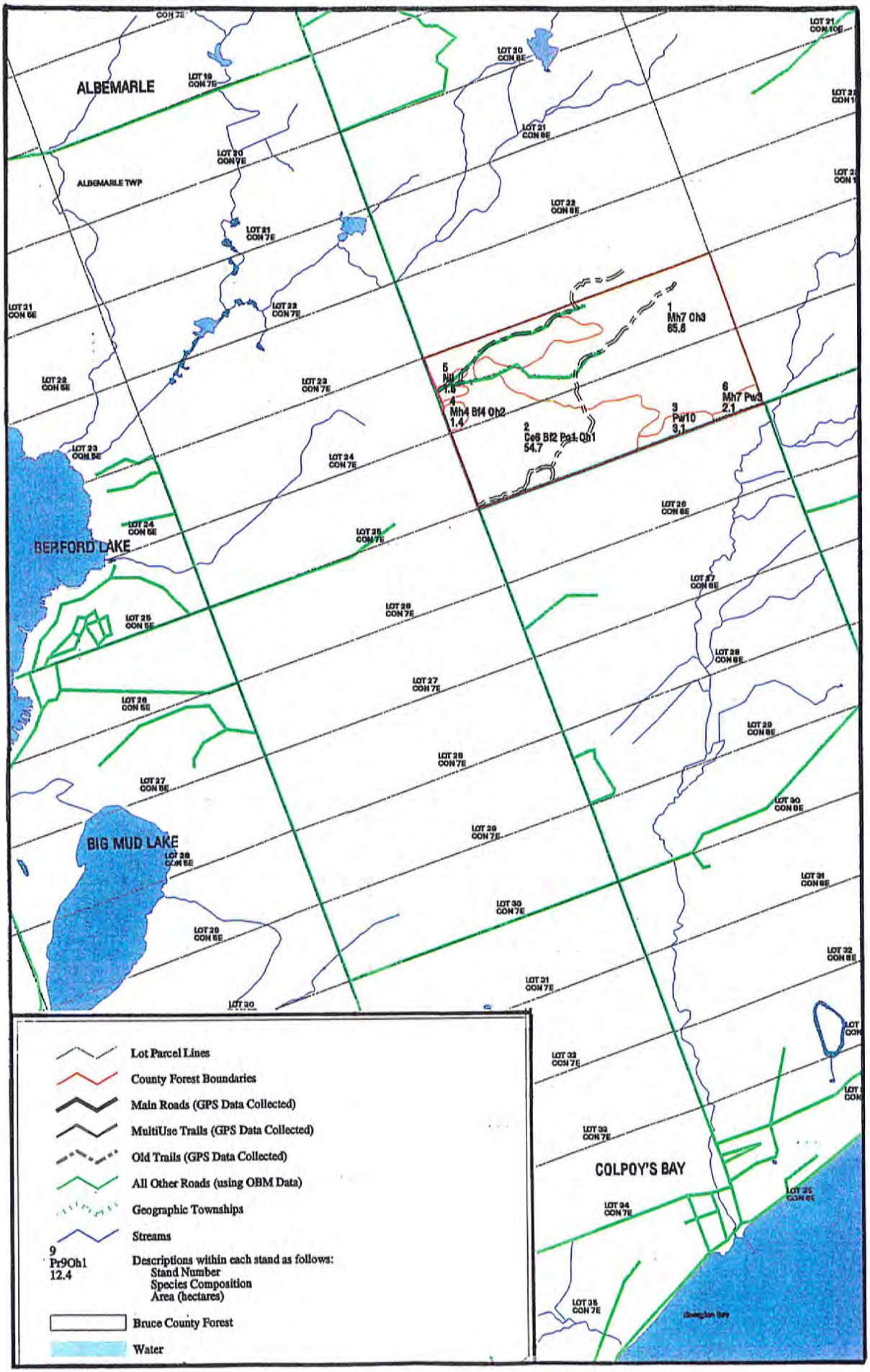
Work accomplished will be reported to Bruce County Council following the completion of each operating year. The work will be recorded and maintained by the Bruce County forest technician.

ALBEMARLE TRACT

Property Location Map

Town of South Bruce Peninsula (Albemarle),
County of Bruce





Albemarle Tract

Productive Forest Land in Albemarle Tract

Working Group	Productive Forest (Hectares)	Non-Productive Forest (hectares)
White Pine	3.2	0.0
Cedar	52.8	0.0
Hard Maple	65.2	0.0
Open Field	0.0	1.2
Total	121.2	1.2

Table 1

Bruce County Forests

Stand Summary
for
Albemarle Tract
South Bruce Peninsula (Albemarle)

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in five-years	Harvest in ten years
Albemarle, Conc. 8, Part Lots 24 & 25							
1	Mh_7 Oh_3	22.7	62.0	50	50	no	yes
2	Ce_6 Bf_2 Po_1 Oh_1	41.9	52.8	25	30	no	yes
3	Pw_{10}	45.0	3.2	25	50	yes	no
4	Mh_4 Bf_4 Oh_2	37.0	1.2	25	40	no	yes
5	Nil-open field	400 stems/ha	1.2			no	no
6	Mh_7 Pw_3	3.0	2.0	25	20	no	no
Total hectares			122.4				

BRUCE COUNTY FORESTS

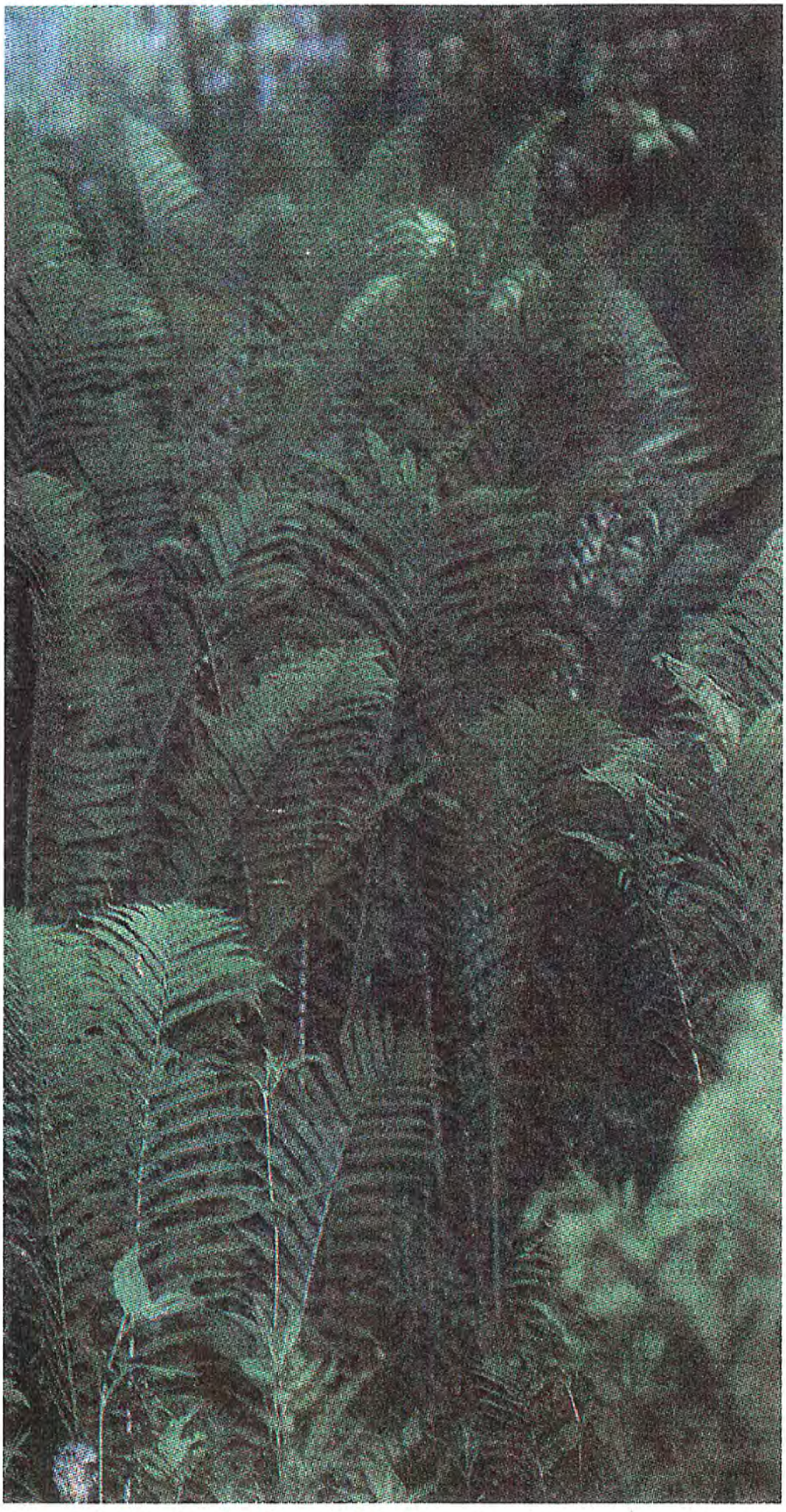
FIVE-YEAR OPERATING PLAN SUMMARY

for

Albemarle Tract
South Bruce Peninsula (Albemarle)
Conc. 8, Part Lots 24 & 25

White Pine

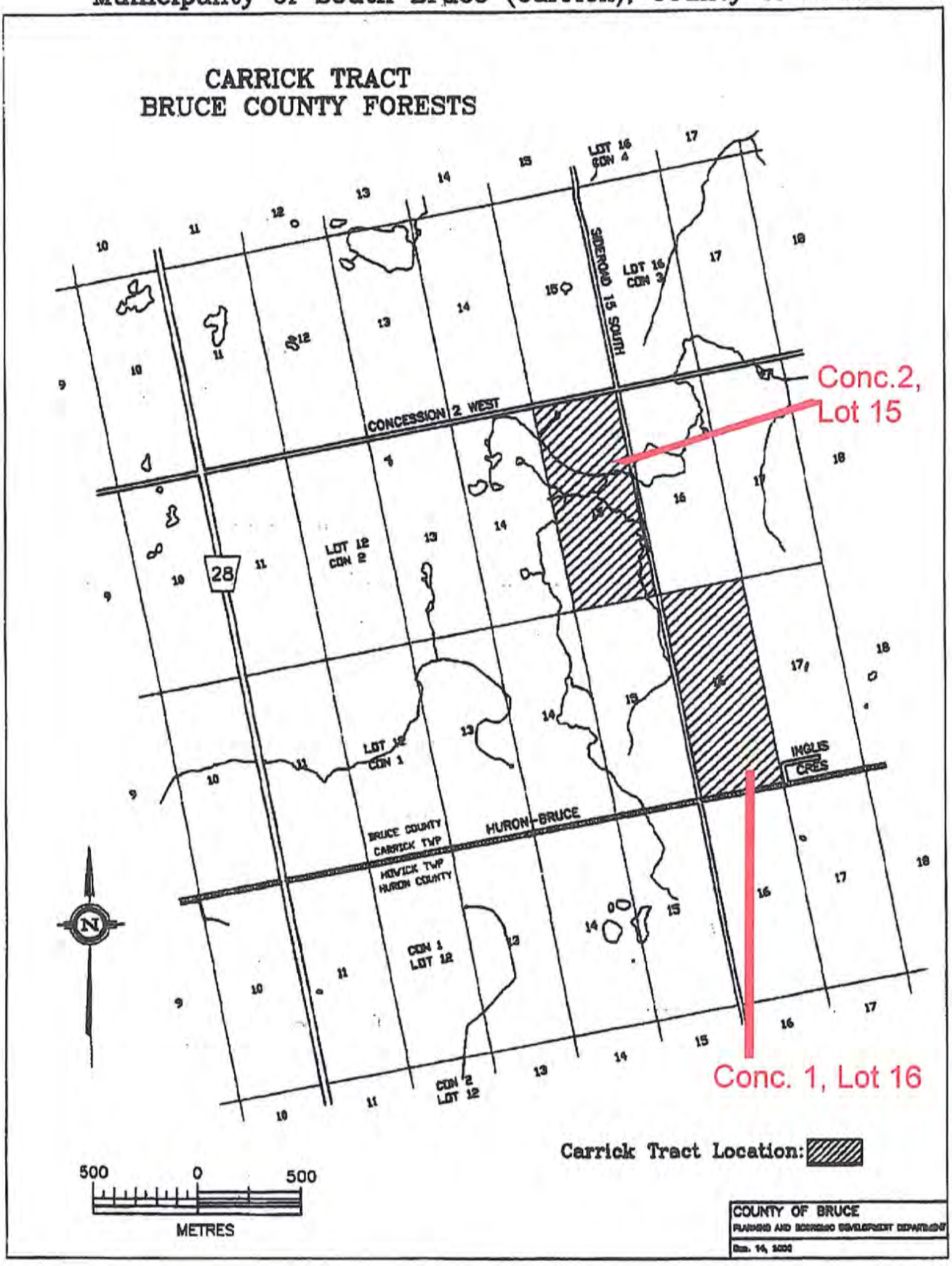
Comp. #	*Area (hectares)*	*Species Composition*	*Five Year Management Plan*
3	3.2	Pw_{10}	4th row removal and a selective thinning in remaining rows

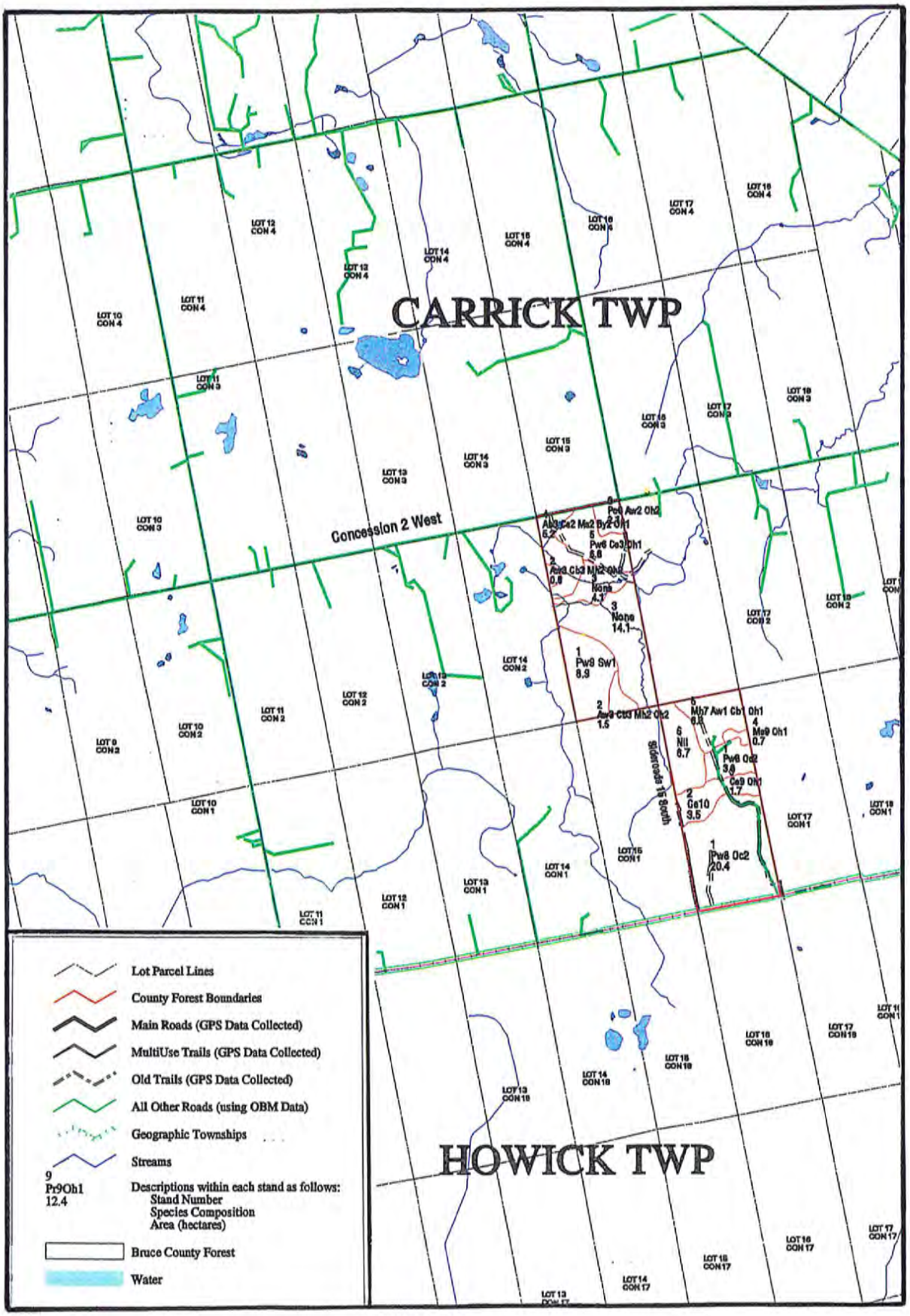


CARRICK TRACTS

Property Location Map

Municipality of South Bruce (Carrick), County of Bruce





Carrick Tract

Productive and Non-Productive Forest Land in the Carrick Tracts

Working Group	Productive Forest (Hectares)	Non-Productive Forest (Hectares)
White Pine	37.3	0.0
Cedar	4.7	0.0
White Ash	1.7	0.0
Soft Maple	1.0	0.0
Hard Maple	7.0	0.0
Black Ash	0.0	6.2
Poplar	0.0	3.1
Cattail Marsh & Lowland Swamp	0.0	19.6
Total	51.7	28.9

Bruce County Forests
Stand Summary
for
Carrick Tracts
Municipality of South-Bruce (Carrick)

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in 5 years	Harvest in 10 years
Carrick, Conc. 1, Lot 16							
1	Pw_8 Oc_2	31.8	21.3	30	70	yes	no
2	Ce_{10}	44.8	3.4	30	30	no	no
3	Ce_9 Oh_1	14.0	1.3	30	30	no	no
4	Ms_9 Oh_1	20.0	1.0	60	60	no	yes
5	Mh_7 Aw_1 Cb_1 Oh_1	25.0	7.0	115	85	yes	no
6	Nil	700 stems/ha	6.4			no	no
Carrick, Conc. 2, Lot 15							
1	Pw_9 Sw_1	39.0	8.8	45	85	yes	no
2	Aw_3 Cb_3 Mh_2 Oh_2	29.9	1.7	40	75	yes	no
3	Nil		13.2			no	no
4	Ab_3 Ce_2 Ms_2 By_2 Oh_1	18.0	6.2	40	45	no	no
5	Pw_6 Ce_3 Oh_1	29.6	7.2	40	85	yes	no
6	Po_6 Aw_2 Oh_2	19.8	3.1	40	65	no	no
Total Hectares			80.6				

BRUCE COUNTY FORESTS

FIVE-YEAR OPERATING PLAN SUMMARY

for

Carrick Tracts

White Pine

Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 2, Lot 15, Comp. 1	8.8	$Pw_9\ Sw_1$	4th row removal and a selective thinning in the remaining rows -access required through neighbouring property
Conc. 2, Lot 15, Comp.5	7.2	$Pw_6\ Ce_3\ Oh_1$	4th row removal and a selective thinning in the remaining rows -the Cedar pockets will be removed
Conc. 1, Lot 16, Comp. 1	21.3	$Pw_8\ Oc_2$	4th row removal and a selective thinning in the remaining rows

Hardwoods

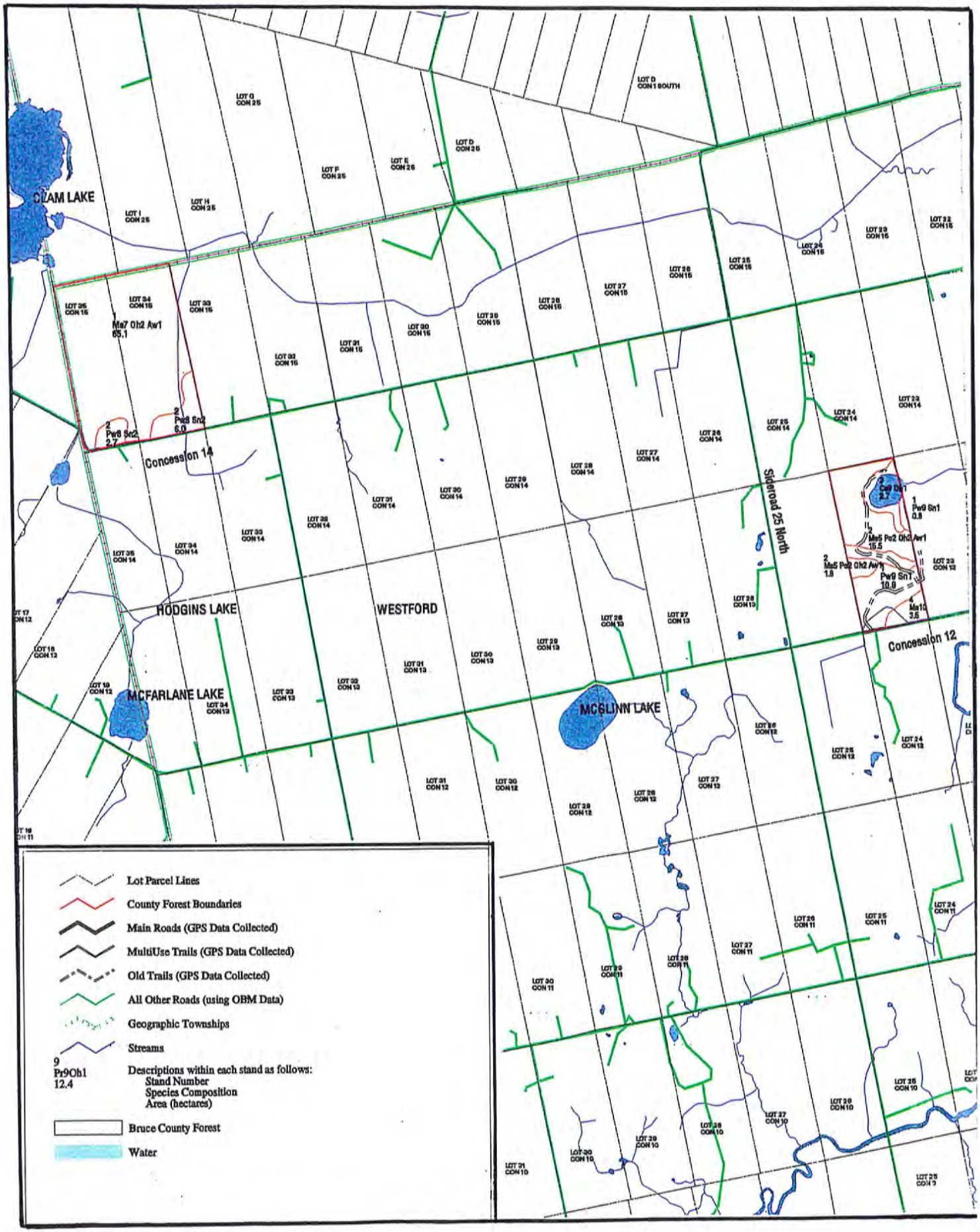
Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 2, Lot 15, Comp. 2	1.7	$Aw_3\ Cb_3\ Mh_2\ Oh_2$	A light improvement thinning -access limited
Conc. 1, Lot 16, Comp. 5	7.0	$Mh_7\ Aw_1\ Cb_1\ Oh_1$	Assess in four years for an improvement thinning

CULROSS TRACTS

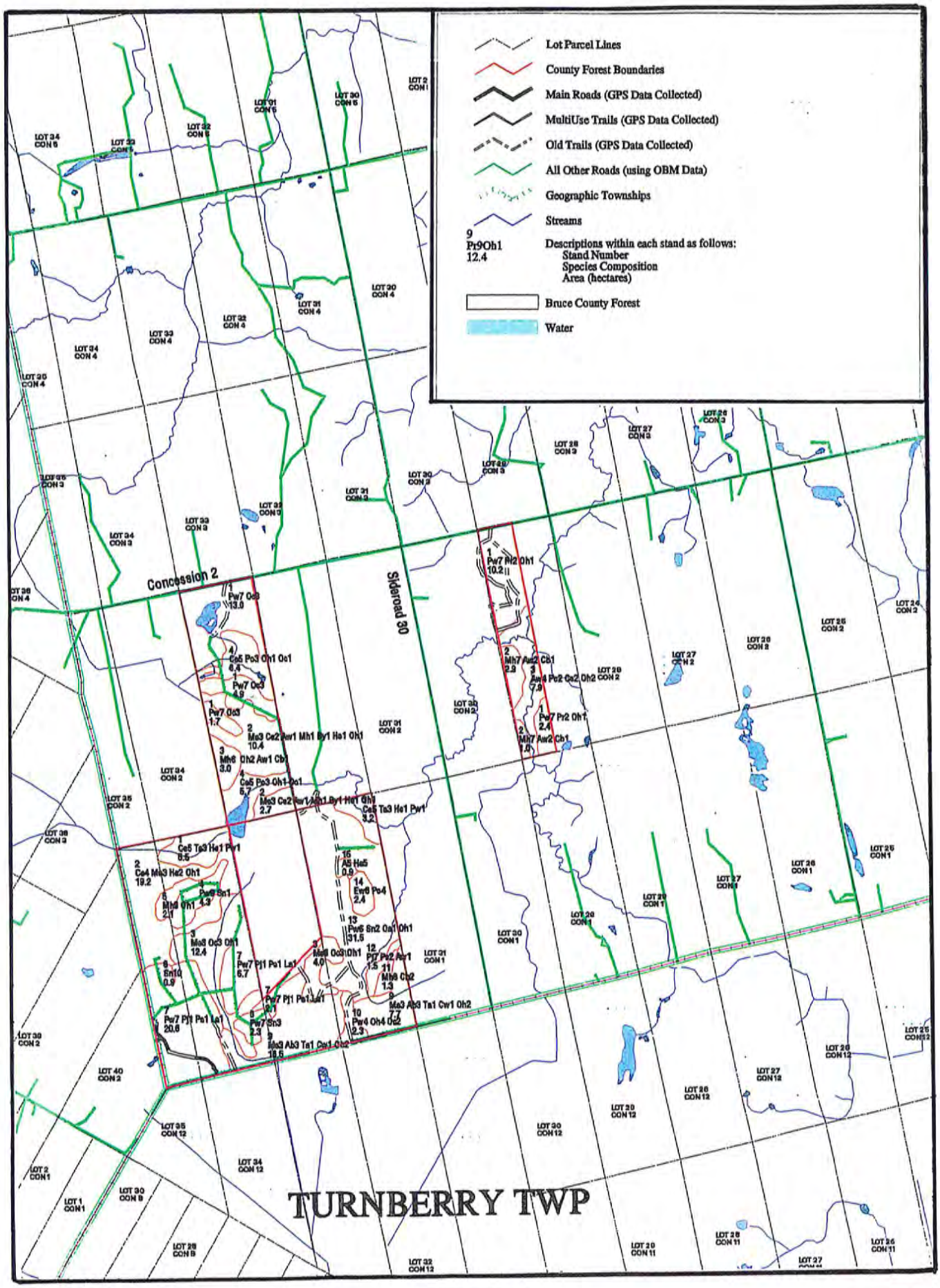
Property Location Map-Municipality of South Bruce

Culross Tract (North Part of Township)

BRUCE COUNTY FORESTS



Culross Tract



Culross Tract

Productive and Non-Productive Forest Land in the Culross Tracts

Working Group	Productive Forest (Hectares)	Non-Productive Forest (Hectares)
White Pine	122.0	0.0
Cedar	43.8	10.0
White Ash	5.0	0.0
Soft Maple	130.8	0.0
Hard Maple	7.8	1.2
Norway Spruce	1.3	0.0
Jack Pine	1.7	0.0
Elm	2.8	0.0
Apple	1.2	0.0
Total	316.4	11.2

Table 1

Bruce County Forests
Stand Summary
for
Culross Tracts
Municipality of South-Bruce (Culross)

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in 5 years	Harvest in 10 years
Culross, Conc. 1, Lots 32-35							
1	Ce_5 Ta_3 He_1 Pw_1	13.0	9.4	40	50	no	no
2	Ce_4 Ms_3 He_2 Oh_1	27.6	18.8	40	60	no	no
3	Ms_6 Oc_3 Oh_1	11.3	17.2	30	60	no	no
4	Pw_9 Sn_1	44.7	4.4	40	70	yes	no
5	Mh_9 Oh_1	26.8	3.4	50	80	yes	no
6	Sn_{10}	32.0	1.3	40	50	yes	no
7	Pw_7 Pj_1 Ps_1 La_1	42.4	27.5	40	80	yes	no
8	Pw_7 Sn_3	43.3	2.5	40	70	yes	no
9	Ms_3 Ab_3 Ta_1 Cw_1 Oh_2	6.4	25.2	30	30	no	no
10	Pw_4 Oh_4 Oc_2	19.7	2.8	40	80	no	yes
11	Mh_8 Cb_2	20.0	1.2	150	70	no	no
12	Pj_7 Ps_2 Aw_1	27.0	1.7	40	65	yes	no
13	Pw_6 Sn_2 Os_1 Oh_1	31.1	31.2	40	85	yes	no
14	Ew_6 Po_4	10.0	2.8	35	35	no	no
15	A_5 Ha_5	400 stems/ac	1.2	25	10	no	no
Culross, Conc. 2, Lot 29							
1	Pw_7 Pr_2 Oh_1	44.8	15.6	50	75	yes	no
2	Mh_7 Aw_2 Cb_1	34.8	4.4	50	80	yes	no
3	Aw_4 Po_2 Ce_2 Oh_2	22.0	5.0	50	40	no	no
Culross, Conc. 2, Lot 33							
1	Pw_7 Oc_3	42.5	15.0	40	75	yes	no
2	Ce_4 Oc_3 Ms_3	17.9	12.0	40	65	no	no
3	Ms_3 Ce_2 Aw_1 Mh_1 By_1 He_1 Oh_1	25.1	3.0	50	70	yes	no
4	Ce_5 Po_3 Oh_1 Oc_1	11.6	10.0	25	20	no	no
Culross, Conc. 13, Lot 24							
1	Pw_9 Sn_1	43.8	16.0	35	60	yes	no
2	Ms_5 Po_2 Oh_2 Aw_1	18.4	17.2	25	35	no	no
3	Ce_9 Oh_1	36.3	3.6	25	30	no	no
4	Ms_{10}	31.0	3.2	30	50	no	no
Culross, Conc. 15, Lot 34 & 35							
1	Ms_7 Oh_2 Aw_1	15.6	65.0	50	60	no	no
2	Pw_8 Sn_2	51.0	7.0	40	50	yes	no
Total hectares			327.6				

BRUCE COUNTY FORESTS

FIVE-YEAR OPERATING PLAN SUMMARY

for

Culross Tracts

White Pine

Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 13, Lot 24, Comp. 1	16.0	Pw_9Sn_1	4th row removal and a selective thinning in the remaining rows
Conc. 15, Lot 34 & 35, Comp.2	7.0	$Pw_8\ Sn_2$	4th row removal and a selective thinning in the remaining rows
Conc. 2, Lot 29, Comp. 1	15.6	$Pw_7\ Pr_2\ Oh_1$	A selective thinning
Conc. 2, Lot 33, Comp. 1	15.0	$Pw_7\ Oc_3$	4th row removal and a selective thinning in the remaining rows
Conc. 1, Lots 32-35, Comp. 4	4.4	$Pw_9\ Sn_1$	4th row removal and a selective thinning in the remaining rows
Conc. 1, Lots 32-35, Comp. 7	27.5	$Pw_7\ Pj_1\ Ps_1\ La_1$	4th row removal and a selective thinning in the remaining rows
Conc. 1, Lots 32-35, Comp. 8	2.5	$Pw_7\ Sn_3$	4th row removal and a selective thinning in the remaining rows
Conc. 1 Lots 32-35, Comp. 13	31.2	$Pw_6\ Sn_2\ Os_1\ Oh_1$	As soon as possible-4th row removal and a selective thinning in the remaining rows

Jack Pine

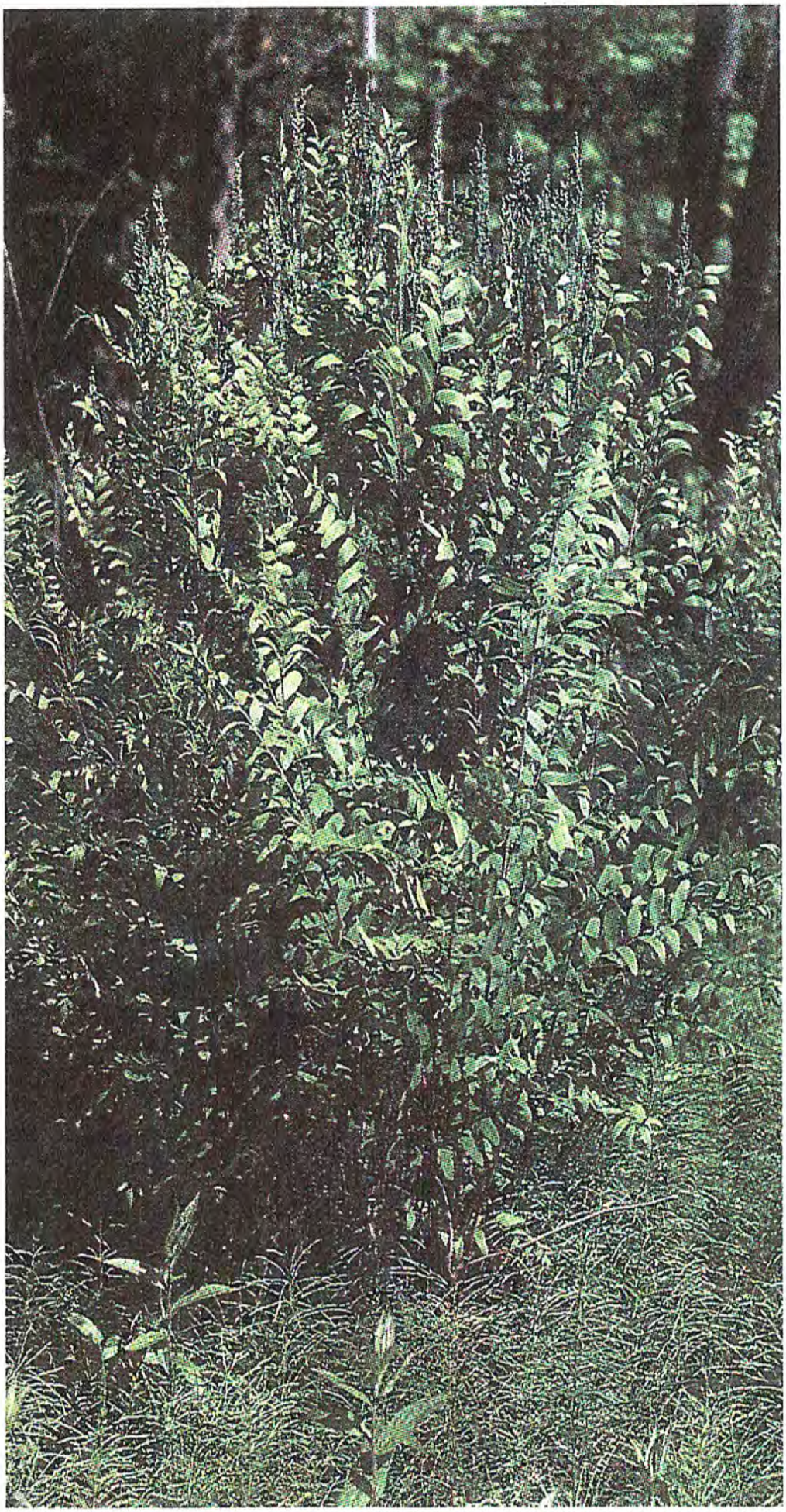
Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 1, Lots 32-35, Comp. 12	1.7	Pj_7 Ps_2 Aw_1	Immediate thinning-4th row removal and a thinning in the remaining rows reducing the basal area to 18m²/ha

Norway Spruce

Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 1, Lots 32-35, Comp. 6	1.3	Sn_{10}	4th row removal and a selective thinning in the remaining rows

Hardwoods

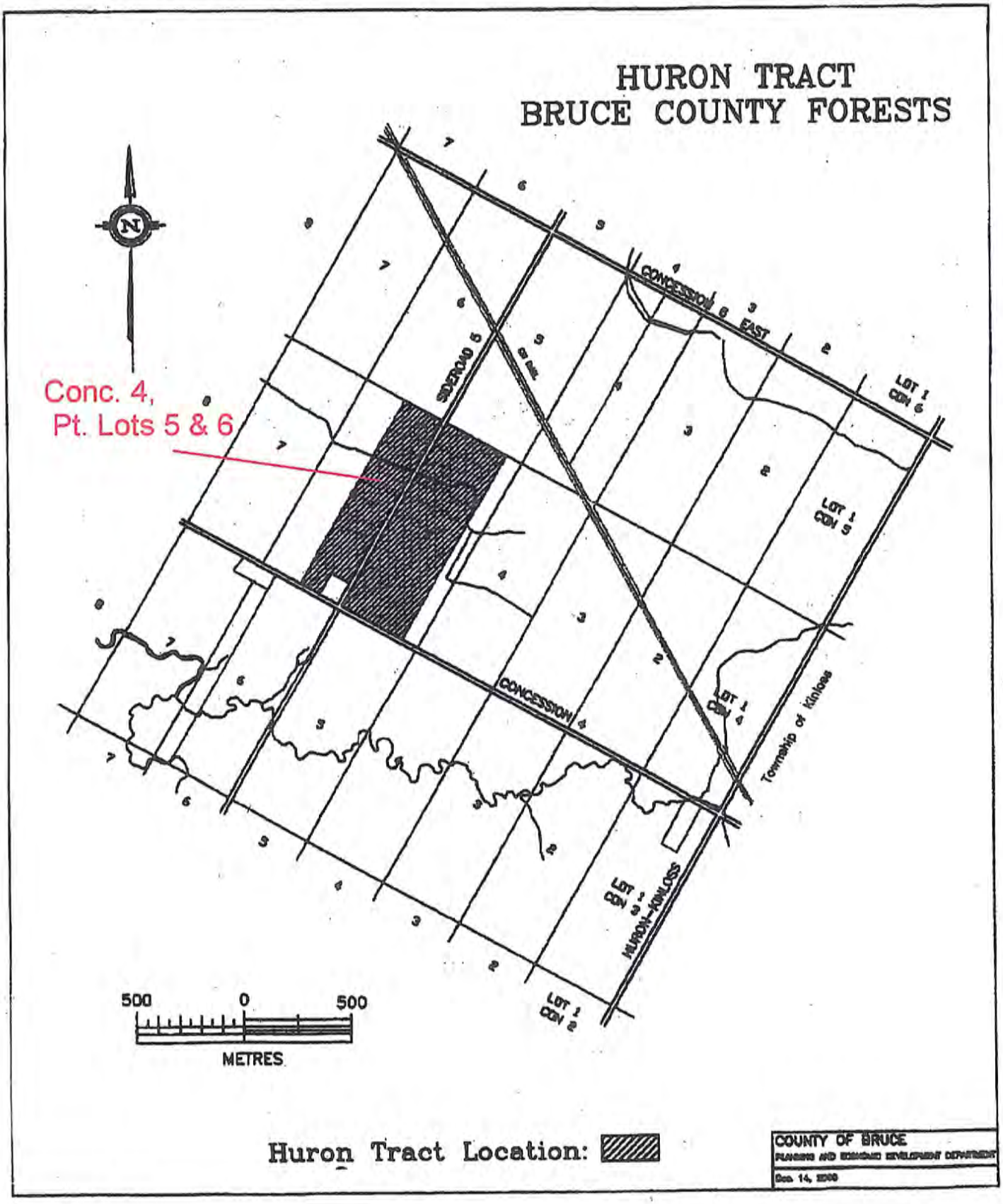
Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 2, Lot 29, Comp. 2	4.4	Mh_7 Aw_2 Cb_1	A light improvement thinning
Conc. 2, Lot 33, Comp. 3	3.0	Mh_6 Oh_2 Aw_1 Cb_1	If access is feasible an improvement thinning-single tree selection
Conc. 1, Lots 32-35, Comp. 5	3.4	Mh_9 Oh_1	A selective thinning removing diseased and defective trees.

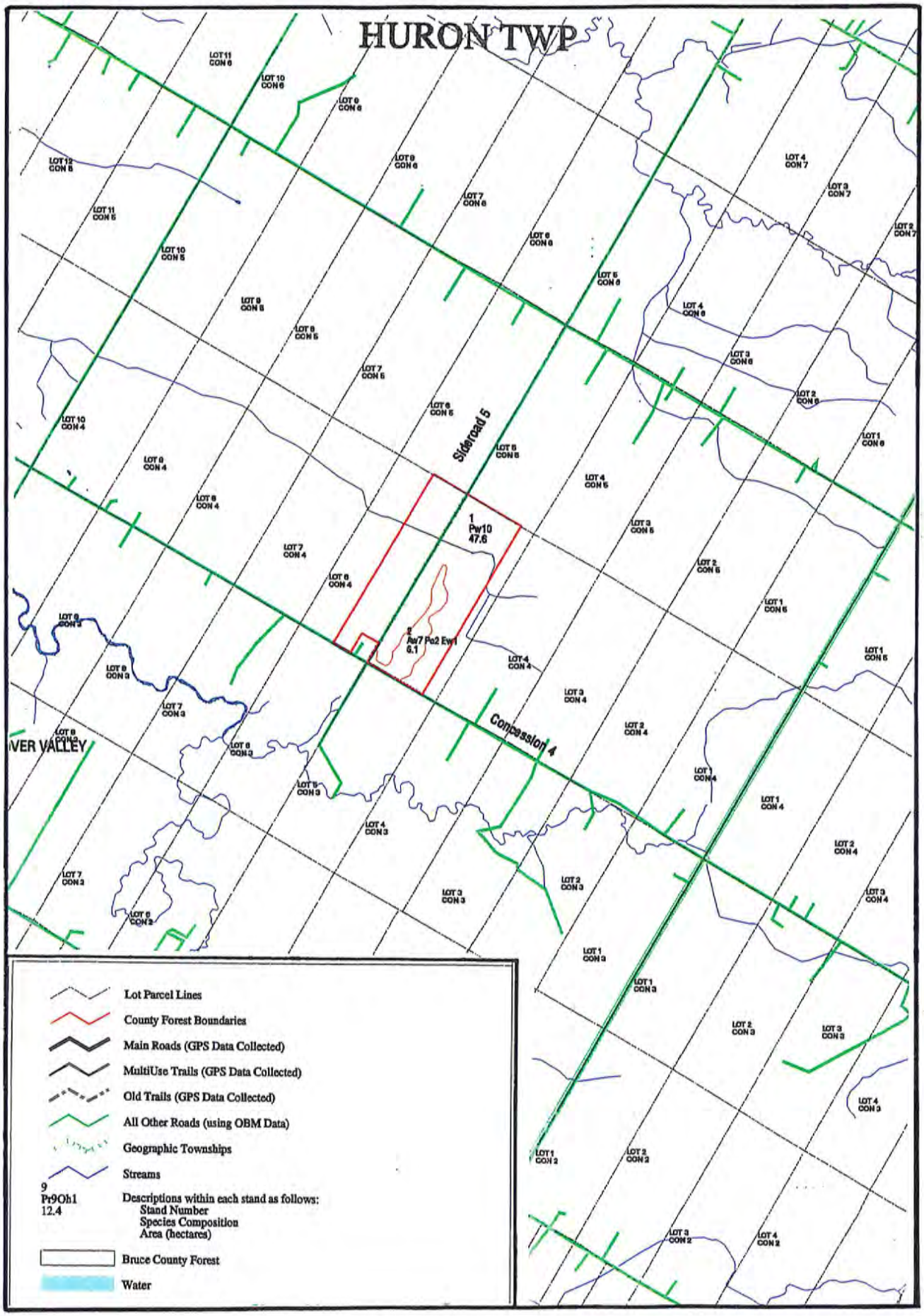


HURON TRACTS

Property Location Map

Township of Huron-Kinloss (Huron), County of Bruce




HURON TWP
Sideroad 5
Concession 4
1
Pw10
47.6
2
Pw7 Po2 Ew1
6.1
VER VALLEY
Lot Parcel Lines
County Forest Boundaries
Main Roads (GPS Data Collected)
MultiUse Trails (GPS Data Collected)
Old Trails (GPS Data Collected)
All Other Roads (using OBM Data)
Geographic Townships
Streams
9
Pr9Oh1
12.4
Descriptions within each stand as follows:
Stand Number
Species Composition
Area (hectares)
Bruce County Forest
Water

Huron Tract

Productive Forest Land in the Huron Tract

Working Group	Productive Forest (Hectares)	Non-Productive Forest (Acres)
White Pine	44.4	0.0
White Ash	6.5	0.0
Total	50.9	0.0

Table 1

Bruce County Forests
Stand Summary
for
Huron Tracts
Municipality of Huron-Kinloss (Huron)

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in 5 years	Harvest in 10 years
Huron, Conc. 4, Part Lots 5 & 6							
1	Pw_{10}	48.0	44.4	40	65	yes	no
2	$Aw_7\ Po_2\ Ew_1$	22.0	6.5	40	55	no	no
Total hectares			50.9				

BRUCE COUNTY FORESTS

FIVE-YEAR OPERATING PLAN SUMMARY

for

Huron Tract

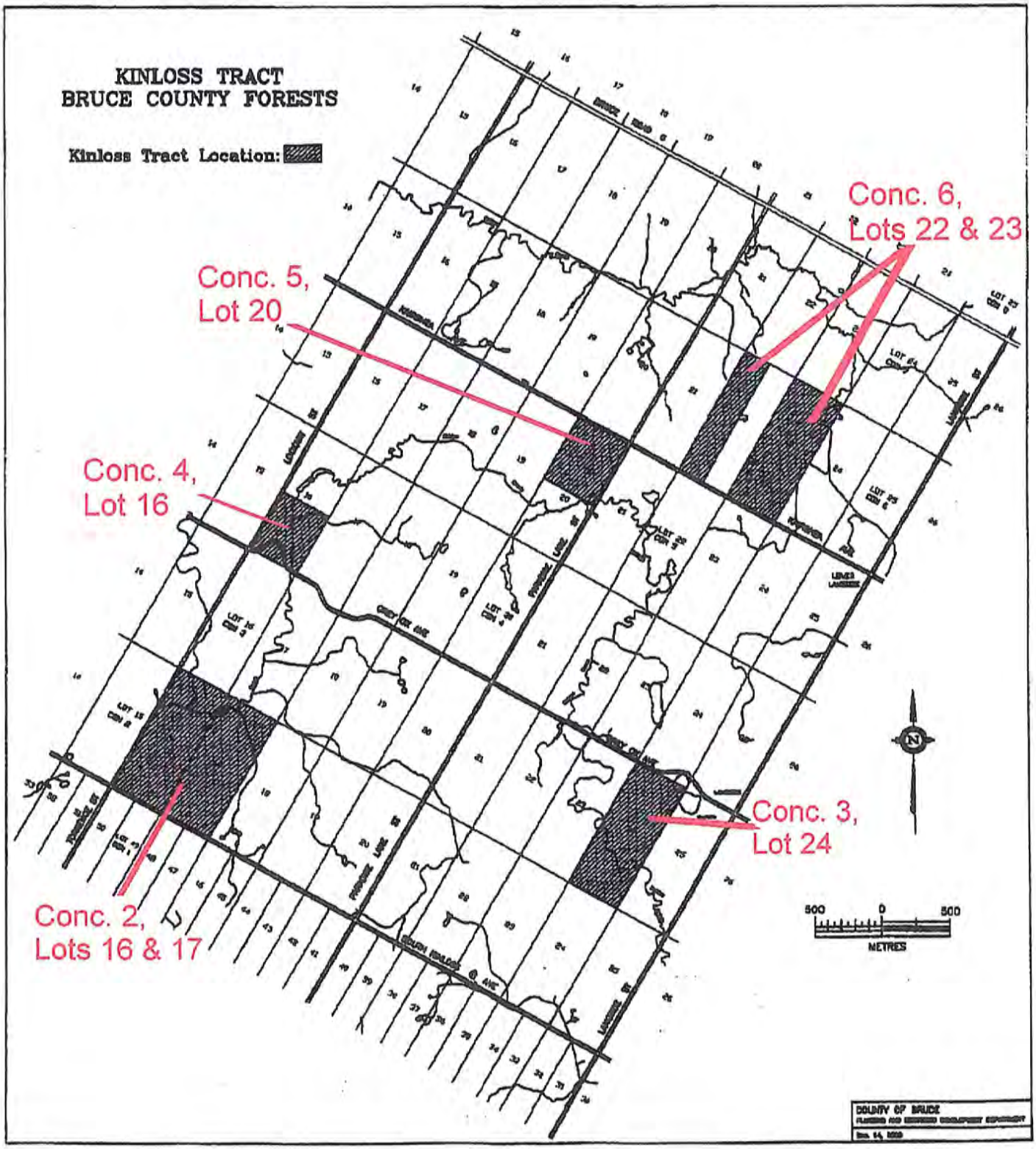
White Pine

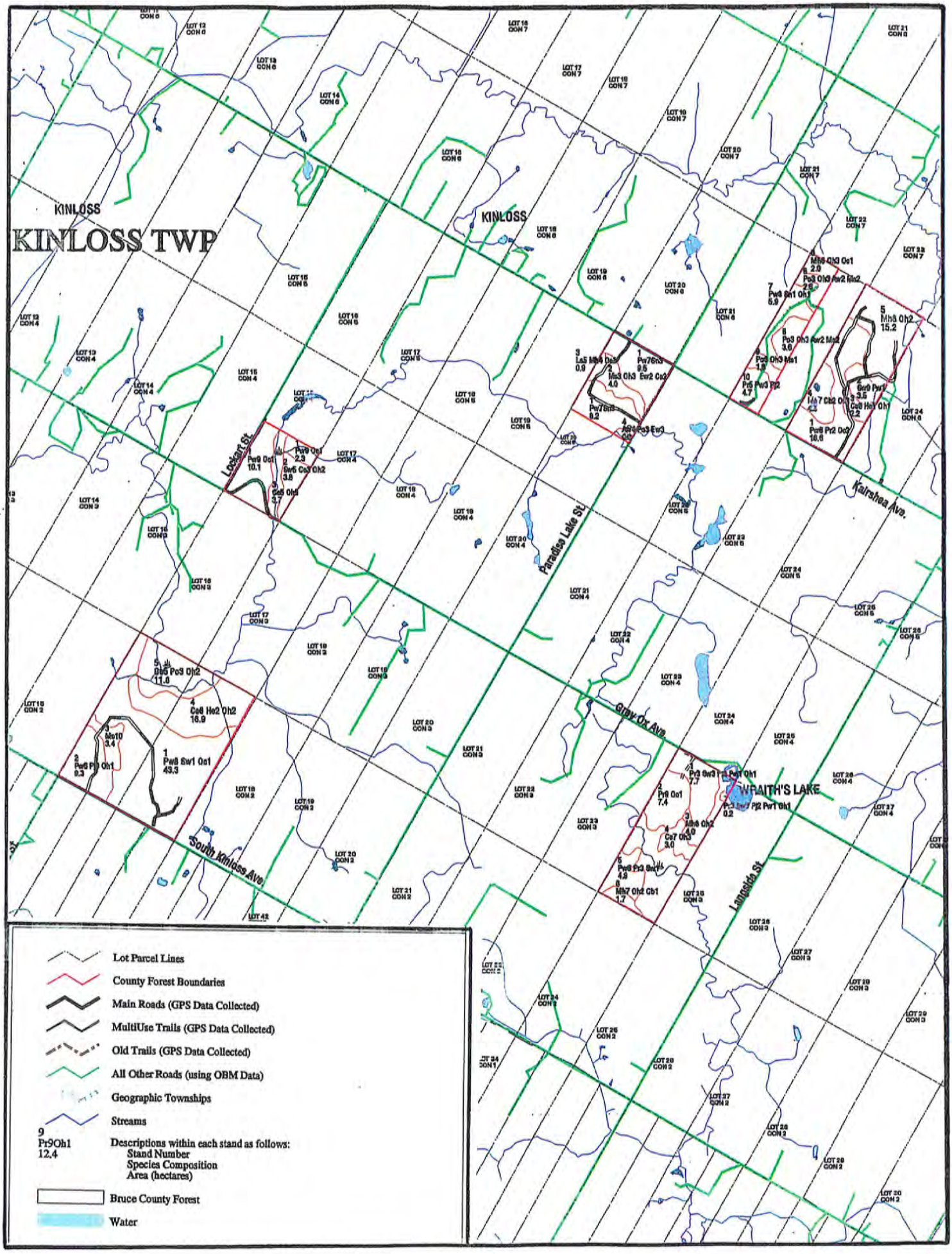
Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 4, Part Lots 5 & 6, Comp. 1	44.4	Pw_{10}	4th row removal and a selective thinning in the remaining rows

KINLOSS TRACTS

Property Location Map

Township of Huron-Kinloss (Kinloss), County of Bruce





Kinloss Tract

Productive Forest Land for the Kinloss Tracts

Working Group	Productive Forest (Hectares)	Non-Productive Forest (Acres)
White Pine	111.4	0.0
Red Pine	18.4	0.0
Cedar	18.7	13.1
Hard Maple	26.4	0.0
European Larch	1.5	0.0
White Spruce	6.4	0.0
Soft Maple	3.0	3.3
White Ash	0.0	1.0
Poplar	7.2	0.0
Wetland	0.0	11.6
Total	193.0	29.00

Table 1

Bruce County Forests
Stand Summary
for
Kinloss Tracts
Municipality of Huron-Kinloss (Kinloss)

Stand #	Species Content (percentage)	Basal Area (m2/ha)	Size (hectares)	Age (years)	Height (feet)	Harvest in 5 years	Harvest in 10 years
Kinloss, Conc. 2, Lots 16 & 17							
1	$Pw_8\ Sw_1\ Oc_1$	41.6	47.3	40	70	yes	no
2	$Pw_6\ Pj_3\ Oh_1$	29.7	6.0	40	70	yes	no
3	Ms_{10}	16.0	3.0	40	80	no	no
4	$Ce_6\ He_2\ Oh_2$	26.3	14.2	50	50	no	no
5	$Ce_5\ Po_3\ Oh_2$	10.0	9.5	25	20	no	no
Kinloss, Conc. 3, Lot 24							
1	$Pr_3\ Sw_3\ Pj_2\ Pw_1\ Oh_1$	34.5	7.2	40	70	yes	no
2	$Pr_9\ Oc_1$	51.5	7.2	40	70	yes	no
3	$Mh_8\ Oh_2$	19.6	4.5	25	30	no	yes
4	$Ce_7\ Oh_3$	36.6	2.7	40	40	no	no
5	$Pw_6\ Pr_3\ Sw_1$	41.3	4.8	40	80	yes	no
6	$Mh_7\ Oh_2\ Cb_1$	30.0	2.0	80	90	yes	no
7	Nil	0	11.6	0	0	no	no
Kinloss, Conc. 4, Lot 16							
1	$Pw_9\ Oc_1$	39.3	12.4	50	50	yes	no
2	$Sw_5\ Ce_3\ Oh_2$	21.7	4.0	25	35	no	no
3	$Ce_5\ Oh_5$	4.0	3.6	25	15	no	no
Kinloss, Conc. 5, Lot 20							
1	$Pw_7\ Sn_3$	33.4	16.2	40	70	yes	no
2	$Ms_3\ Oh_3\ Ew_2\ Ce_2$	13.3	3.3	25	40	no	no
3	$La_5\ Mh_4\ Oc_1$	44.0	1.5	30	70	yes	no
4	$Aw_4\ Po_3\ Ew_3$	10.0	1.0	25	35	no	no
Kinloss, Conc. 6, Lots 22 & 23							
1	$Pw_6\ Pr_2\ Oc_2$	36.2	19.2	40	70	yes	no
2	$Sw_9\ Pw_1$	34.0	2.4	30	40	yes	no
3	$Ce_8\ He_1\ Oh_1$	42.0	1.8	30	40	no	no
4	$Mh_7\ Cb_2\ Oh_1$	24.4	3.7	25	45	no	yes
5	$Mh_8\ Oh_2$	22.4	14.0	50	90	no	yes
6	$Mh_6\ Oh_3\ Oc_1$	28.0	2.2	30	80	yes	no
7	$Pw_8\ Sn_1\ Oh_1$	37.5	5.5	40	70	yes	no
8	$Po_3\ Oh_3\ Aw_2\ Ms_2$	21.0	6.0	25	50	no	no
9	$Po_6\ Oh_3\ Ms_1$	18.0	1.2	25	50	no	no
10	$Pr_5\ Pw_3\ Pj_2$	38.7	4.0	30	60	yes	no
Total Hectares:			222.0				

BRUCE COUNTY FORESTS

FIVE-YEAR OPERATING PLAN SUMMARY

for

Kinloss Tracts

White Pine

Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 2, Lots 16 & 17, Comp. 1	47.3	Pw_8 Sw_1 Oc_1	4th row removal and a selective thinning in the remaining rows
Conc. 2, Lots 16 & 17, Comp.2	6.0	Pw_6 Pj_3 Oh_1	4th row removal and a selective thinning in the remaining rows
Conc. 3, Lot 24, Comp. 5	4.8	Pw_6 Pr_3 Sw_1	4th row removal and a selective thinning in the remaining rows -access through neighbouring property
Conc. 4, Lot 16, Comp. 1	12.4	Pw_9 Oc_1	4th row removal and a selective thinning in the remaining rows
Conc. 4, Lot 20, Comp. 1	16.2	Pw_7 Sn_3	4th row removal and a selective thinning in the remaining rows
Conc. 6, Lots 22 & 23, Comp.1	19.2	Pw_6 Pr_2 Oc_2	4th row removal and a selective thinning in the remaining rows
Conc. 6, Lots 22 & 23, Comp.7	5.5	Pw_8 Sn_1 Oh_1	4th row removal and a selective thinning in the remaining rows

Red Pine

Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 3, Lot 24, Comp. 1	7.2	Pr_3 Sw_3 Pj_2 Pw_1 Oh_1	4th row removal and a selective thinning in the remaining rows
Conc. 3, Lot 24, Comp.2	7.2	Pr_9 Oc_1	4th row removal and a selective thinning in the remaining rows
Conc. 6, Lots 22 & 23, Comp. 10	4.0	Pr_5 Pw_3 Pj_2	4th row removal and a selective thinning in the remaining rows

White Spruce

Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 6, Lots 22 & 23, Comp. 2	2.4	Sw_9 Pw_1	4th row removal and a selective thinning in the remaining rows Note: harvest at the same time as Comp. 1

European Larch

Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 5, Lot 20, Comp. 3	1.5	La_5 Mh_4 Oc_1	4th row removal and a selective thinning in the remaining rows

Hardwoods

Tract & Comp. #	Area (hectares)	Species Composition	Five Year Management Plan
Conc. 6, Lots 22 & 23, Comp. 6	2.2	Mh_6 Oh_3 Oc_1	An improvement thinning removing diseased and defective stems
Conc. 3, Lot 24, Comp. 6	2.0	Mh_7 Oh_2 Cb_1	A selective thinning–access has to be gained through neighbouring property.

Species Glossary

MAIN SPECIES		INCIDENTAL SPECIES	
Mh	Hard Maple	Ha	Hawthorn
Ms	Soft Maple	Ch	Chestnut
Or	Red Oak	Ap	Apple
Ow	White Oak	Bg	Black Gum
Ob	Black Oak	Hb	Hackberry
Obu	Bur Oak	Id	Ironwood
Aw	White Ash	By	Yellow Birch
Ab	Black Ash	Op	Pin Oak
Ag	Green Ash	Osw	Swamp White Oak
Bd	Basswood	Os	Shumard Oak
Be	Beech	Ss	Sassafras
Cb	Black Cherry	Sy	Sycamore
Bw	Birch (all)	Tt	Tulip
E	Elm (all)	Lo	Locust
Hi	Hickory (all)	Pj	Jack Pine
Wb	Black Walnut	Ps	Scotch Pine
Bu	Butternut	Pl	Lodgepole Pine
Po	Poplar	Sb	Black Spruce
Cd	Cottonwood	Sr	Red Spruce
Ww	Willow	Bf	Balsam Fir
Pw	White Pine	Oh	Other Hardwoods
Pr	Red Pine	Oc	Other Conifers
He	Hemlock	UGS	Unacceptable Growing Stock
Sw	White Spruce		
Sn	Norway Spruce	AGS	Acceptable Growing Stock
Ce	Cedar		
L	Larch (all)	BA	Basal Area

General Legend for Forest Mapping

Marsh/open fen-wetland characterized by poorly drained organic and /or mineral soils and dominated by aquatic emergent species such as cattails, sedges, rushes and various herbaceous plants, often interspersed with small areas of water, and/or infrequent hydrophytic shrub cover (i.e. less than 50% ground coverage:

Brush/shrubland-successional areas exhibiting more than 50% woody plant coverage with shrubs and non-commercial trees being predominte (e.g. dogwood, willow, narrow-leaved meadowsweet, hawthorn, apple etc.) and tree crown coverage less than 25%.

Forest type/stand boundary

Stand Data-Stand # 16

Species Composition by percentage-Ce_4 Po_2 Bf_2 Oh_2

Area (ha)-80.7

AWS

AQUATIC AND WILDLIFE SERVICES

Environmental Consulting & Resource Management

R.R. # 1, Shallow Lake, Ontario, N0H 2K0
Phone: (519) 372-2303, Fax: (519) 372-1990

November 28, 2001

Lands & Forest Consulting
Box 10
Desboro, Ontario
N0H 1K0

Attention: **Jim Eccles**

Subject: Flora/Fauna Investigation on Bruce County Lands

Dear Jim:

Field investigations for significant Flora species and determination of Ecological Site Type, was carried out by AWS Consulting and its agents at the two-requested/identified sites, with the following determinations:

1. Locally known site as **'Ira Lake Fen'** area.

- Lot 8, concession I and II west and lot 9, concession II west Lindsay, Municipality of Northern Bruce Peninsula, County of Bruce
- Field investigation commenced & completed on September 21, 2001
- No observation or historical literature references to significant flora species within the 'fen habitat' areas. Time of year was a constraint but still acceptable for field flora study work. We feel confident that no provincially or regionally significant flora species presently occur within this area.
- No observations of significant fauna during this field survey, however past visits to sites and personal observations, as well literature searches indicate that several significant species utilize the fen habitat and surrounding wetland and adjacent forested uplands:
  - Eastern Massasauga Rattlesnake, Threatened Species (current)
  - Black Terns, Vulnerable Species (historical)
  - Northern Harrier, Not at Risk but considered Provincially Significant (current)
- Vegetation communities were also checked and classified in accordance to 'Ecological Land Classification for Southern Ontario, First Approximation'
  - Tamarack-White Cedar treed Fen Type, Code: FET1-2: Provincial Rank=S5
  - Twig-rush Open Fen Type, Code: FEO1-1: Provincial Rank =S3
  - Reed-canary Grass Organic Meadow Marsh Type, Code: MAM3-2: Prov. Rank=S5
  - Associated forested wetland and open water marsh habitat not examined, as requested.

2. Possible Alvar site within locally known area **'Miller Lake Tract'**

- Lot 15, concessions IV and V west Lindsay, Municipality of Northern Bruce Peninsula, County of Bruce
- Field investigation commenced and completed on September 23, 2001
- No observation or historical literature references to significant flora species within the study area. Time of year was a constraint but still acceptable for field flora study work. We feel confident that no provincially or regionally significant flora species presently occur within this area.
- Site habitat conditions were small, limited and of poor quality for any significant flora/fauna species. Site conditions would however provide some minor feeding habitat for the Threatened Eastern Massasauga Rattlesnake.

- Vegetation communities were also checked and classified in accordance to 'Ecological Land Classification for Southern Ontario, First Approximation'
  - Dry Annual Open Alvar Pavement Type, Code: ALO1-2: Provincial Rank = S3
  - Reed-canary Grass Mineral Meadow Marsh Type, Code: MAM2-2: Provincial Rank = S5
  - Common Juniper Carbonate Shrub Rock Barren Type, Code: RBS1-1: Provincial Rank = S3

Provincial ranking systems for identified vegetation communities:

- S5 = Considered common and wide spread, Globally secure
- S3 = Considered Rare to Uncommon, Globally very rare

The alvar community identified was of poor quality and of such small size that the site provided a limited diversity of species with limited ecological functions to adjacent habitat and associated fauna.

Also of note was the identification of a second alvar community approx. 800m north east of the previously identified alvar. This second site located on lot 16, concession 4, and outlined on the returned air photo was of the same vegetation community type as the first alvar site, but 4X the size and greater ecological function potential. No significant flora could be identified at this second site as well.

Yours truly,

John Morton, Aquatic and Wildlife Services

Att. Returned Infrared Air Photos of Identified Sites by 'L & F' Consulting