Long Point Region Conservation Authority

Forest Management Plan

2020 – 2039

For the Period of

January 1, 2020 to December 31, 2039

I hereby certify that this plan has been prepared under my personal supervision and that all field work and calculations have been carried out to the best of my skill and judgement

OPFA Seal	Fraser Smith, R.P.F.	26 December 2019 Date

GM: Judy Maxwell

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CONTEXT

INTRODUCTION AND SUMMARY

This Forest Management Plan (FMP) was prepared in 2019 by conducting a third-party assessment of the historic FMP, the current Management Forest Tax Incentive Program (MFTIP) plan, as well as substantially updating with new content. The 2020-2039 FMP is a continuation of these historic documents and is prepared to ensure consistency in sustainable forest management for Long Point Region Conservation Authority (LPRCA) forest lands. The FMP was prepared by a consultant team consisting of; David Holmes, R.P.F., retired LPRCA forester; Kate Potter, project manager and client liaison with Smooth River Consulting; and Fraser Smith, R.P.F., lead author and forester with FSmith Consulting. Judy Maxwell, LPRCA General Manager/Secretary Treasurer, provided guidance for the overall project as well as critical review insight throughout the project. Most notably, work on this FMP would not have been possible without the knowledge and expertise of Debbie Thain, LPRCA Forestry Technician, who provided guidance, consultation, review, as well as critical institutional knowledge throughout the project.

Fundamentally, a FMP lays out the overarching framework of how forest management actions will be carried out over the coming planning period (2020-2039). FMPs must ensure sustainability while finding a balance of social, economic and environmental values. For private lands in Ontario, FMPs commonly describe goals and objectives for a 20 year period within the framework of the existing resources and land base. This is covered by describing the silvicultural systems that may be employed over that period, as well as the considerations and constraints that guide when and how to implement those systems. Further, FMPs will commonly describe the explicit management schedule for the coming five year period, generally within a 5 Year Operating Schedule (5YOP). This FMP contains a 5YOP covering the years 2020-2025, recognizing that the primary operating season stretches over the winter months. The 5YOP maintains a consistent approach to management patterns to date and will be replaced by a comparable 5YOP in 2025.

The FMP is divided into a series of sections that cover sustainable management activities over the planning period and follows a comparable framework to other FMPs. Most sections include a brief description of recommendations related to that section, and these recommendations are further summarized in the final section. A high-level overview of the sections follows:

- The Landscape section provides a description of the LPRCA watershed, the forest resources to be managed, and the environmental limitations to be considered.
- The Forest Uses section described the anthropogenic and other uses of the forest recognizing the multi-use nature of LPRCA forest holdings.
- The Existing Guidelines, Policy and Legislation section lists the critical legislative framework as well as the policies and plans affecting management actions at the local level.

- The LPRCA Forestry Management Background section provides an overview of the management activities to date, the planning framework for LPRCA, as well as the existing compartment inventory and descriptions contained within the Managed Forest Tax Incentive Program (MFTIP) plan.
- The Forest Management Considerations section provides information on forest health, conservation and risk management considerations that are central to the adaptive management framework in which the field of forestry operates.
- The Management Goals and Objectives section updates the existing goals and objectives from the expiring 2000-2019 FMP and synthesizes with the MFTIP plan and Strategic Plan to provide consistency of management approach for LPRCA. The FMP clearly articulates the management goals and objectives of the landowner.

Operations:

- The Sustainable Timber Yield and Available Harvest Area section explicitly lists the areas planned for harvest during the coming five year period and demonstrates the clear link to management activities to date.
- The Priority Functions section provides an overview of existing land designations specific to LPRCA, a review of those designations, as well as discussion on compatibility with recommended management approaches.
- The Determination of Sustainability section outlines the approaches to monitoring and assessment, past and projected harvest practices, as well as illustrated examples of the silvicultural systems to be employed within the framework of sustainable forest management for the described primary forest types.

Together, these sections provide the overarching framework for LPRCA forest management so that the Authority can continue its legacy of well-managed forest lands within the Long Point watershed.

In 2013, LPRCA achieved Forest Stewardship Council® (FSC®) certification (FSC® C018800) through the Eastern Ontario Model Forest (EOMF) - Forest Certification Program. FSC® is an international, membership-based, non-profit organization that supports environmentally appropriate, socially beneficial, and economically viable management of the world's forests. Sustainable forest management practices in these forests are verified through an independent third-party evaluation system. The Standards for Assessing Forest Management in the Great Lake-St. Lawrence Region outlines the ten core FSC® Principles that ensures the forest is “well-managed”. LPRCA is proud that its forests have been certified to FSC® Standards.

CONTEXT

LANDSCAPE

The Land

The Watershed

The Long Point Region watershed defines an area drained by more than 30 creeks and tributaries. These watercourses drain an area of 2,782 sq. km (1,080 sq miles) in portions of Brant, Elgin, Haldimand, Norfolk and Oxford counties. [i] ,

Major communities within the watershed include Port Burwell and Straffordville in Elgin County; Norwich and Tillsonburg in Oxford County; Delhi, Waterford, Simcoe and Port Dover in Norfolk County; and Jarvis and Hagersville in Haldimand County.[ii]

The watershed has been divided into six main sub-watershed areas: Big Otter Creek, South Otter/Clear Creek, Big Creek, Dedrick/Young/Hay Creek, Lynn River/Black Creek and Nanticoke/Sandusk/Stoney Creek. All these sub-watersheds drain directly into Lake Erie. Each sub-watershed has unique features relative to their land base and land use that affect the health of the overall Long Point Region watershed. [iii]

Quick Facts:

- The Long Point Region watershed is located in southwestern Ontario, being almost 100km at its widest and 60km running north to south.
- The watershed includes approximately 200 km of Lake Erie shoreline, including the internationally renowned Long Point sand spit.
- The combined length of all streams and tributaries in the watershed is over 3,700 km.
- There are three major physiographic regions in the watershed: the Norfolk Sand Plain, the Haldimand Clay Plain and the Horseshoe Moraine/Mount Elgin Ridges.
- The Long Point Region watershed falls within the Deciduous Forest Region of Canada, also known as the Carolinian Forest Zone. There are significant forest pockets that include species such as Tulip tree, Black Gum, Sassafras, Black Oak, and Cucumber Tree which are generally not represented elsewhere in Canada. These tree species are rare nationally and provincially and occur naturally only in southern parts of Ontario north of Lake Erie. [iv]

Physiography

LPRCA's watershed is primarily rural with several urban centers (the largest are Tillsonburg and Simcoe), with additional hamlets scattered throughout the watershed. Most of the land area is farmland used for row crops and specialty vegetable crops. Forests occupy 21% of the jurisdiction, which is high compared to the rest of southern Ontario. Some are isolated

forest blocks at the back of farm properties, but a substantial number are located along the edges of watercourses with riparian forest cover, which contributes to overall connectivity of forests on the landscape. [v]

The physiography of the watershed has been described by Chapman and Putnam (1966), Barnett (1978, 1982), Presant and Action (1984) and others. Abiotic characteristics are further described by Bowles (1997), Brant Field Naturalists (1996) and Norfolk Field Naturalists (1987). Sand and clay dominate the watershed's soil types as the Norfolk sand plain occurs in the west and the Haldimand clay plain resides to the east. The Oxford Till Plain in the northwest portion of the watershed contains silt and loam. The topography generally consists of smooth, long gentle slopes and sand ridges that have been dissected and deeply eroded by stream courses [vi]

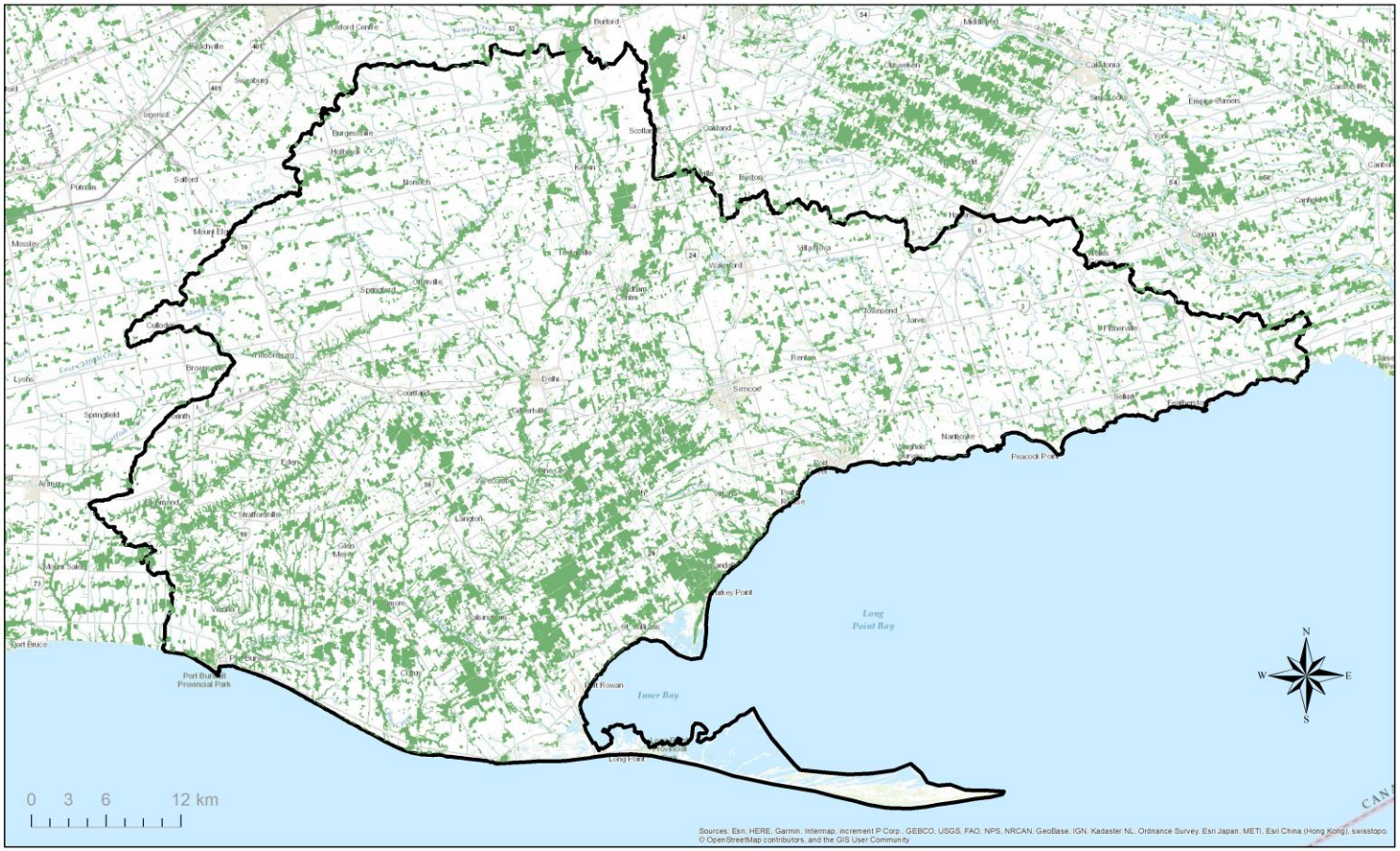
Topography + Soils

Generally, the western portion of the watershed is on the Norfolk sand plain, the eastern portion is on the Haldimand clay plain, and the northwest portion is on the Oxford till plain. More detailed soil maps are also available for Oxford, Haldimand-Norfolk, Elgin, and Brant. The majority of LPRCA's watershed and forest properties are found on the Norfolk sand plain. The sand plain is located in the southern half of Bayham, Middleton, North Walsingham, South Walsingham, portions of Windham, Charlotteville and the western portions of Townsend and Woodhouse townships. The Haldimand clay plain consists of gently rolling topography with a distinctive pattern of slough ponds and ridges. It is in Walpole township and the eastern portions of Townsend and Woodhouse townships. Only three LPRCA properties are found on the Haldimand clay plain (Haldimand Conservation Area (C.A.), Jacques Tract and Black Creek C.A.). The Oxford Till Plain consists of till plain and till moraine features. It covers the townships of Dereham, North Norwich, South Norwich, northern portion of Bayham, and portions of Windham. The portion of the Oxford Till Plain in LPRCA's jurisdiction largely consists of clay and clay loam soils. [vii]

Most of the land area within the LPRCA watershed is farmland and woodlands occupy approximately 21% of the total land base. The LPRCA is one of the most significant forest landowners in the watershed along with the Province of Ontario, the Region of Haldimand-Norfolk, Nature Conservancy of Canada, and the Government of Canada. [viii]

LPRCA forest properties are spread throughout the watershed. Many of these are physically adjacent to one another and are therefore grouped together for management purposes.[ix]

Forest Cover in the LPRCA Watershed



Legend

Forest Cover

LPRCA Watershed

This map was created by Smooth River Consulting with Fraser Smith Consulting with data from the Long Point Region Conservation Authority. November 2019.
The forest cover data was obtained from the Ontario GeoHub. This data was last updated October 2019.

Figure 1: Forest Cover in the LPRCA Watershed Area

The Water

Aquatic Community

A stream's ability to support a diverse and sustainable aquatic community depends on the in-stream habitat characteristics such as stream temperature, dissolved oxygen, food types, cover, stream bottom type, and spawning areas (Cushing and Allan 2001). These attributes are directly linked to landscape use with higher levels of natural cover (e.g. forest cover) fostering healthier aquatic habitats. Stream temperature needs to be stable and in a range necessary for specific species' health and survival within a watercourse. Dissolved oxygen within streams is usually abundant, however the holding capacity for dissolved oxygen will vary in direct relation to temperature, water aeration (e.g., water flowing over rocks), primary production, and water quality (Cushing and Allan 2001). Food sources of aquatic species include vegetation (e.g., periphyton), particulate organic matter, aquatic macroinvertebrates, fish, and terrestrial organisms. A range of food types needs to be present in a stream to support a healthy, dynamic food web.

Benthic macroinvertebrates carry out necessary functions in a river or stream. Grouped into functional feeding groups, benthos can be shredders, grazers, collectors, or predators (Cushing and Allan 2001). As such, each functional feeding group has specialized morphologic adaptations needed to carry out necessary functions. Each functional feeding group plays a role in breaking down and assimilating organic matter in a stream, which generates a healthy stream. Benthic macroinvertebrates are also indicators of stream health.

Wetlands

Wetlands are lands that are either seasonally or permanently covered by shallow water. They also include areas where the water table is close to, or at, the surface. Wetlands are an essential component of Long Point Region forest ecosystems. They provide environmental, economic and social benefits that are not easily measured. Wetlands provide important wildlife, fisheries and vegetation habitat; control and store surface water; improve water quality by trapping and/or filtering sediments and contaminants; and, provide recreational and educational opportunities. [x]

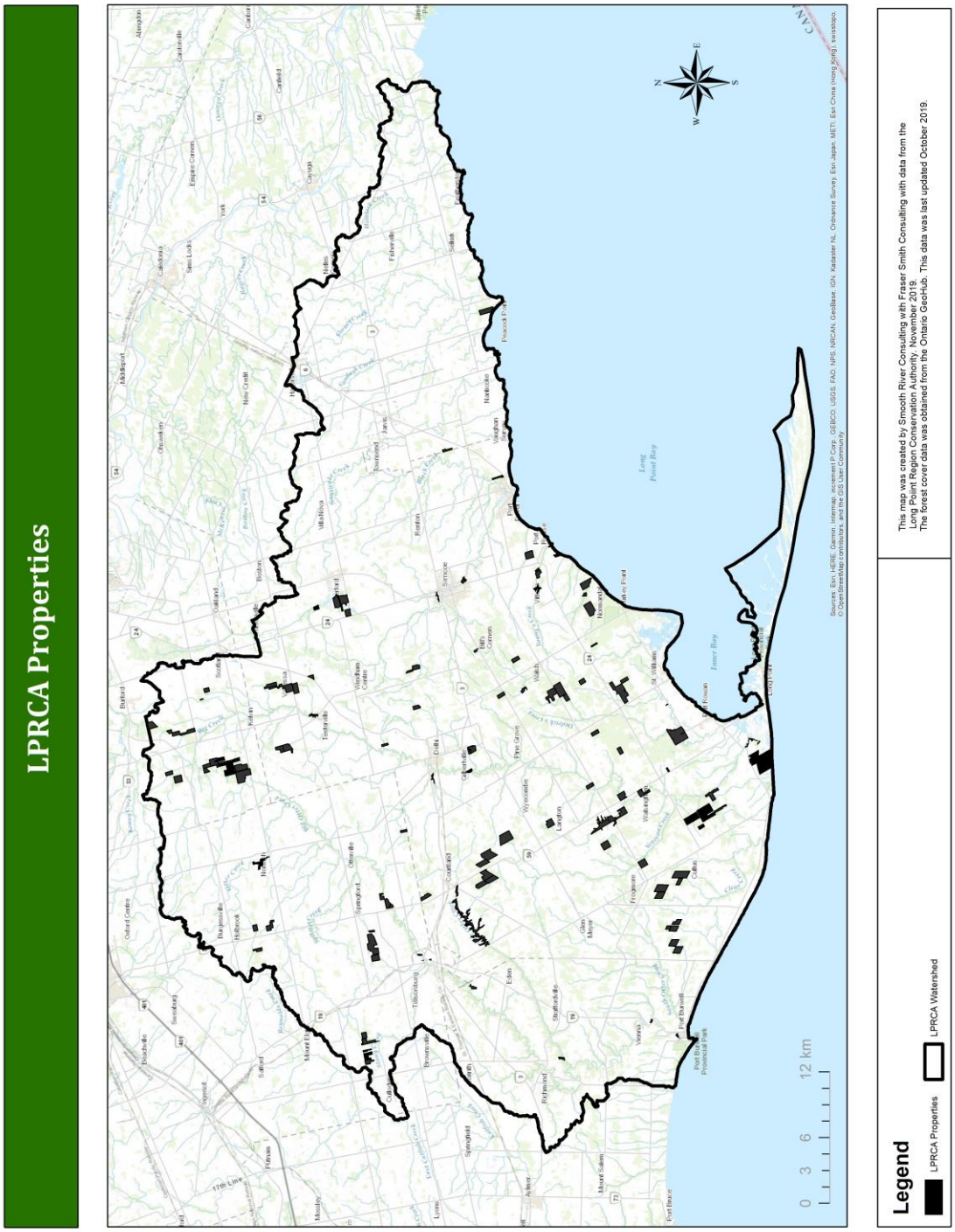


Figure 2: LPRCA Forested Properties

Plants and Animals

Flora and Fauna

LPRCA is located within the Carolinian Life Zone. There is a wide variety of species commonly observed during LPRCA forestry field investigations including those common to the Great Lakes- St. Lawrence forests, as well as more typical Carolinian species.[xi] The LPRCA forest properties also support a variety of shrubs and herbaceous species typical of the Carolinian Forest Region and the more northerly Great Lakes St Lawrence Forest Region. [xii]

Biodiversity

Forests within this region are typically dominated by maple, beech, and oak species. However, there are smaller areas which are representative of the broader Carolinian Life Zone and include species such as the tulip tree, black gum, sassafras, black oak and cucumber tree. These tree species are rare in Canada and occur naturally only in southern parts of Ontario north of Lake Erie. [xiii]

Species at risk in area

There are 85 species at risk found in the Long Point Region watershed area, including 14 reptiles and amphibians, 30 birds and insects, 14 fish and mollusks, 23 plants and mosses and 4 mammals. [xiv]

External Factors

Regional Climate

Climatic elements such as precipitation (rain and snow), evaporation and temperature have a dominant effect on various components of the hydrologic cycle (see figure below). Understanding these elements and their patterns plays a key role in understanding how natural systems function and respond to changes in climate (e.g., extreme variability in precipitation). The climate of an area depends on its location within the worldwide circulation of the atmosphere. Local climates may also be profoundly affected by the proximity of an area to large water bodies and local topographic relief. The Long Point watershed is located within the Great Lakes- St. Lawrence Forest Region as well as Carolinian Forest Region, which is known as a biodiversity hot spot in Canada. The LPRCA watershed also contains a relatively high percentage of forest cover compared to much of the rest of southern Ontario, including many large forest blocks with high connectivity across the landscape. Much of this is due to the continuing management of the LPRCA forestry program. This watershed supports a high diversity of plants and wildlife, including at least 85 Species at Risk. [xv]

The Long Point Region has a moderate temperate climate and features a low latitude and elevation compared to other parts of Southern Ontario. A moderate temperate climate denotes a moderate, even precipitation throughout the year and temperatures ranging from warm to hot and humid in summers to below freezing in winter. Winters are mild compared to the rest of Ontario due to its southerly location and proximity to Lake Erie, which has a moderating effect on temperature variation and winter extremes. With Lake Erie to the south, winds coming across the lake are warmer in winter and cooler in summer than the

land, thereby moderating air temperatures over the watershed. Climate in Southern Ontario is quite varied throughout the year and although there are forecasted normals and averages, the daily and seasonal weather patterns can be quite unpredictable. [xvi]

Climate Change

Good forest stewardship involves wise environmental and economic decisions and implementing the most effective strategies to help the woodlot adapt to climate change. Many of these management options are already part of good stewardship practices to enhance wildlife, timber values, recreation, and other objectives. Consider how forests can play a vital role to help capture carbon emissions and minimize the impacts of climate change in the future. [xvii]

Minimum temperatures have increased in northern Ontario between 1.4 and 3.8°C. By comparison, temperature increases experienced in southern Ontario have been less: between 0.7 and 2.1°C Concurrently, an earlier start to the vegetative growing season has increased the overall duration of the growing season. This could lead to increased agricultural and forestry opportunities. Temperature increases have preceded changes in rainfall patterns. This may mean forests will experience increased moisture stress and the risk of wildfires in some cover types may increase. Woodlands affected by extreme events such as tornadoes, windstorms, ice storms, summer heat waves, droughts, floods, and wildfires can take decades to recover after disturbance, and forest ecosystem structure and productivity may change as a result [xviii]

Forests naturally capture carbon dioxide from the atmosphere, which is then stored as carbon in live trees, downed woody debris, and in the soil. This carbon can be stored for decades and centuries in living trees or in durable wood products like furniture or building frames until it is released when vegetation either decays or is burned. Maintaining or increasing the amount of carbon that can be stored by your woodlot is crucial to help reduce atmospheric carbon dioxide emissions and the effects of climate change in the future.[xix]

Many changes to the timing, distribution, and interaction between species are already being observed in Ontario. These changes may affect the biodiversity in your woodlot, as well as affecting both forest and human health. [xx]

As our climate changes, the projected changes in temperature and precipitation that are most likely to affect woodlots and woodlot management are:

- Longer growing seasons
- More winter rain and earlier peak stream flows
- Shorter frozen ground operating season
- Drier soils in summer and increasing abundance and outbreaks of pests and disease
- Increasing invasive species and new pathogens from southern climates
- More frequent extreme weather events including heavy rain, wind and ice storms
- Changing habitat ranges, particularly for southern edge species
- Decoupling of co-evolved ecological processes that may affect woodlots in unknown ways (e.g. insect pollination, seed production, host hardiness, wildlife interactions)

FOREST USES

Wildlife

Stick Nests

Squirrels and many bird species build or use stick nests as their nesting habitat. Bird species that build stick nests include hawks, herons, ravens, eagles, osprey, and crows. Bird species that use stick nests that have been built by other species includes falcons and owls. Birds will commonly use stick nests repeatedly, for many years, or a series of nests by annual rotation. Any disturbance near, or the felling of, a tree containing a stick nest during forest management activities may displace the bird from the area [xxi]

LPRCA forest management practices follow or exceed the most recent provincial guidelines for the protection of nesting habitat for raptors and great blue herons to ensure the present populations of species are maintained. Generally, the Authority ensures that identified stick nests and the trees immediately adjacent to the canopy of the tree that contains the nest will be retained in all situations, provided they do not violate other forest management guidelines or health and safety guidelines. Furthermore, stick nest areas are identified during the prescription development and tree marking stages. Setbacks of at least one full tree length are marked for reference by harvest operators. These minimum practices provide protection for nests that have not been or cannot be identified as being built or used by a specific species. All known stick nests are identified within operating plans and harvesting activities are excluded from the area of the known nest during breeding season. [xxii]

Cavity Trees

Many species of wildlife rely on cavity trees for habitat. While some species excavate their own cavity ("primary cavity nesters"), others use naturally formed cavities or cavities created by other wildlife species ("secondary cavity nesters"). These cavities provide valuable wildlife habitat. Silvicultural prescriptions generally state that a minimum of ten cavity or potential cavity trees measuring over 25 centimeters (≥10 inches) in diameter at breast height will be retained per hectare.

When marking a stand containing cavity trees, priority is given to cavities in living hardwood trees. As per the Ontario Tree Marking guidelines (Ontario Ministry of Natural Resources, 2004), cavity trees are to be retained in the LPRCA Forest according to the following order of priority, based on the type of cavity they contain: 1) pileated woodpecker roost cavity, 2) pileated woodpecker nest cavity, 3) other woodpecker nest cavity or natural nest or den cavity, 4) escape cavity or major bole wound facilitating entry and exit, 5) woodpecker feeding cavity, 6) a high potential to develop cavities. Forest management guidelines dictate that when selecting trees that may develop cavities the focus should be on retaining trees that are of good health, trees with holes that are not open to the rain, and trees which provide multiple benefits to wildlife. Following the Ontario Tree Marking guidelines, every attempt will be made to identify at least six cavity trees per hectare. High priority cavity trees should be marked with a "W" in blue paint for the purpose of explanation of retention choice to the auditor and/or harvester.

Mast Trees

Many species of wildlife rely on mast for food. The term mast refers to the edible fruits of both overstory and understory plants. Soft mast, such as cherries, and hard mast, such as acorns and beech nuts, are consumed by about 25% of birds and mammals within the Great Lakes-St. Lawrence forest. Native mast producing trees within the LPRCA Forest, which are commonly relied upon by wildlife, can include the following tree species families: oak, beech, hickory species, walnut, butternut, and cherry. Numerous other tree and shrub species also provide mast and should be managed as such within forest management plans.

Standard practices dictate that at minimum ten mast trees per hectare should be maintained when prescribing forest management activities. Priority should be given to oak, hickory, butternut, walnut, and beech tree species. These trees must be at least 25cm in diameter at breast height but are ideally over 38cm (≥15 inches). Maintaining a variety of mast trees is also of great importance and the selection should be weighed against seven criteria: tree species, tree size, crown position, crown condition, evidence of mast production, evidence of wildlife use, and risk and vigour. These mast trees should be scattered throughout each hectare of the forest as much as possible.

Supercanopy Trees

Supercanopy trees are large, living trees (generally ≥60 cm dbh) that emerge above the main canopy of a stand and create vertical structural diversity in the forest. Their open crowns make them ideal nest, roost, and perch sites for large birds such as bald eagles, ospreys, turkey vultures, red-tailed hawks, and ravens.

Supercanopy trees are often veterans that survived stand-initiating disturbances. For example, residual pines that survive low to moderate intensity fires eventually become supercanopy trees as the new forest regenerates.

Some supercanopy trees should be retained in all cuts wherever possible. Current guidelines require the retention of at least one supercanopy tree per four hectares when available [xxiii]. The supercanopy tree minimum applies mainly to mature forest ecosystems. While supercanopy trees do exist within young forest stands, their importance is not realized until the young stand matures.

Forest Infrastructure

Forest Roads

Forest access roads (primarily skid trails) are established and maintained as required except within newer acquisitions that have not received any management activities since purchase. In the past, these roads were left open for public access, but due to illegal entry by off-road vehicles as well as the volume of illegally dumped garbage gates have been installed to limit access only to L.P.R.C.A. staff.

Trails

Walking trails in forest tracts are primarily unorganized / unmaintained and limited to foot traffic. Several areas receive regular scheduled / ongoing maintenance, including Hay Creek and Norwich.

Recreation

LPRCA forest properties afford excellent opportunities for outdoor recreation activities including hiking, bird watching, and hunting. Passive recreation has the least amount of impact on the forest ecosystem and activities such as hiking and bird watching are expected to increase in popularity due to changing demographics in Canada (Foot, 1990) [xxiv].

Non-Motorized

Non-motorized activities that are passive in nature are allowed. These include:

- Walking and hiking at your own risk
- Cross country skiing on unmaintained forest roads and trails
- Bird watching on all properties
- Bicycling on forest access roads and established trails located in the Anderson tract by written agreement with the Turkey Point Mountain Bike Club
- Angling and hunting activities (see separate section below)
- Trapping is allowed by written permission only

Motorized

Motorized vehicle access is prohibited and strongly discouraged. Snowmobiling is only allowed on certain Authority lands where agreements are in place with the local chapter of the Ontario Federation of Snowmobile Clubs. Gates have been installed at the entrance of all forest roads to prevent illegal entry.

Hunting

Hunting is permitted at several LPRCA forest tracts in order to help manage local wildlife populations and to provide recreational opportunities for hunters. The primary species that are hunted are wild turkey, white tailed deer, waterfowl, ruffed grouse, and other small game. [xxv]

All provincial and municipal hunting regulations, seasonal restrictions and Conservation Authority rules must be followed. Hunters should consult the municipal bylaw and Ontario Ministry of Natural Resources regulations to confirm restrictions. Hunters must not trespass on adjacent private property without the landowner's consent. [xxvi]

Certain LPRCA properties do not allow hunting and interested parties should contact the Authority to determine which activities are permitted.

Conservation

Natural Heritage Woodlands

The Long Point Region watershed lies within the heart of the Carolinian Forest Zone and contains some of the most significant Carolinian forests in Canada. In December 2002, the LPRCA designated a proportion of its forests as Natural Heritage Woodlands (NHW). [xxvii]

The natural heritage values of several properties were assessed using a quantitative scoring and ranking system, with recommendations of candidate sites for consideration by LPRCA. The following criteria were evaluated:

- No less than 10% of stand consists of Carolinian species

- Property was inventoried as part of natural areas assessment
- Stand is at least 85 years old
- Stand contains "interior" forest and/or is part of a large forest block
- Stand has a high conservation rating for vulnerable, threatened, and endangered species
- Number of unique communities
- Diversity of plant and bird species [xxviii]

In 2002, LPRCA designated 1,933 acres or 20 percent of its forested properties as Natural Heritage Woodlands. The sale of Backus Woods to the Nature Conservancy of Canada in 2011 reduces the NHW designation to 1,145 acres. [xxix]

The natural heritage approach identifies and evaluates natural heritage values and assesses the status of species and habitats. This approach to forest management identifies opportunities and actions for protecting significant natural heritage features within specific LPRCA forest properties. [xxx]

The selected woodlands will be exempt from regular forest management operations and will serve as core areas for the protection of vulnerable, rare, threatened, and endangered species. [xxxi]

Areas of Concern

The presence of rare and unique flora and fauna on the LPRCA forests and adjacent properties have been well documented by Bowles (1997), the Brant Field Naturalists (1996), and the Norfolk Field Naturalists (1987). Such sites are often referred to as Areas of Concern (AOCs). Where forestry operations are planned, these areas should be ground-truthed for the presence of rare and unique forest communities and habitats before any operations are carried out. As AOCs are identified their location should be added to the Authority's Geographic Information System (GIS). Silvicultural systems should be suitably modified to ensure that forestry operations do not diminish these unique forest communities and habitats. [xxxii]

Water Conservation

Since the formation of the Big Creek Valley Conservation Authority in 1948, water conservation continues to be one of the LPRCA's priorities. Many of the Authority forests are situated in head-water areas of the numerous rivers and creeks, which form the watershed and are critical in maintaining downstream water quality and quantity. [xxxiii]

All management within the Authority's forest properties should promote conservation of water quantity and quality consistent with the LPRCA Water resources management Plan. The Authority can accomplish this by 1) Maintaining forest cover through proper forest management techniques and by planting trees where necessary; 2) Developing standards and guidelines for forestry practice in consultation with its partners. This will protect soil, water quality and quantity, and riparian habitats during and after forest management operations.[xxxiv]

Wildlife Management

LPRCA is largely situated within the Carolinian Forest Region and is recognized as a biodiversity hot spot in Canada. Many wildlife species have the potential to occur in the forested and open area habitats, some of which are unlikely to be detected without targeted surveys. A wide range of mammals, birds, snakes and turtles inhabit the watershed. They may use forested and open habitats for various activities, such as courting, breeding, foraging, denning, roosting, staging, hibernating, and migrating. [xxxv]

Education

The Authority currently offers conservation education programs for primary school students at its conservation education centre at Backus Heritage Conservation Area. Approximately 5,000 students visit the site annually. The Authority also offers several special events with an outdoor education theme at Backus Heritage throughout the year at this location. [xxxvi]

Research

The LPRCA's ongoing support for research projects includes providing study sites. The Authority's protocol for research collaboration requires a written request to use the property, a summary of the nature of the research, acknowledgement of the Authority's contribution to the research, and a copy of the completed thesis, report, or any published findings. As a passive participant in most research projects, the Authority's primary involvement includes forested land provision and verification of the efficacy of the research aims and project scope. The research conducted on LPRCA lands should coincide with the LPRCA monitoring protocol and assist wherever possible with monitoring efforts. [xxxvii]

The following subsections describe some past and ongoing research partnerships on the LPRCA forest land base. Collaborative research and proper management are integral components of sustainable forest management. The ongoing study of treatment applications and effects assist in the development of best management practices for a range of forest types, especially in a period of changing climate and associated species interactions.

MNRF Group Selection studies

In 2001, Ministry of Natural Resources and Forestry (MNRF) researchers began an experimental management approach to determine the efficacy of group selection silvicultural approaches on both forest communities as well as avian populations within a southwestern Ontario forest context. This experiment was designed initially with site selection and pre-harvest data collection. Eight sites in both Norkfolk and Middlesex Counties are part of this study. These allow researchers to examine three group selections, three single tree selections, and two reference stands before and after harvest. In 2006, researchers paired this study with a companion study in the continuous forests of Algonquin Park to better understand geographically specific variables as well as applicability across the broader landscape of Ontario forests.

Objectives:

1. Determine whether group selection silviculture is preferable over a "no cut approach" versus the typical single-tree selection system at maintaining mid-tolerant and intolerant tree species (such as oaks, hickories, black cherry, sassafras, and elm).

2. Provide adaptive recommendations for refining provincial silvicultural guidelines for regenerating mid-tolerant trees using the group selection system (i.e. identify appropriate gap sizes, timing and frequency of tending, etc.), and describe their influence on avian nest success.
3. Identify the effects of various treatments on bird species diversity, abundance, reproductive success, and document changes over time.
4. Determine how measures of nest productivity compare to results from point counts to determine whether abundance is an adequate measure of site quality and sustainability.
5. Compare conditions created by forest management to uncut stands in order to evaluate species-specific responses with varying life histories against overall stand structure and composition.
6. Provide suitable demonstration sites for landowners and associated forest managers to observe differences in the three treatment approaches and their outcomes.
7. Develop forest management guidelines that could benefit hooded warblers, and other gap-dependent species found in the fragmented forests of southwestern Ontario and make recommendations for those species that are negatively affected by some conventional silvicultural treatments.

Treatments:

No Cut Controls: Two sites were managed with no tree cutting operations for 40 or more years.

Single Tree Selection: A total of three sites were managed according to the classically adopted single-tree selection prescription for managing tolerant hardwoods for sawlog production and with consideration for important integrated objectives as described in the *Silvicultural Guide to Managing Southern Ontario Forests*[xxxviii].

Group Selection: A total of three sites were managed according to the group selection prescription. Each Group Selection site was divided into two zones: "Large Gap Zone" and "Small and Medium Gap Zone". The Large Gap Zone has three gaps ranging in size from 40 to 44m diameter to target a gap size of 0.14 ha. This is approximately 1.5 times the canopy height of mature forests in this area and meets the size that is recommended for many primarily mid-tolerant species (*A Silvicultural Guide to Managing Southern Ontario Forests,* OMNR, 2000). The Small and Medium Gap Zones have five Small Gaps of 20 m in diameter (0.03 ha) and four Medium Gaps of 30m in diameter (0.07).

Only the gaps were harvested and those trees deemed necessary to allow for access. No between gap thinning occurred. All trees 2.5 cm or greater were removed from all gaps. All regeneration came naturally as a result of existing seedlings, resprouting, or natural seed germination. Hand-tending was conducted in the gaps for three consecutive years following harvesting. This was designed to promote the survival and growth of mid-tolerant and intolerant trees species over shade-tolerant and shrub species, by removing all competing species in a 1m radius circle around targeted species: red, black, bur, white, and swamp white oak, flowering dogwood, bitternut and shagbark hickory, American chestnut, American elm, sassafrass, black cherry, butternut and black ash. One additional crop-tree-based hand tending was conducted for seven growing seasons following harvesting. This

last tending included the pre-tending marking of crop trees based on a spacing factor with a priority for oaks and rare species.

Flux Tower Research - LPRCA Wilson tract site

The main goal of this study is to understand the impact of environmental drivers on the carbon sink or source capacity of a deciduous (Carolinian) forest within the Great Lakes Basin in Canada. No studies have previously examined the carbon sink capacity in the northernmost extent of Carolinian forests, nor the sensitivity of carbon-uptake to climatic variables. The specific objectives are: 1) to examine the impacts of seasonal and interannual climate variability, including the occurrence of extreme weather events, on the forest's net ecosystem productivity using observations made over five years (2012 to 2016); and 2) to compare the growth and productivity of this forest to other similar deciduous forests in eastern North America.

The study site is located north of Lake Erie near Long Point Provincial Park, roughly 5 km southwest of Walsingham in Norfolk County, Ontario, Canada. The study site is part of the Turkey Point Observatory and Global Water Futures Program. The Turkey Point Observatory is comprised of an age-sequence of three planted and managed white pine conifer forests, and this 70-110-year-old naturally regenerated deciduous forest. The forest is growing on abandoned agricultural land with nearby forest tracts subject to periodic timber extraction. The site is owned and managed by the Long Point Region Conservation Authority (LPRCA).

The site is predominantly comprised of hardwood species with a few scattered conifer species. White oak is the dominant tree species, while other tree species include sugar maple and red maple, American beech, black oak, red oak, white ash, and white pine. A sample of tree cores taken on site date the oak species to 1942, while some white pine trees appear to have begun growing from 1903. The extensive understory is made up of young deciduous tree species as well as other herbaceous plants including Canada mayflower, putty root, yellow mandarin, red trillium, horsetail and other species. The forest is rich in biodiversity with a total of 573 tree and plant species.

Half-hourly fluxes of momentum, latent heat (LE), sensible heat (H), and CO_2 (F_c) have been measured continuously using a closed-path eddy covariance system (CPEC) since January 2012. This study examines the first five years (2012 – 2016) of data recorded and measurements are ongoing.

The CO_2 storage (S_{CO2}) within the column of air below the EC sensors is calculated by vertically integrating the difference between the current and previous half-hourly measured CO_2 concentrations. This calculation is performed using CO_2 concentration measurements made above the canopy at 38 m height and mid-canopy at 16 m height. At times when mid-canopy measurements are not available the change in storage is calculated from the above-canopy measurements. CO_2 storage has been shown to generally increase at night, while decreasing in the morning [*Goulden et al.*, 1996a].

Following the extensive forest measurements provided through the flux-tower located on site, the stand is planned to be managed as part of the upcoming 5-Year Operations Plan

in order to provide precise measurements of stand information such as CO_2 flux and stem responses to forest management. Direction will be set in the conventional manner through prescriptions prepared by LPRCA Forestry staff and reviewed and approved by an R.P.F. with an appropriate scope of practice, along with tree marking by a certified Ontario Tree Marker and will be developed in collaboration with the primary research partner.

Environment Canada/Canadian Forest Service Emerald Ash Borer sites

Researchers at the Canadian Forest Service Sault Ste. Marie will continue to use the LPRCA Middleton-McConkey Tract to assess the establishment, spread, and impact of biological control wasps. Researchers anticipate that this established emerald ash borer biological control program release site will be used for a number of years to investigate the impact of the wasps, with the aim of mitigating damage caused by emerald ash borer. For example, in 2019-2020, the site was used to assess the impact of parasitoids using exclusion cages. These cages were placed on designated trees to limit the access of the wasps to emerald ash borer larvae, and then to determine if there was a difference in the number of insects that emerged from caged trees as compared to trees that were not caged. Federal researchers anticipate a desire to re-assess the health of ash trees at the site in future years. This will include regeneration of ash, size of the emerald ash borer population and for the presence and activity of the wasps.

EXISTING GUIDELINES, POLICY AND LEGISLATION

The following policies and regulations may affect activities undertaken on LPRCA properties. A brief summary, key elements of the policy, and regulation are noted; however, the original documents should be referred to for details and comprehensive understanding of their content.

Federal

- Migratory Birds Convention Act (MBCA) – This Act protects migratory birds, eggs, and nests. Additional information on which species are protected and Beneficial Management Practices describing ways to avoid contravening the MBCA is provided by the Canadian Wildlife Service (CWS).
- Species at Risk Act (SARA) – This Act protects listed Species at Risk and their habitats from harm on federal lands as well as species that are under federal jurisdiction (i.e., Aquatic Species and Migratory Birds).
- Fisheries Act – This Act prohibits work that results in serious harm to fish that are part of, or support a commercial, recreational or Aboriginal fishery. However, it may be possible to obtain an Authorization from the Department of Fisheries and Oceans Canada or Environment and Climate Change Canada to undertake work that could potentially cause serious harm to fish provided that certain conditions are met.

- Plant Protection Act – This Act addresses introduced forest pests, among other potentially damaging plants on other lands. This Act and associated policies and guidelines are intended for the prevention and control damaging plants are administered by the Canadian Food Inspection Agency.

Provincial

- Endangered Species Act (ESA) – This Act protects listed Species at Risk and their habitats from harm and is administered by the Ministry of Natural Resources and Forestry (MNRF)
- Drainage Act – This Act provides procedures for the construction, improvement and maintenance of drainage works. All policies and regulations contained within the Drainage Act are administered by the respective municipality.
- Ontario Professional Foresters Act (OPFA) – Regulates and governs the profession of professional forestry in Ontario and ensures that professional practice of RPFs are within the best interests of the people of Ontario.
- Forestry Act – This Act provides the definition of Good Forestry Practices and provides authority for the Minister of Natural Resource and Forestry to direct control of infestations on private property if in the public interest.
- Managed Forest Tax Incentive Program (MFTIP) Guidelines and Policies as administered by the MNRF. Activities carried out on lands under the MFTIP program must conform to Good Forestry Practices as defined by the Forestry Act as well as core MFTIP guidelines and reporting schedules.
- Conservation Land Tax Incentive Program (CLTIP) Guidelines and Policies as administered by the MNRF. Activities carried out on lands under the CLTIP program must not cause harm to the feature for which the lands are deemed eligible. Further, management activities for trees cannot include any remuneration, monetary or material, for timber or non-timber forest products.
- Invasive Species Act - This Act and associated policies and guidelines address the prevention and control of invasive exotic species and is administered by the MNRF.
- Conservation Authorities Act and Regulations – Provincial legislation that is administered by the Ministry of the Environment, Conservation and Parks (MECP) and provides authority to Conservation Authorities to regulate those activities affecting floodplains, watercourses, shorelines, wetlands and other areas.

Long Point Region Conservation Authority

- LPRCA Forest Management Plan 2000 to 2019 – Provides direction for forest management activities on LPRCA properties.
- LPRCA Strategic Plan 2019-2023 – Identifies the LPRCA's vision, mission, and values as well as goals and strategic priorities.

Municipal

Tree-cutting Bylaws / Forest Conservation Bylaws – Generally, these bylaws provide for the preservation of trees and prohibit/regulate/minimize the destruction or injury of trees within the municipality. Municipalities with these bylaws are listed below.

- Brant Tree Conservation Bylaw
- Elgin Woodland Conservation Bylaw
- Norfolk Forest Conservation Bylaw
- Oxford Woodlands Conservation Bylaw
- Haldimand Forest Conservation Bylaw

Official Plans

Each municipality has an Official Plan to provide direction on future planning and development, and to help create the community envisioned by residents. Among many other things, these plans include provisions for protection of natural features. The following upper and lower tier municipalities have Official Plans:

- Elgin County, Ministry of Municipal Affairs and Housing (MMAH) approved in 2013
- Municipality of Bayham, MMAH approved in 2002
- Norfolk County, MMAH approved in 2008
- Brant County, MMAH approved in 2012
- Haldimand County, MMAH approved in 2009
- Oxford County, MMAH approved in 1996

Relevant Guidelines from the Ministry of Natural Resources and Forestry

Silvicultural guidelines and strategies have been developed by forestry professionals over time and have been summarized into the Ontario Ministry of Natural Resources and Forestry publication: Forest Management Guide to Silviculture in the Great Lakes-St. Lawrence and Boreal Forests of Ontario (OMNRF, 2015). This "Silviculture Guide" forms the foundation of all the following silvicultural strategies. In the following sections, each commonly used silvicultural system and major forest working group will be summarized as it pertains to the lands owned by the Authority.

The Silviculture Guide is one of a suite of forest management guiding documents in Ontario. Other guides of note that will be used as the basis for Good Forestry Practices in the LPRCA Forest include, but are not limited to: A Silvicultural Guide to Managing Southern Ontario Forests (OMNR, 2000), the Ontario Tree Marking Guide (OMNR, 2004), the Scaling Manual (OMNR, 2007), A Land Manger's Guide to Conserving Habitat for Forest Birds in Southern Ontario (OMNR, 2011), Forest Management Planning Manual for Ontario's Crown Forests (OMNR, 2009), and the in-press Afforestation Guide for Southern Ontario (OMNRF, 2018).

LPRCA FORESTRY MANAGEMENT BACKGROUND

Historical Perspective for Management

The LPRCA has a rich history of forest management dating back to 1948 when the Big Creek Valley CA was formed as one of the earliest of the conservation authorities in Ontario.[xxxix]

Rapid clearing of forests in southern Ontario for agriculture and settlement in the 1800s and early 1900s led to severe problems of soil erosion, flooding, and the loss of fish and wildlife habitat. So rapid was the clearing that by 1860 the forests of Norfolk, Oxford, and Brant were depleted by 60%. By 1910, almost 90%. [xl]

In the early 1900s, as farmland became unproductive, run-down and even abandoned farms became a common sight on the Norfolk Sand Plain and in other parts of southern Ontario. In the mid-1940's when conservationists were struggling to come up with new approaches to deal with these issues, the idea of watersheds as a logical management unit took hold. The Conservation Authorities Act of 1946 encouraged the formation of conservation authorities to manage natural resources on a watershed basis where there was community interest and commitment. In 1948, Big Creek Valley Conservation Authority was formed and a similar body was established in the neighbouring Otter Creek watershed in 1954. The two authorities were formed to help address local concerns about flood control, soil conservation and water quality, and in 1971 they amalgamated as the LPRCA.[xli]

The Authorities prioritized land acquisition of forests to create wind breaks that would protect soil, water-holding areas to prevent flooding and drought, recreation and nature trails, wildlife refuges, and other efforts to demonstrate practical forest management. LPRCA continues to recognize the acquisition and wise management of forested lands as an important part of its mandate. [xlii]

In the 1960's and 1970's LPRCA was very active in planting tree-less portions of their lands. These plantings were typically one or two species of conifers (e.g., White Pine, White Spruce, Red Pine, Norway Spruce, European Larch), but deciduous trees were also planted on some properties (e.g., Red Maple, Carolina Poplar, Black Walnut). These planting efforts are reflected in the substantial portion (over 900 acres or 12%) of the Managed Forest Tax Incentive Program (MFTIP) participating properties being composed of plantation. [xliii]

Periodic harvesting for timber and fuelwood has been completed on LPRCA properties since its inception. The current focus of harvesting operations is on stands that are over mature, disease and insect infested, and /or have genetically poor-quality trees. [xliv]

LPRCA FMP Ending 2019

Prior to 1995, the Authority shared management of their forest lands with the Ministry of Natural Resources and Forestry (MNRF) through the Agreement Forest Program. After this, a new agreement gave full management responsibilities to LPRCA. In 1998, LPRCA commissioned a forestry consultant to prepare a 20-year Forest Management Plan (2000-2019). Following extensive public consultation, LPRCA approved the plan which provided

an overall direction for an ecosystem-based approach to manage their forest tracts. Several objectives were included in the Plan, such as provisions for wildlife habitat, protection for species at risk, sustainable forest management and opportunities for recreation and education. The Authority Forester in conjunction with forestry staff devised specific 5-Year Operating Plans. As per standard forest management planning practices and timelines, an updated Forest Management Plan was required following the sunset date of the original FMP for development in 2018 for the next planning horizon (2020-2039). This Forest Management Plan builds on the existing FMP, MFTIP Plan, supporting documents, and history of sustainable forest management within the LPRCA watershed. It further incorporates up-to-date practices, knowledge, and forest management standards.

The Forest Management Plan included an initiative to identify and protect 20% of LPRCA's forested properties as Natural Heritage Woodlands (NHW). To achieve this, LPRCA created a Technical Advisory Committee of experts to assess the natural heritage values of several properties using a quantitative scoring and ranking system. It employed data from aerial photos, GIS mapping, and field investigations. NHW are omitted from regular forest management operations and serve as core areas for the protection of rare, threatened and endangered species.

The schedule of forest management activities planned for LPRCA forests over the coming five years is based on the analysis of the sustainable timber management as detailed in the outgoing 20-Year Forest Management Plan coupled with sustained yield analysis within the watershed. The determination of the area available for treatment is an important part of the planning process. Equally important is the allocation process that identifies eligible areas for treatment or sites requiring treatment over a period. Controlling harvest and treatment levels is an important tool to ensure that the balance of growth and harvest is maintained without incurring a deficit. Harvest levels must further anticipate known and potentially unknown threats that may further diminish the resource so that the forests remain healthy despite a level of uncertainty. Revenue generated from timber and fuelwood sales is used to maintain forestry programs and supports LPRCA's operations.

LPRCA MFTIP 2018 – 2027

Of the nearly 10,700 acres that Long Point Region Conservation Authority manages within its watershed, most lands participate in the Managed Forest Tax Incentive Program (MFTIP), which sets out goals and objectives within a broadly prescribed format. The existing MFTIP Plan (2018 - 2027 planning period) addresses 88 LPRCA properties with a total of 7,498.11 acres of MFTIP eligible compartments. The purpose of the current MFTIP Plan was to consolidate the previous individual property Managed Forest Plans into a single, coherent Managed Forest Plan to meet the requirements for program renewal under the MFTIP. As lands change designation or become eligible for different programs, such as the Conservation Land Tax Incentive Program, the designation may change slightly and be recorded through Area Amendments to the MFTIP Plan. The central requirement of the MFTIP is that all activities must be in keeping with Good Forest Management Practices as defined by the Forestry Act (RSO 1990).

LPRCA Strategic Plan

Along with many other conservation authorities, the Long Point Region Conservation Authority regularly undertakes strategic planning exercises to establish goals and objectives for a wide range of program areas. As a community-based environmental agency, the LPRCA is dedicated to protecting, restoring, and managing the natural resources within the watershed. The link between the Strategic Plan and Forest Management Plan must be in concert. Generally, Strategic Plans are more high-level than Forest Management Plans.

Among the strategic directions within the LPRCA Strategic Plan 2019-2023, the LPRCA commits to organizational excellence with objectives that include:

- Designing all programs and projects using the best possible measures to ensure that program activities realize the desired results
- Developing management strategies to support conservation areas for sustainable recreation, education and tourism

The stated Vision (Working together to shape the future well-being of our watershed) and Mission (Deliver excellent services and experiences; Protect, advance and rejuvenate the watershed; and Optimize the health and well-being of the watershed through education and best practices) asserts a clear tie between the two guiding documents.

The Long Point Region Conservation Authority forest tracts are managed to enhance the health of our watershed by practicing sustainable forest management, protecting wildlife habitat and Species at Risk (SAR), and providing opportunities for recreation, hunting and education to the public. Under the guidelines of the MFTIP, a 20-year LPRCA Managed Forest Plan (2018-2037) was completed and approved by the Ministry of Natural Resources and Forestry and formally adopted in the spring of 2018. [xlv]

During the 2018 field season, there were 165 acres ecologically surveyed on three properties for the collection of data for Species at Risk (SAR) plants, provincially rare plants and vegetation types. A total of 460 acres were marked and tendered out to local sawmills including 165 acres of salvageable ash impacted by the Emerald Ash Borer. [xlvi]

The LPRCA continued to participate in multiple research projects with partners throughout the watershed. In 2018, data was compiled to assist in the creation of a provincial database for hemlock with the goal of monitoring Hemlock Wooley Adelgid, a destructive pest, in partnership with the provincial Wooley Adelgid Working Committee. [xlvii]

Environment Canada recommends a minimum 30% forest cover and 10% interior forest habitat to sustain the natural diversity of both plants and animals in a watershed. Both sides of streams should have a minimum 30-meter-wide naturally vegetated riparian area – with 75% of the stream length naturally vegetated – to provide and protect aquatic habitat. In the absence of non-forested vegetation mapping along LPR watershed riparian zones, CO suggests that 50% of the vegetated riparian zone be forest cover. [xlviii]

To help achieve these targets and improve watershed health, LPRCA and its partners offer a variety of programs to increase forest cover and expand stream buffers. [xlix]

Overall, 20% of the watershed is forested, 3.4% is forest interior, and 36% forested riparian area. [l]

Trees and buffers provide many benefits including improved air quality, temperature and climate regulation, carbon sequestration, water filtration and retention, and wildlife habitat while offering recreational and economic opportunities. [li]

Forests grow slowly, but environmental benefits begin as soon as trees are planted. Changes in forest cover will be noticed in 5+ years. [lii]

Compartment Descriptions

For compartment descriptions, this Forest Management Plan follows those descriptions provided within the 2018-2027 LPRCA Managed Forest Tax Incentive Program (MFTIP) Plan. This details the mapping and description of 16 forest compartment types for softwoods and hardwoods, as well as four open compartment types. Additional details about each individual compartment are provided in Appendix B of the MFTIP Plan. Stand Analysis tables for each compartment have also been prepared and are on file at LPRCA. The Stand Analysis tables summarize data collected during prism cruising inventories completed by LPRCA forestry staff. They determine basal area, species composition, and compartment definition as per the requirements of the 10-year MFTIP renewal. Ongoing updates to these documents complement management efforts, forest growth and change over time. Approximately 87% of the MFTIP participating lands are hardwood forest (6495.73 ac), 12% are plantation (893.20 ac), and the remaining lands are open features (1%, 109.18 ac). Hardwood forests are further divided into upland hardwood, lowland hardwood, upland mixed hardwood and lowland mixed hardwood. The average age of these forest compartments is 66 to 81 years old with an average "diameter at breast height" (dbh) range of 17 to 18 in. In addition, there are 125.57 acres of early successional hardwood forest compartments with an average age of 15 years and an average dbh of 5 in. On upland hardwood sites, hard maple, soft maple, red oak and white pine are the primary species, whereas on lowland hardwood sites soft maple dominates with a smaller component of green ash and other species. Approximately half of the plantations are comprised of Mixed Plantation (475.32 ac). The remaining plantation forest compartments are dominated by an abundance of white pine (257.55 ac). White pine also makes up a large component (~40%) of the mixed plantations and early stage mixed plantations. Red pine, black walnut, white spruce, and red oak are other common species recorded in the plantations. Norway spruce, European larch, scot's pine and white cedar-dominated plantations are only represented on single properties. On average, the plantations tend to be slightly younger and have a marginally smaller dbh than the hardwood forests. Table 1 describes the compartments identified within the MFTIP plan along with total acreage and summary characteristics.

Table 1: Summary of forest resources to be managed

Compartment Type	Total Area (ac)	Estimated Avg. Height (m)	Estimated Avg. Age (yrs)	Avg DBH (in)	Primary Species *
Upland Hardwood	1,485.23	27	81	18	Mh3 Ms2 Or1
Lowland Hardwood	1,312.97	27	70	17	Ms8 Ag1
Upland Mixed Hardwood	2,010.16	28	72	17	Ms2 Mh1 Or1 Pw1
Lowland Mixed Hardwood	1,561.8	26	66	17	Ms6 Ag1
Early Successional Hardwood	125.57	6	15	5	Po4 Ms2 Ag1
Total Hardwood	**6,495.73**				
White Pine Plantation	257.55	26	54	15	Pw9
Mixed Plantation	393.48	21	48	13	Pw4 Pr2
Early Mixed Plantation	81.84	2	10	1	Pw3 Or3
Norway Spruce Plantation	3.96	26	60	20	Sn6
Red Pine Plantation	39.49	17	38	11	Pr10
White Spruce Plantation	36.92	16	44	11	Sw9
Black Walnut Plantation	64.9	17	31	12	Wb8 Pw1
European Larch Plantation	2.17	5	20	6	Le10
Scots Pine Plantation	5.89	28	65	40	Ps8
White Cedar Plantation	1	6	30	4	Ce10
Memorial Forest	6	6	20	4	Mh4 Or4
Total Plantation	**893.2**				

*(species comp ≥ 10% of trees, to nearest 10%)

FOREST MANAGEMENT CONSIDERATIONS

The practice of forest management is a continuous process of balancing ecological, economic, and social considerations to meet stated objectives over long term planning horizons. Operation considerations of growth, sustained yield, forest regeneration, and replacement must be balanced with a multitude of dynamic management factors. Forest health, threats disease and pests, forest succession and climate change all demand consideration while still meeting conservation targets. The following section outlines the approaches taken to address these considerations.

Conservation

Forest conservation is the practice of planning and maintaining forested areas for the benefit and sustainability of future generations.

Sustainable forest management intrinsically recognizes that forests are a renewable resource that when managed responsibly will provide sustained social, ecological, and economic wellbeing over time.

This Forest Management Plan coupled with the Long Point Region Conservation Authority's mandate clearly articulates the forest management conservation goals and objectives to benefit the Long Point watershed.

Forest Health

Forests are constantly changing. Many biotic and abiotic factors influence the growth and survival of trees and forests. Abiotic factors are those that impact forests through natural events, including fire, wind events, and drought. Low levels of disturbance are natural and healthy in a forest, and the general health condition of the LPRCA forest is good. Biotic factors, such as insects and disease, also occur naturally but are becoming more prevalent and diverse due to increased human presence in forested areas. The risk and occurrence frequency of many non-native introduced forest pests is on the rise. Higher impact events are generally infrequent. Infestations of natural pests are usually cyclical and eventually balanced out by natural predator processes. LPRCA forests are managed for forest health with a long-term view of sustainable resource management.

The maintenance of a healthy forest involves protection from insects, disease, fire, and humans when required. The ability to plan for and control these damaging agents varies considerably. However, preparedness planning for sudden occurrences (e.g. fire) requires regular monitoring to identify developing problems and assume management activities that promote forest health and reduce the risk of large-scale forest protection problems. Control actions can be based on i) the values being threatened, ii) severity of the problems, and iii) resources available for effective control. [liii]

LPRCA staff undertake ongoing activities to manage and stay informed about forest health concerns. That said, there is little that can be done to slow the spread or reduce mortality from non-native pests and diseases that have no natural control mechanisms. This is a particularly troubling issue regarding forest health given the geographic location of the Long Point watershed and the emerging stresses connected to climate change. The

Recommendations section following Biotic Threats outlines several strategies to help maintain a healthy forest.

Abiotic Threats

Fire Protection

Forest fire has had a historically moderate impact on the forests of Long Point watershed. Prior to European settlement fire was a normal, cyclical part of the natural landscape and forests were shaped by its impact. In the natural pine and oak forests, continual regeneration occurred through infrequent, low-intensity ground fires that exposed mineral soils and killed competitive species such as red maple, ironwood, and poplar.

Modern firefighting techniques and landscape fragmentation have virtually eliminated fire's role in the Long Point watershed. The use of prescribed fire in regenerating pine and oak was very successful in the past. However, high costs, safety concerns, and protection of other forest and property values have limited the use of this tool on LPRCA lands.[liv]

Wind Events and Drought

Increasingly, forest managers globally are experiencing conditions related to climate change that, while not uncommon in forest management, are occurring with greater frequency and severity. Two of these conditions include wind events and drought conditions. It is expected that with changing global climate regimes, such events will increase in severity and frequency, and therefore with less predictability. Under such conditions, forest managers must factor what is known about past events and assume changes in patterns only intensify in the future.

Within the framework of these anticipated extremes, it is important to recall that diverse, healthy, and well-managed forests provide increased resiliency and are best suited to weather the storms ahead. For more information on how forest managers can best prepare and mitigate the effects of wind events and drought on woodlots, refer to the direction provided in the Ontario Ministry of Natural Resources and Forestry publication Managing Your Woodlot in a Changing Climate (2014).

Biotic Threats

Invasive plants are a growing problem in south and central Ontario forests, and early detection is key to better managing the issue. The presence of some plants can also pose hazards for Authority Forestry staff and operators working on active harvest blocks.[lv]

Native insects have always had an impact on forest conditions and influenced forest development. The most visible native insects are defoliators, such as the forest tent caterpillar and the fall webworm. Infestations of these pests are cyclical and in the absence of other factors they do not usually cause extensive mortality. Nevertheless, if the forest is undergoing stress from prolonged drought, local mortality may be high. Extensive infestations of these pests may alter the stand structure considerably.

LPRCA forest trees are relatively well adapted to the native insects that attack them. Limiting agents, such as predatory birds, insects or diseases, invariably lead to the end of periodic infestations. However, these natural limits on population are not present when the insects are

invasives from other continents. For this reason, introduced pests have much greater potential to affect forests. Their potential to cause widespread mortality in a number of species means they are a major concern to forest managers. The development of biological controls, such as importing predatory insects, may hold the best hope for limiting the damage these invaders potentially cause. The development of resilient tree strains and ensuring diverse stand conditions may also minimize forest damage. [lvi]

KNOWN THREATS:

Emerald Ash Borer

Emerald ash borer (EAB) is an introduced, invasive beetle in the buprestid family. It is native to China and eastern Asia and was discovered in North America in 2002. EAB feeds on all species of Ash in Ontario and there is no known natural control on the population. The larval form of EAB bore under the bark of living trees to the vascular layer called the cambium. Here, the larvae feed in a winding "serpentine" pattern of feeding tunnels that cut off the flow of water and nutrients to the stem. Eventually, these tunnels will cut off the flow to the tree by girdling the stem.

Emerald ash borer is one of the most serious forest pests in southwestern Ontario. Within the Long Point watershed, EAB has been a major threat for at least the past decade and forest management operations have required adaptive approaches to best manage the resource for the "post-EAB" forest. Trees infested by EAB are still valuable in the wood fibre and sawmill markets because the insect only infests the outermost layer of wood. Timing of salvage operations should be swift as standing trees will decline in quality if not utilized. LPRCA has taken an active and collaborative role with research partners in the management of EAB through research plots in the Middleton tract. These essential biological control studies will assist with future management options for forest managers across Ontario.

Gypsy Moth

Gypsy moth is a non-native, accidental introduction from Europe that dates back to 1869. The moth was discovered in Ontario in 1969 and has become well-established as far north as Sault Ste Marie. Gypsy moth populations are cyclical with outbreaks occurring every couple of years, which are commonly addressed through aerial spraying programs.

Gypsy moth larvae or caterpillars will feed on tree leaves. If the larvae population is high, they can defoliate whole trees and forests in a short amount of time. Gypsy moths prefer oak trees but will feed on a variety of hardwood tree species. Under normal circumstances, defoliation caused by gypsy moth is not fatal to a tree. However, trees can decline to the point of death in some cases when defoliation is coupled with dry, hot summers or impacted by other stressors.

There are no known preventive measures for gypsy moth, however spraying programs have been successfully implemented over the past 40 years. The naturally occurring bacterium Bacillus thuringiensis 'kurstaki' (Btk) is a soil-borne bacterium that is applied to the leaves of affected trees while caterpillars are in their early instar stage (immature). Once ingested, the bacterium disrupts the caterpillars' digestive system with the cessation of eating within

24-48 hours. Within days, caterpillars that have ingested Btk will succumb to its effects. Btk has very low residual qualities in the natural environment. Sunlight and fungi deteriorate the bio-pesticide within one-to-four days. It is critical that monitoring programs for gypsy moth identify outbreaks of the caterpillar so that Btk treatments can be effective prior to widespread canopy loss.

Red Pine (Pocket) Decline

Red pine pocket decline describes a complex of health issues that have caused unprecedented rates of decline and mortality in some of Ontario's oldest (>60 yrs) and most successful red pine (Pinus resinosa) plantations. This decline occurs just at the stage where they reach the highest financial return and begin to transition to a healthy, mixed forest.

The decline acts through several factors (hence the description as *a complex*) but is primarily found in soils with a high (alkaline) PH level of >7 in the A, B, and to a lesser extent C soil horizon. The alkaline conditions lead to an increasing inability of the trees to uptake essential nutrients such as iron. Additionally, root diseases such as Armillaria and Heterobasidion root rot, bark beetles and scale insects, as well as abiotic factors such as drought and site characteristics all begin to exacerbate the problem leading to pockets of mortality. The pattern of mortality generally occurs in clearly visible areas or "pockets" with clearly identifiable dead and dying red pine as surrounded by severely thinning and/or yellowing foliage.

Preventive measures for pocket decline include careful species selection for afforestation projects based on soil alkalinity and bulk density. Treatment for existing incidences may include preventive thinning treatments as well as prescription adaptation in proximity to early signs of pocket decline.

Beech Bark Disease

Beech bark disease (BBD) is a disease complex caused by feeding of a bark scale insect and subsequent invasion by Neonectria spp. fungi. The invasion of the cambial layer by the fungi produces annual cankers which eventually coalesce to a point of girdling the tree, thereby cutting off the flow of water and nutrients to the crown.

Beech bark disease can be especially detrimental to forests where beech regeneration, often through prolific suckering from the mature root system and stumps, produces beech "thickets". These thickets can form to a point where regeneration keeps resprouting and dying back from the disease, producing a thick blanket of regeneration unable to reach maturity. Such stands have been dubbed "zombie forests" in the wake of BBD infestation in New England.

Preventive measures to protect against the unwanted effects of BBD largely apply to those stands where the overstory and regeneration communities comprise >20% beech. In such areas, when undertaking hardwood management, beech regeneration through polewood sizes should be treated through a basal bark or "hack and squirt" treatment that targets

the individual stem as well as the root system. Such preventive treatments will assist to ensure a biodiverse and successful regenerating community following a silvicultural intervention.

Garlic Mustard

Like Dog-Strangling Vine, Garlic Mustard has the ability to spread rapidly in a forest understory, shading out native plants and preventing forests from regenerating successfully. Garlic mustard can invade relatively undisturbed forests. Once established it can displace native wildflowers like trilliums and trout lily. It hinders other plants by interfering with the growth of fungi that bring nutrients to the roots of the plants. Garlic mustard has been found to possess allelopathic properties which produce soil-borne chemicals that inhibit the regeneration of other plant species, such as desired trees and understory vegetation.

Garlic mustard has two distinct life stages over its first two years. In the first year, it grows only a cluster of leaves shaped like a rosette, while a strong root system develops. Plants that survive the winter produce a full stem up to one metre tall with flowers and hundreds of seeds in their second year. Dense stands produce more than 60,000 seeds per square metre. Stands of garlic mustard can double in size every four years. Preventive measures to prevent the spread of garlic mustard are best handled through the clean equipment protocols for invasive plant seeds and vegetation outlined below. Additionally, garlic mustard is often spread through more passive recreational activities, especially along trails. Regular monitoring of the LPRCA trail network and early detection with rapid response will be the best preventive measure of future spread that can become costly and a drain on staff resources.

EMERGING THREATS:

Asian Long-Horned Beetle

Asian long-horned beetle (ALHB) is an invasive forest pest that attacks nearly all broadleaf trees, with maples being the preferred host. It has no natural enemies in North America. It was introduced to North America in the 1990s through untreated wooden shipping pallets. Adults lay their eggs in hardwood trees, and larvae then tunnel through the living tissue of the tree stopping the flow of water and nutrients, killing it.

The beetle is native to China and Korea where it is considered a major pest causing mortality of elm, maple, poplar, and willow trees. Since arriving in the US, populations have been confirmed in New York, Illinois, New Jersey, and Ohio. In Canada, ALHB was confirmed in an industrial park in the Toronto area in September 2003. By November 2003 susceptible host trees were being removed from the area to eliminate possible ALHB habitat. ALHB was not found anywhere in Ontario between 2007 and 2012, indicating that early detection and rapid response was effective. In December 2013, ALHB was detected again near Pearson International Airport. At this time, other than preventing reintroduction to Ontario and continuing monitoring, there are no known preventive measures for ALHB.

Dog-Strangling Vine

The name "dog-strangling vine" refers to two invasive plants native to Eurasia: black swallowwort, and pale swallowwort. These lookalike members of the milkweed family were introduced to the northeastern United States in the mid-1800s for use in gardens. In recent years these perennial vines have spread rapidly throughout central and southern Ontario.

Dog-strangling vine (DSV) forms dense stands that overwhelm and crowd out native plants and young trees, preventing forest regeneration. Colonies will generally form mats of interwoven vines that are difficult to walk through and interfere with forest management and recreational activities.

Currently, the most established populations of DSV are located in the Toronto to Ottawa corridor, with other well-established populations spearing eastward with prevailing wind patterns. However, DSV is very easily transported on equipment and soil, making it a future threat to LPRCA forests and the watershed generally. Recently, research and trials have been conducted to assist control efforts. A Hypena moth species has been trialed in open field conditions in the hope that a biocontrol effort may be successful in limiting the population's spread. Preventive measures to curtail the spread of DSV are best handled through the clean equipment protocols for invasive plant seeds and vegetation outlined below. Additionally, DSV is often spread through more passive recreational activities, especially along trails. Regular monitoring of the LPRCA trail network and early detection with rapid response will be the best preventive measure to contain the future spread which will become costly and a drain on staff resources.

Oak Wilt

Oak wilt is an aggressive disease that affects many species of oak (Quercus spp.). It is currently one of the most serious tree diseases in the Eastern United States, killing thousands of oaks each year in forests, woodlots, and home landscapes. Recent evidence suggests that oak wilt is an exotic disease that arrived in North America in the early 1900s. However, the fungus has never been reported by any country other than the United States, so its origin remains unknown.

Currently, oak wilt has been identified in several locations within a short range of the border with Ontario and is expected to rapidly spread north through warming temperatures. The forests of LPRCA are especially at risk due to their geographic location, prevalence of oak as a leading species, and comparable forest structure to those US stands already affected. At this time, other than preventing introduction to Ontario and continued monitoring, there are no known preventive measures.

Helmock Wooly Adelgid

Hemlock wooly adelgid (HWA) is an introduced invasive forest pest that has been decimating hemlock stands in the New England area for several decades and is anticipated to rapidly move north with changing climates. The egg sacs of HWA appear as cotton balls on snow-like clumps can be observed at the base of needles, often high in the canopy. Once

hatched, the HWA feeds on nutrient and water storage cells at the base of the needles, thereby defoliating and eventually killing the tree.

As part of 2019 detection survey for HWA, the Canadian Food Inspection Agency (CFIA) confirmed the presence of hemlock woolly adelgid in a forested area along the Niagara River near Niagara Falls, Ontario where it was previously confirmed between 2013 and 2015. Despite this limited range, it is expected to exist elsewhere in Ontario, though undetected. Preliminary research from the USDA Forest Service (unpublished, personal communication, Mary Ann Favjan 2019) suggests that some degree of management can be achieved through foliar spray and thinning treatments. Foliar spray provides temporary relief against HWA but becomes difficult in a fractured landscape and with large land holdings can become prohibitively expensive. Thinning treatments for stands with >30% hemlock focused on crop tree release of midstorey and overstory hemlock stems showed appropriate resistance to HWA over a ten-year period. A high Live Crown Ratio was the best predictor or resistance to HWA-induced mortality.

Forest Health Recommendations

1. Maintain and enhance the existing forest. The most effective strategy to help guard against pests and disease is to manage for a healthy, diverse forest and retain seed-producing, potentially resistant trees to carry on the gene pool of targeted tree species.
2. Stay current and informed on current and upcoming forest health threats. Staff vigilance, training and the ability to react quickly to native and non-native invaders will be vital to effective forest management.
3. Monitor and maintain an inventory of invasive species occurrences on the Long Point land base.
4. Consistently monitor whenever possible and implement an early detection and rapid response framework to invasives when discovered in LPRCA forest tracts. The cost of monitoring and early management is far surpassed by the cost of inaction, lost diversity and financial return when invasive species populations inevitably grow.
5. Work with operators to reduce the risk of invasive plant seed transfer to LPRCA tracts. A voluntary and educational approach should be taken to encourage equipment cleaning before moving from infested areas. Continue to promote the clean equipment protocol used by many community forests.
6. Manage forests for health, diversity, and resilience against climate change and associated conditions such as extreme wind and drought conditions. Research has shown that dedicated management of forests using the best available forest management approaches produces stands that are best equipped to deal with the extremes and uncertainty associated with climate change.

Risk Management

Managing forest resources inevitably involves making decisions within a framework that includes varying degrees of uncertainty. Depending on the management decision, threat, or problem, uncertainty may have a greater or lesser impact on the outcome or solution. Assessing and managing risk, therefore, is an imperative aspect of sustainable forest

management that must be incorporated and accounted for in planning. Furthermore, it must be recognized that forests are dynamic systems where a "do nothing" approach is indeed itself a management decision and action that has consequences. To help mitigate risk, plans should be revised as new information becomes available, or the possibility of future adaptation of management direction should be accounted for in preparing the plans. This FMP explicitly takes both approaches. First, by explicitly stating and accounting for risks, such as those mentioned in the preceding section on forest threats. Secondly, this FMP allows for a degree of revision as new information is provided during the planning period. This would include changes in the presence and/or abundance of natural heritage features for which a property was designated as Natural Heritage Woodlands thereby requiring re-designation.

Risk Assessment generally involves an evaluation of two primary attributes: the likelihood of an event occurring compared against the severity of the outcome if it does occur. This assessment of probability versus severity of occurrence is sometimes plotted on a grid to help assessors better visualize the various risks involved. A low probability and low-risk outcome do not warrant much time and resources, while a low probability and high-risk outcome (or the inverse) warrants further investigation or potential preventive measures to be implemented. Finally, a high probability and high-risk outcome may warrant a deviation or revision to planned management actions. For further information and details on the organizational approach to risk management within forest management planning, review the standard that is commonly used in the development of risk assessment and management policies: International Organization for Standardization (ISO) 31000:2009.

Timber Management

Within the history of the Long Point watershed many species have been coveted and harvested based solely on meeting market demands. Forest practices over past centuries often employed the perspective of supplying goods from a seemingly inexhaustible resource without due planning for future conditions or needs. These short-term approaches led to many areas being stripped of biological diversity, overall forest health and function, and long-term ecological goods and services. The Long Point watershed is not unique in this history of natural resource use as it can be seen across the province of Ontario and beyond. As a Conservation Authority and responsible forest landholder with a view to long-term sustainable practices, however, the Long Point Region Conservation Authority has committed to undertaking activities that benefit the watershed over the long term, while continuing to sustainably manage the forest resource for future generations. This Forest Management Plan provides the basis for direction and intent of timber management as well as broader forest management goals and objectives for the coming planning period.

In 1995 the Canadian Council for Forest Ministers (CCFM) established "criteria and indicators for sustainable forest management in Canada" (CCFM, 1995). Many Canadian jurisdictions are currently incorporating the CCFM criteria into their forest policies and laws in their own ways.

MANAGEMENT GOALS AND OBJECTIVES

It is widely accepted that an integrated ecosystem-based approach to forest management is required to maintain the ecological integrity and productive capacity of the forest while providing multiple benefits to society. This paradigm, termed ecosystem management, is founded on the concept of sustainability. The overall goal for the future management of LPRCA forest lands reflects this approach to management. Forests must be managed for a variety of goals and objectives, to provide the ecological, economic, and social benefits required. Through clear objectives and application of the most pertinent sustainable forest management principles, Long Point Region Conservation Authority can continue to sustainably manage the renewable resource of its forest land base. The following broadly outlines the objectives for this Forest Management Plan, building on previous management efforts to date and sets forth strategies to meet those objectives.

Objective 1a: To maintain healthy forest ecosystems.

Objective 1b: To conserve the structure, function and natural diversity of the forest environment.

Manage forests to:

- Maintain and enhance a diversity of forest types on a variety of site conditions.
- Provide a diversity of flora and fauna characteristics of the region.
- Conserve populations of provincially vulnerable, threatened or endangered species of flora and fauna and to protect and enhance significant natural features.
- Provide a mosaic of age classes and ensure forest stand development through all seral stages with special considerations for modifying conventional silvicultural systems for managing forests which have the potential to exhibit characteristics associated with late seral ("old growth") forests.
- Conserve water quantity and quality.

Objective 2: To conserve downstream water quantity and quality.

- Promote conservation of water quantity and quality consistent with the LPRCA Watershed Strategies.
- Maintain forest cover through science-based sustainable forest management practices and by planting trees where appropriate and where lands are available.
- Maintain access roads and trails in good condition. Install culverts where necessary to maintain water flow where access roads cross streams and seeps.

Objective 3: To conserve Natural Heritage Woodlands

- Develop a Natural Heritage strategy for protecting rare and unique forest communities.
- Maintain 20% of lands as Natural Heritage Woodlands.

- Survey Natural Heritage Woodlands regularly to ensure that the features for which they have been designated continue on the site within the dynamic framework of a maturing forest system. Additionally, regular surveying will provide an opportunity to identify emerging issues, such as Oak Wilt that should be addressed through direct management efforts.

Objective 4: To facilitate input and expert guidance into the management of LPRCA forests.

- Obtain scientific and technical input to assist with the development of forest policies and management strategies
- Partner with local interest groups for demonstration projects and for implementation management activities.
- Identify opportunities to co-manage forest lands with other public forest owners where possible and appropriate, especially where the other public forest is adjacent to LPRCA forest lands

Objective 5: To demonstrate leadership and excellence in forest management.

- Review standards and guidelines for forestry practice and develop performance standards, in consultation with partners.
- Manage all forest areas as examples of sustainable forest management.
- Promote properties or areas within properties as visible demonstration areas of the application of various silvicultural systems and sustainable management practices, wherever possible,
- Continue to work with researchers and government partners to further the science of forest management within southern Ontario forest systems.

Objective 6: To manage forest resources for multiple benefits.

- Promote responsible recreational, educational, and scientific uses of forest properties
- Provide a sustained timber yield to meet the demands for renewable wood products.
- Encourage the use of forest properties for outdoor education
- Manage forests to provide a variety of ecological, economic, and social benefits
- Identify those properties or parts of properties which can be managed for timber production, in conjunction with meeting the Authority's forest management goals and objectives.
- Encourage the use of forest properties for scientific research.

Objective 7: To protect the integrity and health of the forest.

- Implement management practices to promote forest health, including supporting monitoring of invasive species, insects, and disease, in consultation with municipal, provincial, and federal agencies as appropriate,
- Develop a program for control of invasive species in LPRCA forests.
- Work with watershed residents to remove rubbish from forest properties and to control illegal dumping of rubbish and theft of trees on Authority properties.
- Install gates at all access points and mark property boundaries.

Objective 8: To acquire additional forest lands.

- Target additional forest areas for acquisition as opportunities arise with priority given to those lands which conform to the LPRCA land acquisition guidelines (LPRCA 1995) and which complement the overall goals and forest management objectives.

Management Goals and Objectives Recommendations

1. The Long Point Region Conservation Authority Board of Directors adopt the Management Goals and Objectives in this Forest Management Plan to continue the sustainable management of Authority forest holdings.
2. In consultation with partners, develop standards and guidelines for forestry practice which will protect soil, water quality and quantity, and riparian habitats during and after forest management operations.
3. Identify opportunities for public input to forest management plans, 5-year schedules of management activities and annual work programs.
4. Maintain the highest standards of silvicultural practice on Long Point forest lands.

OPERATIONS

SUSTAINABLE TIMBER YIELD AND AVAILABLE HARVEST AREA

5-Year Available Harvest Area

As an integral component of the ongoing management of Long Point Region Conservation Authority forest lands, this Forest Management Plan (FMP) contains a 5 Year Operations Plan (5YOP). A 5YOP outlines the properties that are to be managed under the silvicultural systems outlined in this FMP for the coming 5-year period of 2020-2025. The properties listed have been assigned to a given operating period that generally stretches over the winter months. Occasionally, a listed property's harvest may be shifted slightly to another year in order to accommodate ecological, social, or economic factors. Consistent monitoring of stands for invasive species and forest pests, as well as monitoring of local timber markets is key to optimizing the success of 5YOP implementation. Prior to the end of the 2020-2025 5YOP, a subsequent 5YOP for 2025-2030 will be drafted. It is expected that each 5YOP will maintain similar levels of management to historic levels as well as what is listed in the 2020-2025 5YOP.

The 5YOP plan includes the entire property in the listing but this should not imply that the entire property will be managed similarly, or even entirely within a given year. Each property contains different forest compartments which must be managed through a specific prescription therefore each compartment within a property must be considered differently.

As such, the 5YOP presents a list of the Available Harvest Area (AHA), but an overestimate of the listing of total lands to be managed. Stemming from the 5YOP, the individual compartments will be managed following a prescription prepared and sealed by a Registered Professional Forester in good standing with the Ontario Professional Foresters Association or an Associate R.P.F. with an appropriate scope of practice (see Appendix B: Practice of Professional Forestry in Ontario). On many properties, prior to the preparation of such prescriptions for a given harvest area, LPRCA conducts ecological surveys to identify relevant natural heritage features such as Areas of Concern, Species at Risk, etc. This information then aids in informing the extent of management operations. Such reductions in AHA are represented in the following table as an estimated value based on historic values.

All forest operations are guided by the Forest Certification Policies and Procedures Manual, EOMF Information Report No. 51 v. 3, December 2014. This manual was developed by forest managers to ensure that forest management activities on the certified forests comply with the FSC® Standards. The manual includes Policies to outline roles and responsibilities and standard operating procedures for all aspects of forest management.

Table 2: 5YOP Property List, by Year

Year	Property Name
2020 - 2021	Harris/Harris/Harris/Floyd Tract 5th Concession - Block # 1
	Swick/King Tract
	Tarcza/Hird/Roberts Tract - West Half
	Devos Tract
2021 - 2022	Harris/Harris/Harris/Floyd Tract 5th Concession - Block # 2
	Sackrider Tract
	Parrott Tract
	Tarcza/Hird/Roberts Tract - East Half
	Nemeth Tract (conifer)
2022 - 2023	Harris/Harris/Harris/Floyd Tract 5th Concession - Block # 3
	Abbott/Townsend Tract
	Lippsitt/Penner/Vandevyre Tract
	Nemeth Tract (hardwoods)
2023 - 2024	Harris/Harris/Harris/Floyd Tract 5th Concession - Block # 4
	McKonkey/Middleton Tract
	Culver/Wintermute Tract
	Livsey Tract
2024 - 2025	Wilson Tract
	Kyte/Laforge Tract
	Proper/Sereles/Greathead Tract
	Hughes Tract

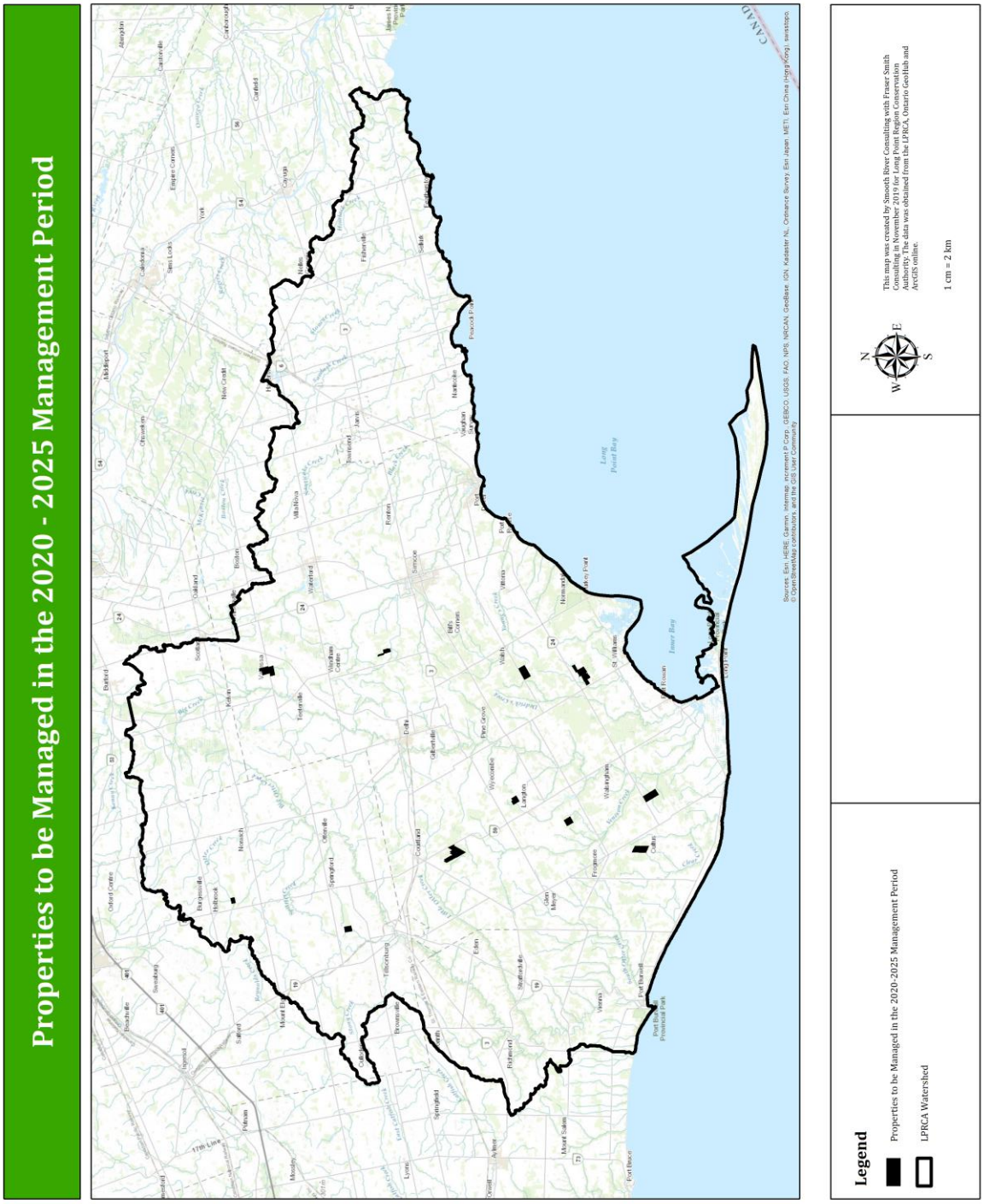


Figure 2: Properties to be managed in the 2020-2025 Management Period

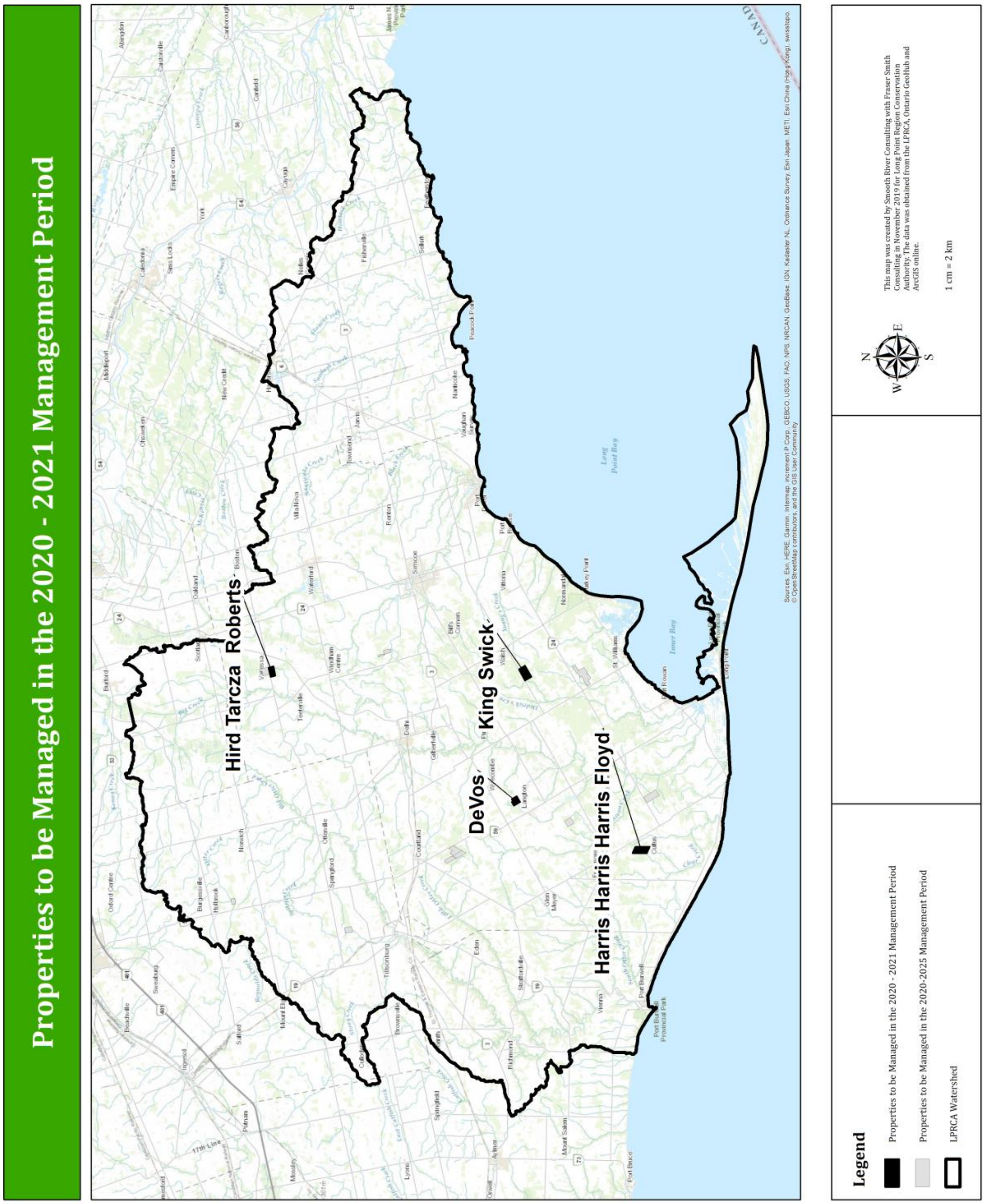


Figure 3: Properties to be managed in the 2020-2021 Management Period

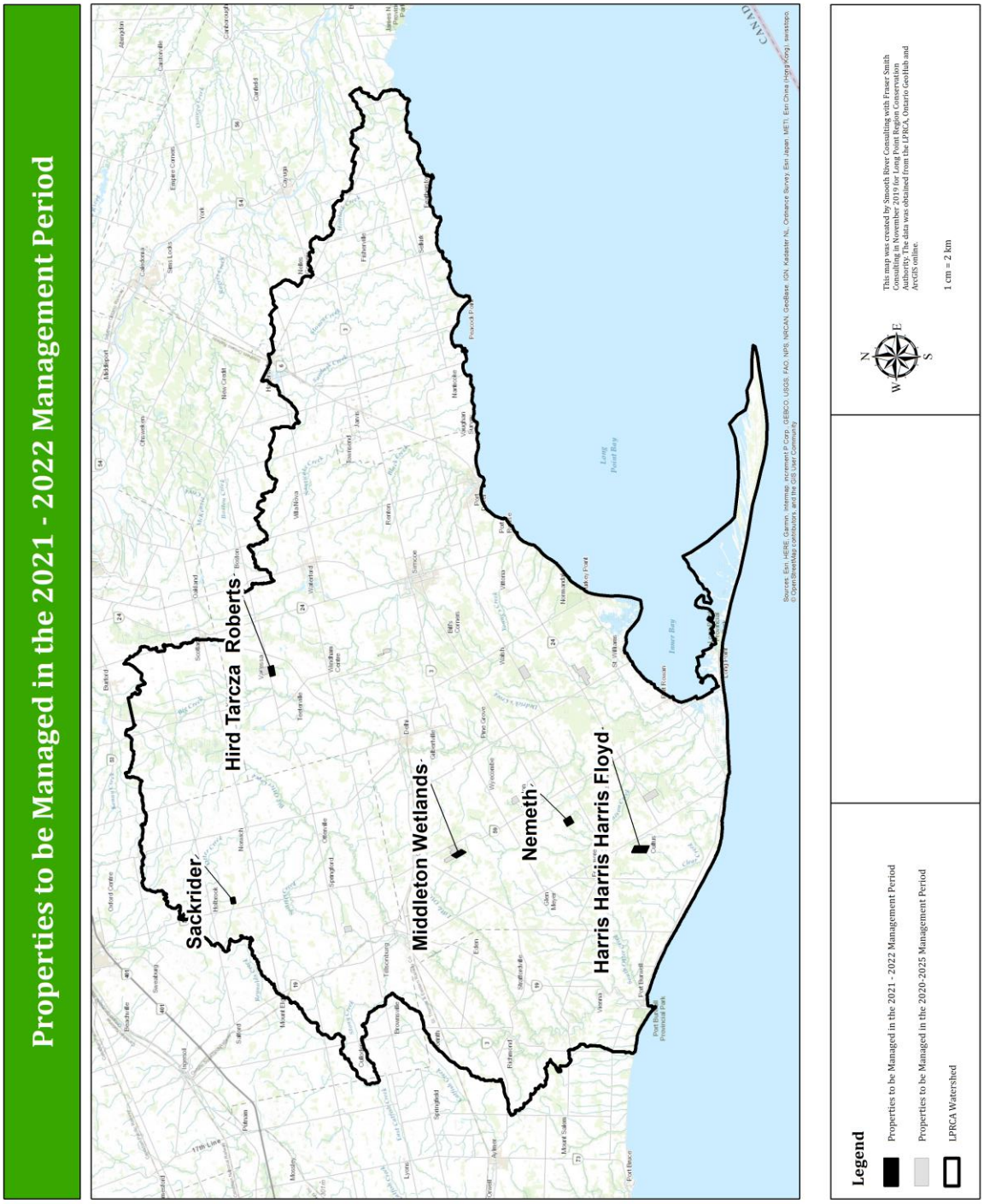


Figure 4: Properties to be managed in the 2021-2022 Management Period

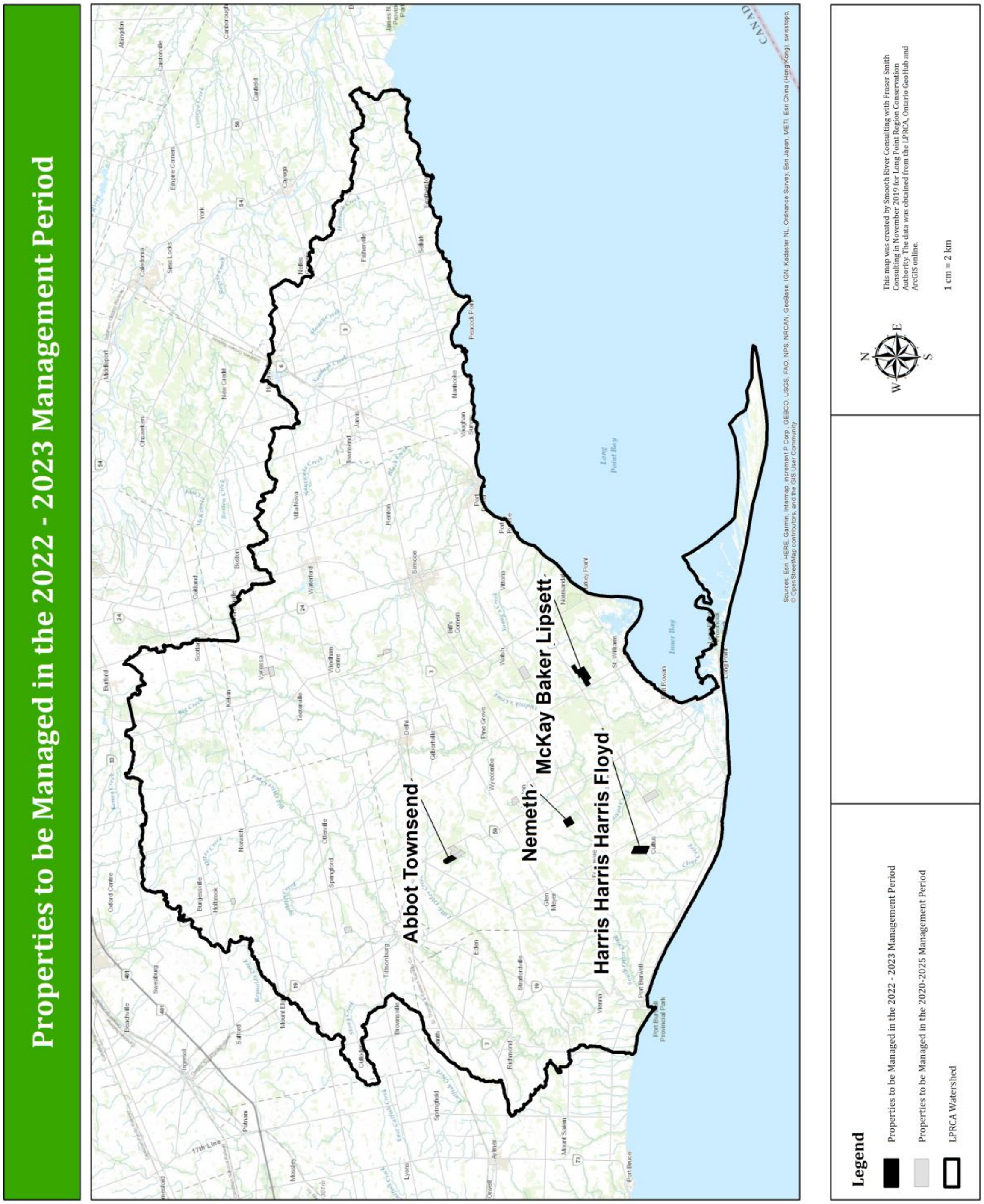


Figure 5: Properties to be managed in the 2022-2023 Management Period

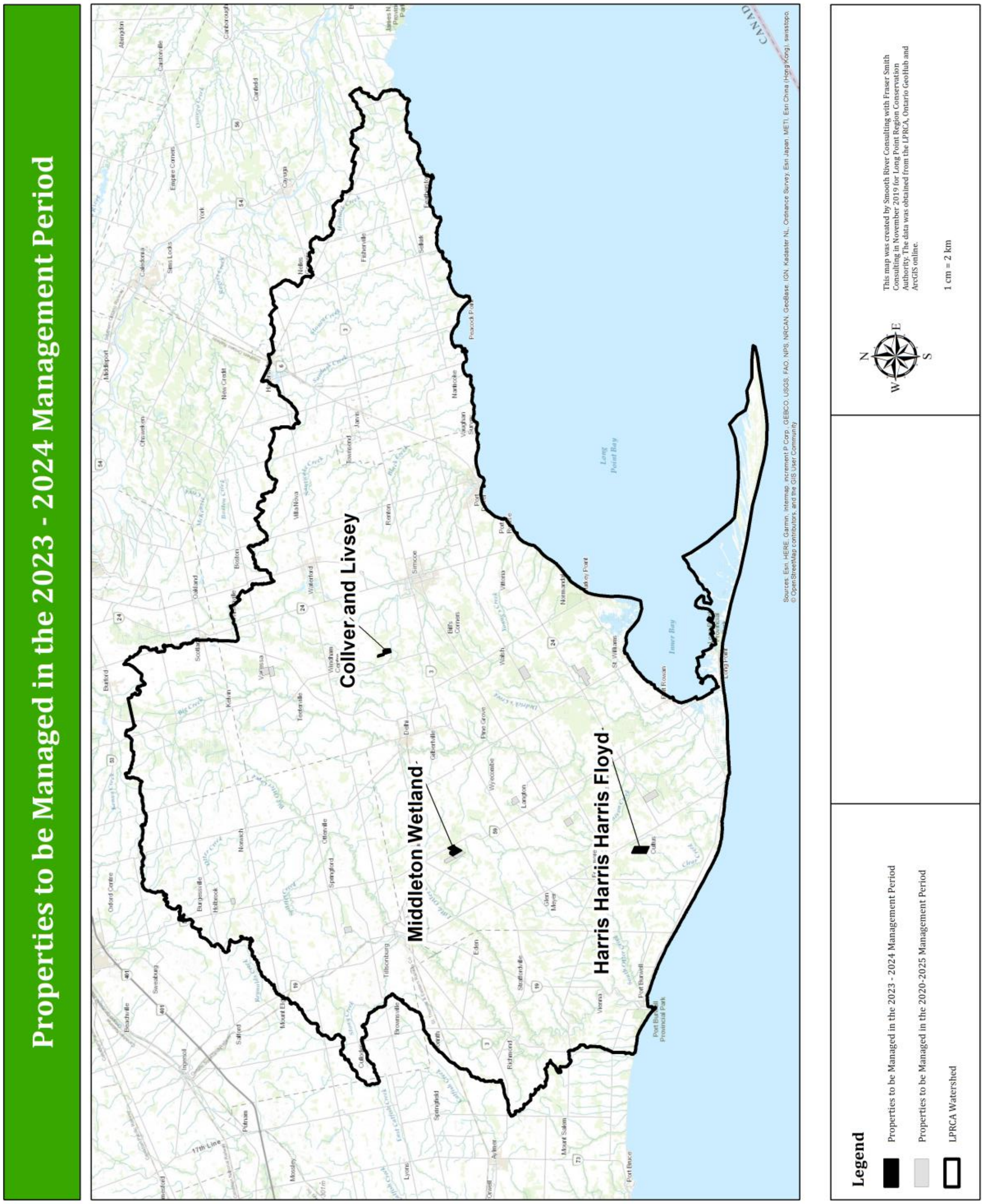


Figure 6: Properties to be managed in the 2023-2024 Management

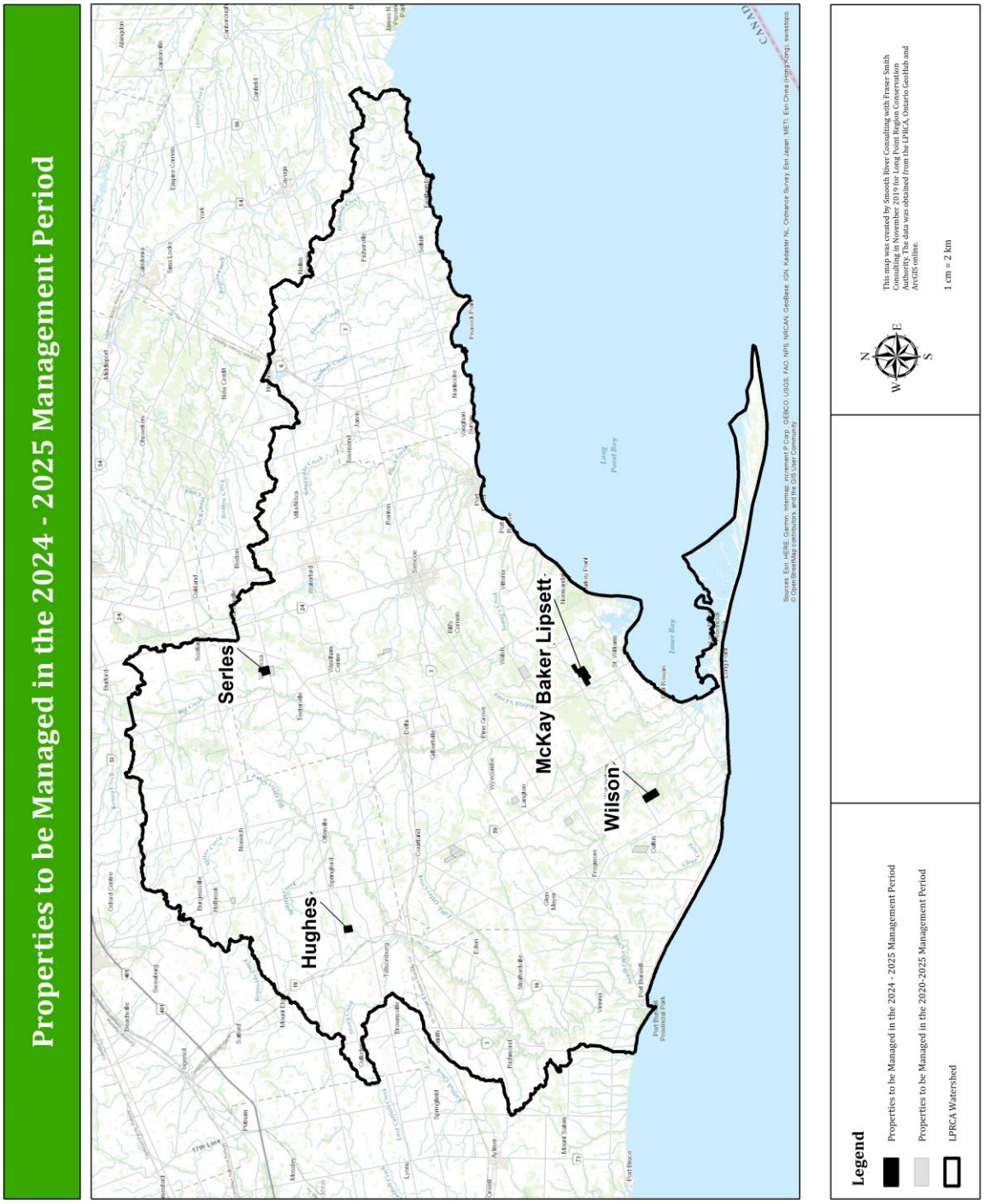


Figure 7: Properties to be managed in the 2024-2025 Management Period

Forecasted Yield

Over the period of the last Forest Management Plan (2000-2019), it has been demonstrated that careful management of LPRCA forests can satisfy the goals and objectives of maintaining and increasing biological diversity and habitat, while balancing social and economic goals and objectives. A summary for the 2010 to 2018 period is summarized in Table 3.

Table 3: Historic Harvest Values

Year	Revenue (gross annual)	Managed Area (ac)	Volume (FBM)	Volume (FBM) / ac	Revenue / ac
2010	$ 296,596.91	497	825,240	1661.28	$ 597.07
2011	$ 402,128.79	346	1,155,116	3338.49	$ 1,162.22
2012	$ 250,773.13	164	829,592	5058.49	$ 1,529.10
2013	$ 264,135.98	168	568,309	3382.79	$ 1,572.24
2014	$ 279,651.00	237	817,802	3450.64	$ 1,179.96
2015	$ 317,643.78	211	746,753	3539.11	$ 1,505.42
2016	$ 353,448.65	230	858,203	3731.32	$ 1,536.73
2017	$ 317,363.00	261	680,164	2605.99	$ 1,215.95
2018	$ 332,797.00	460	953,045	2071.84	$ 723.47
Total	**$ 2,814,538.24**	**2574**	**7,434,224**	**N/A**	**N/A**
Avg	$ 312,726.47	286	826,025	3204.44	$ 1,224.69
Minimum	$ 250,773.13	164	568,309	1661.28	$ 597.07
Maximum	$ 402,128.79	497	1,155,116	5058.49	$ 1,572.24

Within the 5 Year Operating Plan (5YOP), individual stands (tracts) have been assessed for the estimates of the projected volume and revenue that can be anticipated. These figures are based on historic volume and revenue yields on the same or similar tracts of LPRCA forest, wherever possible. Additionally, the revenue values are based on local markets historically and at present. As with any resource-based market, prices for timber and associated forest products fluctuate greatly, and cannot be predicted with certainty from one year to another. Therefore, it is recommended that LPRCA forestry staff closely monitor local markets to make minor adjustments to the schedule in order to realize optimal value for the listed management properties. (Table 4: List of 5YOP Properties with Management Area, next page).

Table 4: List of 5YOP with Management Area

Year	Property Name	Total Area (acres)	Total Area (hectares)	Anticipated Reduction in Harvest Area Resulting from Ecological Survey (acres)
2020 - 2021	Harris/Harris/Harris/Floyd Tract - Block #1	50.00	20.24	3
	Swick/King Tract - West Block	100.00	40.49	15
	Tarcza/Hird/Roberts Tract - West Block	50.00	20.24	5
	Devos Tract	94.00	38.06	4
	Annual Total	**294.00**	**119.03**	**27**
2021 - 2022	Harris/Harris/Harris/Floyd Tract - Block #2	50.00	20.24	3
	Sackrider Tract	50.00	20.24	1
	Parrott Tract	100.00	40.49	3
	Tarcza/Hird/Roberts Tract - East Block	50.00	20.24	3
	Nemeth Tract (conifer)	36.50	14.78	1.5
	Annual Total	**286.50**	**115.99**	**12**
2022 - 2023	Harris/Harris/Harris/Floyd Tract - Block #3	50.00	20.24	3
	Abbott/Townsend Tract	95.00	38.46	1
	Lippsitt/Penner/Vandevyre Tract	75.00	30.36	3
	Nemeth Tract (hardwoods)	63.50	25.71	1.5
	Annual Total	**283.50**	**114.78**	**9**
2023 - 2024	Harris/Harris/Harris/Floyd Tract - Block #4	50.00	20.24	3
	McKonkey/Middleton Tract	137.43	55.64	2
	Culver/Wintermute Tract	60.00	24.29	1
	Livsey Tract	20.00	8.10	1
	Annual Total	**267.43**	**108.28**	**7**
2024 - 2025	Wilson Tract	50.00	20.24	4
	Kyte/Laforge Tract	30.00	12.15	1
	Proper/Sereles/Greathead Tract	125.00	50.61	5
	Hughes Tract	88.00	35.63	7
	Annual Total	**293.00**	**118.62**	**17**

Sustainable Timber Yield and Available Harvest Area Recommendations

1. The Long Point Region Conservation Authority Board of Directors adopt the 5 Year Operating Plan in this Forest Management Plan.
2. Monitor those tracts listed for management prior to harvest and in the 5 years post-harvest for incidences of invasive species and forest pests and disease.
3. Carefully monitor local timber markets to make best use of forest products within the 5 Year Operating Plan and make minor timing adjustments as required to optimize value.

PRIORITY FUNCTIONS

Priority Tract Functions

Beginning in 1999, Long Point Region Conservation Authority initiated efforts to designate a portion of forested lands as Natural Heritage Woodlands (NHW). This initiative was identified within the now-expiring 2000-2019 Forest Management Plan and set out criteria by which an external Technical Advisory Committee assessed the natural heritage value of several candidate properties using a quantitative scoring system. That criteria included:

1) The stand contains at least 10% basal area of one or more of the following species in the overstory or regeneration: black oak, bur oak, shagbark hickory, bitternut hickory, black gum, sassafras, tulip tree. If all species meeting criteria were from the oaks (*Quercus spp.*), the threshold rises to at least 20% of basal area.
2) The property has been identified in the Natural Areas Inventory and is not included in criteria (1).
3) The stand is at least 85 years of age and is not included in criteria (1) or (2).
4) Plantations are excluded from the criteria to be assessed.

Additionally, the assessment of potential NHW lands considered the presence of "interior forest" conditions, the value to vulnerable/threatened/endangered species, and diversity measures for plant and bird species.

NHW are omitted from regular forest management operations and serve as core areas for the protection of rare, threatened and endangered species. This does not preclude harvest activities as incidences of natural disasters and insect/disease infestation, invasive and exotic species threats, as well as maintenance of Carolinian content are all areas in which management interventions must be considered.

Review of Designations

Most of the 13 properties designated in 2002 as Natural Heritage Woodlands (NHW) share similar eligibility characteristics in that they contain a relatively high amount of VTE (Vulnerable, Threatened, or Endangered) species records. Since these records are historic rather than contemporary, it is not expected that the eligibility or designation of these tracts will change over the course of this planning period. It is anticipated that the stands themselves will continue to pass through natural stages of succession and that the habitat offered by these stands will change as well. Natural systems are inherently dynamic and evolving, and with this variation come changes in site characteristics and habitat for those same VTE species for which the tract is eligible. Many NHW forested tracts list Carolinian tree species that are mid-tolerant of shade (such as American chestnut, black gum, hickories, etc.). Many of these tracts also show a relatively high basal area indicating shaded conditions in the understory. As these tracts serve as core areas for the protection of rare, threatened and endangered species such as those tree species just listed, monitoring and management to perpetuate these conditions and species is required.

Table 5: NHW Properties

NHW Tract Name	Total		NHW Designation		Last Prism Cruise Date
	Acres	Hectares	Acres	Hectares	
Anderson Tract	188.00	76.08	35.00	14.16	2019
Burwell Tract	100.00	40.47	100.00	40.47	2005
Carr Tract	50.00	20.24	50.00	20.24	2016
Coppens Ferris Armstrong	385.33	156.00	195.00	78.95	1999
Earl Danylevich Tract	135.45	54.82	35.00	14.16	2016
Harris Harris Harris Floyd	150.00	60.71	150.00	60.71	2016
Harvey Tract	99.50	40.27	90.00	36.44	2016
Hepburn Tract	100.00	40.47	78.00	31.57	2016
McKay-Baker Tract	296.85	120.14	105.00	42.49	2016
Watson CA	307.00	124.24	307.00	124.24	2005
TOTAL	**1,812.13**	**733.44**	**1,145.00**	**463.42**	

The Anderson Tract presents an interesting case study for consideration of the future course of NHW designated properties and LPRCA management. Anderson is a 188 acre property with 35 acres designated NHW due primarily to the abundance of black, white, and red oak, which make up 36%, 17%, and 7% of the total basal area, respectively. This stand also currently shows a relatively high basal area of 25.6 square meters/hectare, with 7.8 square meters/hectare of the overall in the 50 centimeters and above diameter category. These are not conditions in which oak regeneration is anticipated to be successful as shade conditions are too high for a mid-tolerant species. If the tract is to persist as an oak-dominated stand, management intervention will be required. Furthermore, with the anticipated arrival of Oak Wilt in Ontario, this stand will be especially vulnerable to an invasive that targets nearly all members of the oak genus. Monitoring will be essential and management to allow for healthy, vigorous growth should be considered.

Compatibility with Recommended Management and Designated Functions

The process of identification of NHW within the previous Forest Management Plan has been well-incorporated within the "regular business" of LPRCA land management. Designated functions determined as NHW are helping to maintain species diversity, protecting critical habitat features, and contributing to broader regional natural heritage targets. Additionally, the focus of NHW designations on Carolinian forest species provides for silvicultural direction to maintain and enhance representation of a rare and threatened habitat. This direction is especially beneficial when managing under a framework of climate change and the uncertainty that surrounds future ecosystems.

From pg 17 of the 2000-2019 FMP:

> Protection alone does not necessarily ensure the long-term survival of Carolinian habitats. There are forest stands within the LPRCA properties

> which have Carolinian species in the overstory but are regenerating naturally to more common shade-tolerant species such as sugar maple, beech and white ash (…) Many of the Carolinian tree species such as black gum, tulip tree and sassafras are intolerant to shade. (…) The Authority should develop silvicultural systems and techniques for managing these stands to renew the native Carolinian tree species.

This direction is further reflected within the reports for each NHW property as it recommends that all identified tracts should be re-inventoried after 20 years to ensure that Carolinian tree species content is adequate. If not, it is recommended that prescriptions and/or operating plans be prepared to address the shortfall and remove competing tree species to allow for desired regeneration to occur. Further re-inventory information will assist in guiding the preservation and management of those features for which a given property has been NHW-listed.

Priority Functions Recommendations

1) Re-inventory Natural Heritage Woodland properties to ensure that eligibility criteria are met.
2) In cases where Carolinian tree species content is declining, consider silvicultural interventions to remove competing tree species to allow for Carolinian regeneration. These areas would be added to the Available Harvest Area and Operations Schedule as it represents a salvage intervention.
3) Perform field surveys of Moulton, and Wilson Tracts to determine if any Areas of Natural and Scientific Interest qualify for designation as Natural Heritage Woodlands.

DETERMINATION OF SUSTAINABILITY

Ecological Foundations for Silviculture

Wind, logging, agriculture, and land clearing have shaped the forest landscape of Southwestern Ontario and have greatly influenced the temporal and spatial distribution of forest cover, flora, and habitats. Large areas of blowdown caused by catastrophic wind events prompted the growth of relatively even-aged stands, which were comprised of a mixture of shade-tolerant (e.g. sugar maple, beech), mid-tolerant (e.g. silver maple, red maple, yellow birch, black cherry), and intolerant hardwoods (e.g. poplars , white birch). At the other extreme, minor wind events and natural senescence caused the death of individual trees or small groups of trees. Individual tree gaps encouraged the regeneration of shade-tolerant trees and the perpetuation of an uneven-aged forest, comprised of tree species such as hard maple and beech. Multi-tree gaps in the forest canopy encouraged regeneration of even-aged patches of species, such as basswood and yellow birch, and perpetuated uneven-aged forests of shade tolerant and mid-tolerant hardwoods (Naylor and Pinto In: OMNRF 1998a, Section 9.0 p1) [lvii].

Fire appears to have been a more prominent factor in xeric hardwood forest dominated by oaks. Frequent understory forest created appropriate seedbed conditions and controlled completing tolerant hardwood vegetation, facilitating the development of multi-aged stands.

The silvicultural practices applied in the deciduous forest tend to emulate some important aspects of natural disturbance processes, and thus take advantage of the natural adaptation of the tree species comprising these associations. For example, clear cutting produces relatively large forest openings with high light-level, which are similar to the openings created by large catastrophic wind disturbances. Shelterwood cutting tends to emulate the light conditions produced by moderate intensity fires. Group selection and single-tree selection cutting tends to emulate the light conditions produced by multi-tree and single-tree gaps, respectively, which are created by minor wind events or natural tree senescence.

Traditional application of these silvicultural systems may not guarantee that managed forests will have all the aspects of composition and structure that function as wildlife habitat compared to forests created by agents of natural disturbance. Modifications to traditional silvicultural systems may also be required to restore old-growth features to managed forests and to provide critical habitat features such as snags, cavity trees, and woody debris.

Finally, consideration must be given to factors such as the rotation age or cutting cycle, and the size, shape, and dispersion of operating blocks to emulate the mosaic of age classes, forest types, and landscape patterns created by natural disturbance. [lviii]

Definition of Silviculture and Good Forestry Practices

The following definition of silviculture has been taken from the OMNRF, 2015 Forest Management Guide: “A silviculture system is a planned program of silviculture treatments that extends throughout the life of a stand for the purposes of controlling stand establishment, composition, and growth.” When planning for the use of a silvicultural system,

the Authority must ensure that the system chosen will not jeopardize areas of concern. The Forest Management Guide further states:

> "While recognizing some limitations, silviculture systems are further modified to ensure the structure and composition of a forest after a logging operation more closely matches or emulates the conditions found after fire, wind, or other natural disturbance. Emulation refers not only to an attempt to match the natural disturbance mechanism (e.g. gap development resulting from blow down), but also to the post-disturbance growing conditions to which trees have adapted over millennia."

Following from this definition of silviculture, the Forestry Act (R.S.O 1990) defines Good Forestry Practices as: "the proper implementation of harvest, renewal and maintenance activities known to be appropriate for the forest and environmental conditions under which they are being applied and that minimize detriments to forest values including significant ecosystems, important fish and wildlife habitat, soil and water quality and quantity, forest productivity and health and the aesthetics and recreational opportunities of the landscape."

This definition forms the commonly accepted framework for describing acceptable silviculture and good forestry practices in Ontario, as well as the stated measure by which the Managed Forest Tax Incentive Program assesses forest management plans. As such, these definitions will be adopted by the Authority in this document and in planning operations within the LPRCA Forest.

Broadly speaking, silviculture is the art and science of growing trees. A forest management plan (FMP) may define targets for the desired future forest condition at the forest and stand level, and describes the most common and acceptable alternative silvicultural treatments used to achieve those targets. When applying silvicultural systems, forestry professionals often use the term "working group" to refer to forest stands. A working group should be understood as "an aggregate of stands, including potential forest areas assigned to this category, having the same predominant species and managed under the same rotation or cutting cycle and broad silvicultural system".[lix]

Wildlife Habitat and Biodiversity

Forestry operations can have a profound effect on wildlife habitats and the diversity of forest communities. However, silvicultural activities can also be used to enhance habitat features and to promote biodiversity. "A Silvicultural guide for the tolerant hardwood forest in Ontario" presents a general discussion of wildlife habitat requirements and biodiversity considerations [lx]. Habitat components of special importance that can be enhanced through well-crafted silvicultural prescriptions and tree marking protocols are: i) cavity trees; ii) down woody debris; iii) stick nests; iv) mast trees; and v) conifer cover. The "Tree Marking Guide for the Tolerant Hardwoods Working Group in Ontario" (Anderson and Rice 1993) provides guidelines for the provision of these important habitat features and for maintaining biodiversity. Other guidelines cover the habitat requirements for individual indicator species, such as Pileated Woodpecker [lxi]. These guidelines should be consulted during the recommended review of forest management guidelines and practices.

The Authority's forests are habitat for a variety of Carolinian bird species, some of which are classified as rare or threatened (Norfolk Field Naturalist 1987). The habitat requirements for these species vary. As for other areas of concern, silvicultural systems should be suitably modified to ensure that forestry operations maintain or enhance habitat conditions. A forest-level approach to bird habitat management is recommended over the traditional stand-level approach to management. There are several references that can be used to guide the development of appropriate silvicultural systems (Dickson et al 1992, Thompson et al 1992, Thompson et al 1995, Annand and Thompson 1997). [lxii]

Tree Planting

The Authority owns some 893 acres of plantations, which represent approximately 12% of its forest area. Sixty percent of these plantations are over 50 years of age. Plantation establishment through afforestation can be an effective means for restoring native tree species, enhancing wildlife habitats, and promoting biodiversity on LPRCA properties. Tree planting projects can also be used to promote environmental awareness and encourage responsible land stewardship.

Over the past 10 years, the Authority has planted over 855,000 trees. The Authority provides tree planting services to private landowners in the LPRCA watershed. These services include site inspection, preparation of a planting plan, planting, and weed control. The Authority also owns three tree planting machines which are available to landowners and operates cold storage facilities for storing seedlings. The authority also works with numerous groups on community tree plants and will be part of the 50 million Tree Planting Program relaunch. [lxiii]

Monitoring

Property

Ongoing property inspections should be routinely carried out to: 1) Ensure that properties, roads, and other infrastructure features are maintained in good condition; 2) Address uses of the properties that are inconsistent with the policies of the Authority, and 3) Cooperate with neighbouring landowners on issues of joint interest. Whenever possible, the inspections will be conducted in conjunction with ongoing forestry activities to increase efficiency. [lxiv] Inspections should be carried out according to the level of intensity of use (or misuse) of a particular property. The Authority will strive to respond promptly to complaints regarding improper uses of the forest.

Effectiveness Monitoring

The prescriptions for harvesting and renewing the forest are derived from the OMNR's Silviculture Guides. For each harvest area, a site-specific harvest prescription will be reviewed and accepted by a member in good standing with the Ontario Professional Foresters Association. This prescription should be consistent with the Guides. The effectiveness of the Guides is assessed through long-term monitoring by Forest Managers and through forest science programs. For example, the OMNR maintains an extensive network of growth and yield plots throughout Ontario, including some plots in southwestern Ontario. Results of silvicultural effectiveness monitoring are incorporated in the provincial Silviculture Guides.

Regeneration Assessments

It is recommended that a program of regeneration assessments be added to the existing activities of Authority Forestry staff. Generally, two levels of regeneration assessment may be carried out. Extensive assessments should be carried out for commercial thinning operations where regeneration is not a primary objective and for stands where high levels of desirable advanced regeneration exist. Extensive surveys are a visual assessment based on a walk-through of the area and are generally carried out as part of standard practice. Intensive regeneration surveys are commonly conducted at 1, 2, and 5-year intervals to verify the success of afforestation and reforestation, projects and regeneration of challenging species after shelterwood harvesting (primarily white pine and red oak). These assessments are normally written into the standard operating procedures for afforestation programs such as the 50 Million Tree Program. Authority staff currently monitor the activities of site preparation, tree planting and tending to ensure that the desired standards are achieved. Further development of these programs should follow the direction set forth in the Afforestation Guide for Southern Ontario, OMNRF, 2018, Section 2.12.

Timber Extraction Assessment

Identification of Areas of Concern

The first step in preparing a prescription for a stand is to perform a conservation value screening from the Authority's GIS database as well as other available natural heritage information.

Within the LPRCA forest, stands are pre-screened and surveyed by an ecologist to identify and delineate species at risk and other natural heritage features to protect during regular work activities. The results of these areas of concern are then incorporated into the silvicultural prescription.

Preparation of Silvicultural Prescriptions

A silvicultural prescription is a site, compartment, or stand-specific operational plan that describes the forest management objectives and activities for an area. It proposes a series of silvicultural treatments to establish or maintain a free growing stand in a manner that accommodates other resource values such as wildlife habitat and the conservation of biodiversity.

Prescriptions are developed through a series of steps. The first step of development involves gathering information about the stand such as species composition, tree sizes, regeneration on site, wildlife habitat, and tree quality. This information is then analyzed to formulate objectives and prescribe appropriate treatment. [lxv]

Prior to the commencement of any tree marking on Authority lands, a silvicultural prescription will be developed. Prescription development will follow the EOMF FSC SOP 1.2 - Forest Operations Prescription Standard Operating Procedure. The development of this prescription will include the use of current stand inventory information, site conditions, AOC and SAR information, and wildlife habitat information, in order to determine the appropriate marking intensity and direction.

Silvicultural prescriptions will be used as guidelines for tree markers on Authority lands. Additional professional guidance will also be called upon from time to time to properly implement and to achieve the objectives of the silvicultural prescription.

Tree Marking

Tree marking refers to the careful implementation of a Silvicultural Prescription through tree selection for harvest. Tree marking is defined as:

> "(…) the careful selection of trees for harvest or retention based on tree size, vigour, timber quality, biodiversity, and wildlife habitat value. (…) A certified tree marker is a person certified under the Ministry of Natural Resources' provincial tree marker training program, adhering to the tree marker's code of ethics, and applying the principles (e.g. Section 6) of the Ontario Tree Marking Guide. The certification process includes training, testing, audit of work, and periodic updating of knowledge. The use of certified tree markers can include assistant, apprentice, and pre-certification audit markers whose work is supervised and endorsed by a certified marker." [lxvi]

All tree marking on LPRCA lands shall be conducted by, or under the direct supervision of, a Certified Ontario Tree Marker. Tree marking will follow the EOMF FSC SOP 1.4 - Tree Marking Standard Operating Procedure. No paint shall be used in the LPRCA forest for any purpose without the express consent of Authority forestry staff as this may interfere with harvest operations and affect public safety.

Past and Projected Harvesting Practices

The field of forestry is constantly evolving as ongoing research and monitoring provides new insights. Many early and mid-20th century cutting practices disregarded forest types and instead focused on maximizing timber and fiber yields. Since that time a complete change has occurred whereby forest stands are managed with social, ecological, and economic factors in mind so lands can be managed in perpetuity. Furthermore, silvicultural tools are employed to increase the overall health of forest stands, repair degraded forests, and restore and replace representative forest cover types.

The silvicultural systems outlined in this section can be viewed as tools in a toolbox for the sustained management and pursuit of the goals and objectives outlined in this FMP. For example, in some stands single tree selection silviculture may have led to an overabundance of tolerant hardwoods, such as sugar maple, and a decline in mid-tolerant species such as oaks. In future, switching to an appropriately implemented shelterwood harvest may be advisable in order to correct this trend.

The following sections describe the commonly accepted silviculture systems in Ontario and forest working groups found in the LPRCA Forest, as well as special management considerations.

Selection Silviculture System

Selection silviculture refers to the periodic partial harvesting of shade tolerant to mid-tolerant hardwood stands. Harvests are timed based on basal area recruitment using vigour, risk, and species preference to select trees for harvest and retention. Generally, the choice to implement the selection system is implemented in stands where, one, the management goal is for an all-aged future forest, two, the existing and predicted regeneration is best established in ≥70% residual canopy cover (approx. ≤30% full sunlight), and, finally, where a dense mature forest cover of shade tolerant to mid-tolerant species is to be maintained in perpetuity [lxvii]. The primary species found in the LPRCA forest that are best suited to the selection system are sugar maple, red maple, white ash, beech, and to a lesser extent red oak and white pine.

NOTE: Selection management should not be confused with selective cutting. Selective cutting involves the selection and harvesting of individual trees with few, if any, control measures in place, also known as "diameter limit harvesting" or taking the "biggest and the best". The process is technically referred to as "high-grading" and is not considered a Good Forest Management practice in Ontario or Canada [lxviii].When applying the selection silvicultural system in the LPRCA Forest, the forester's prescription and the Ontario Tree Marking Guide will be followed as guiding documents.

The Selection silviculture system is further subdivided into two general applications: the single tree selection system and the group selection system. Both applications are considered selection silviculture and can be employed within the same stand depending on conditions within the immediate vicinity.

Single Tree Selection

Single tree selection is a silvicultural technique used to encourage the development of all-aged forests dominated by shade tolerant species. This system uses a periodic partial-cutting, controlled by basal area, using vigour and risk characteristics to determine individual tree selection. Single tree selection is an uneven-aged silvicultural system. Emphasis is placed on controlling the levels of residual stocking, stand structure and individual tree quality through the tree marking process.

On sites suited to shade tolerant species, single tree selection is one of the most effective systems for the production of high quality sawlogs and veneer. The manager's decision to adopt the single tree selection approach is primarily based on the shade tolerance of the target species or working group, site quality, and the quality of the existing overstory.[lxix].

It is important to note that single tree selection is one of the most difficult systems to apply. Tree markers and forest managers must find a consistent balance between stocking, stand structure, and quality while constantly focusing on both long- and short-term objectives and stand responses. Furthermore, single tree selection is most often applied within shade-tolerant hardwood stands with high geographic, structural, and species variability. Most often, on private (rather than crown) lands, single tree selection tree marking is undertaken by a crew of 2 to 3 markers and one additional "tally" person in order to properly capture the high complexity of size, species, and product types.

Single Tree Selection A profile of a single tree selection silviculture system depicting: Illustrations for all figures by Jodi Hall and provided with permission from the publication: (OMNRF, 2015) *Forest Management Guide to Silviculture in the Great Lakes-St. Lawrence and Boreal Forests of Ontario. Toronto: Queens Printer for Ontario. 394 pp.*

Figure 8: pre-harvest tolerant hardwood stand

Figure 9: stand conditions after a partial selection cut

Figure 10: 25 years later with the natural regeneration of shade tolerant species under the canopy

Single Tree Selection Aerial An aerial view of a single tree selection harvest in a tolerant hardwood stand resulting in >70% residual cover and perpetual all-aged stand.

Figure 11: depicts the initial harvest entry

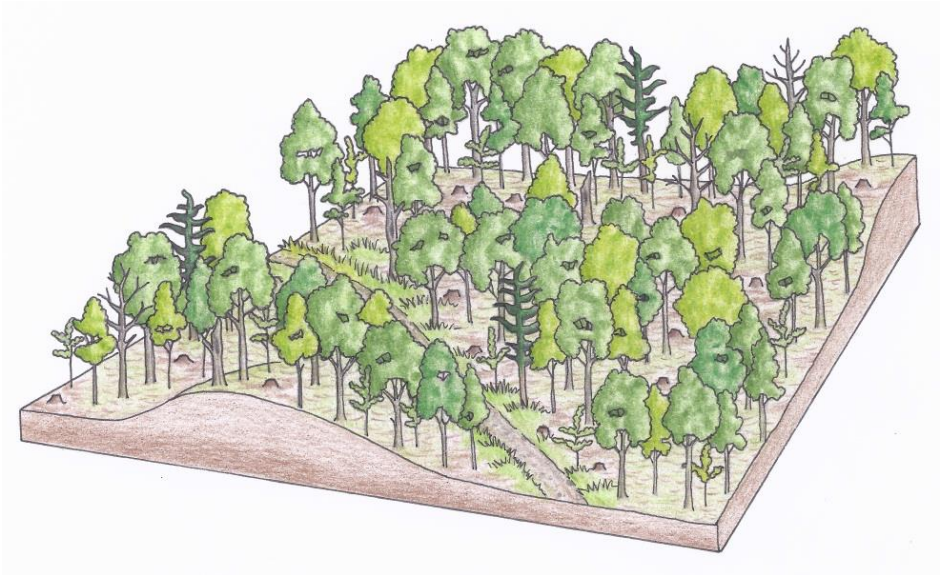
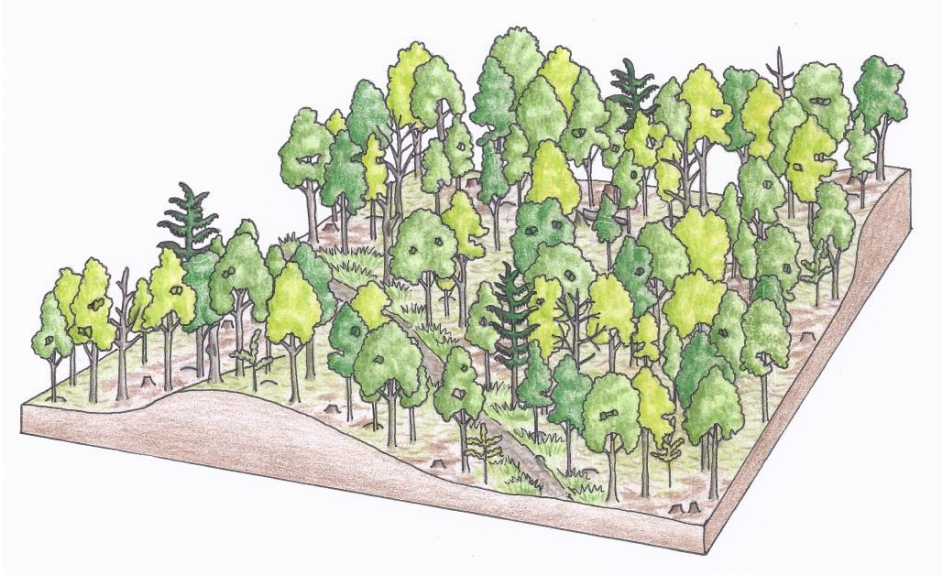


Figure 12: depicts regrowth after approximately 25 years and the harvest associated with the next cutting cycle



Group Selection

Group selection is a silvicultural technique that can be used to encourage the development of a greater proportion of mid-tolerant species primarily within uneven-aged tolerant hardwood forests. This system is a modification of the selection system however, trees are removed in small groups rather than as individuals. Emphasis is placed on matching the size

of the canopy gap to the light requirements for establishment and growth of the desired species. This is achieved by marking and harvesting several companion, dominant trees. (OMNR, 2004)

Group selection tree marking is applied where there is one of two possible objectives: to develop an all-aged stand made up of a mosaic of even-aged patches representing the full range of age classes over the period of one harvest rotation, or alternatively; to develop a mosaic of even-aged patches of mid-tolerant species at appropriate locations within a stand managed primarily for shade tolerant species under the single-tree selection system. Elements of the group selection system may be applied within areas being managed under the single tree selection system. This is especially pertinent in areas of the forest where red oak, white oak, burr oak, black cherry, butternut, etc. form sub compartments within a stand that require release in order to continue providing important mast for wildlife.

Group Selection An aerial view of a group selection harvest in a tolerant hardwood stand.

Figure 13: an initial harvest

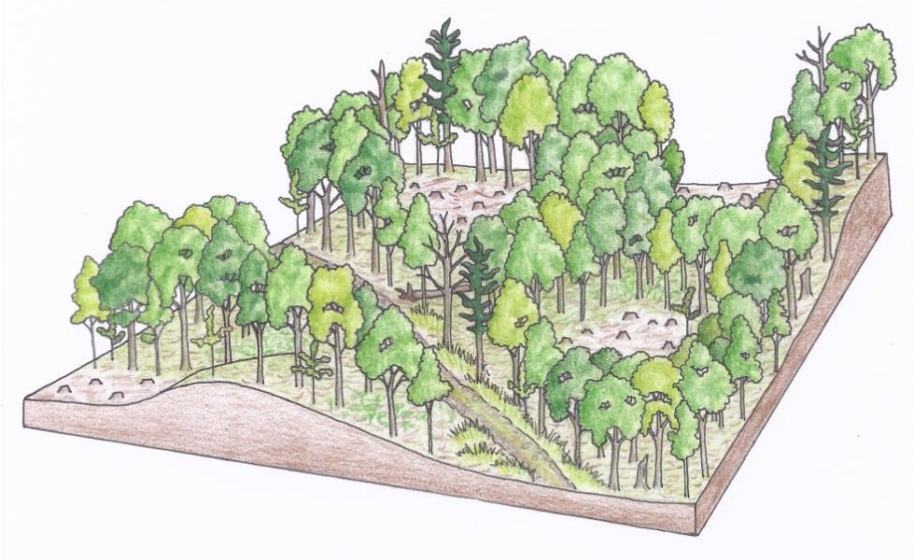
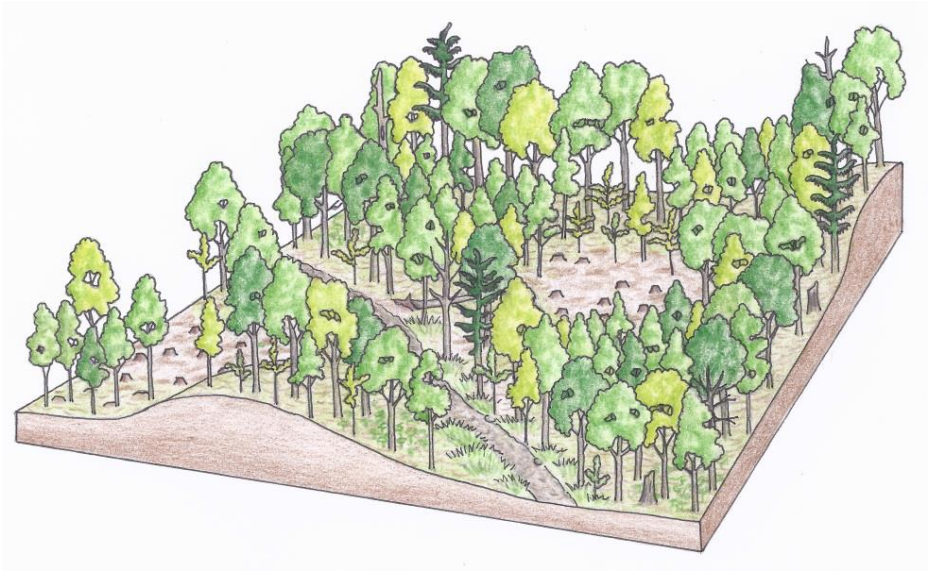


Figure 14: regrowth and harvest associated with the next cutting cycle



Shelterwood Silviculture System

The shelterwood system is an even-aged silvicultural system whereby the partial removal of the overstory provides the correct conditions and shelters desired regeneration of species less shade tolerant than those favoured through selection silviculture. Shelterwood harvests are multi-staged and involve the removal of overstory trees through a series of harvesting operations. This system usually requires three stages of harvest: the preparatory cut, the seed-tree (regeneration) cut, and the removal cut(s). The preparatory cut is the only stage of this series which may not be required in the shelterwood system.

The preparatory cut removes undesirable tree species, poor quality trees, and trees that are overcrowded. This tree removal opens the canopy to permit the growth of the crowns of desired harvest and crop trees, which in turn increases seed production. This cut may not be necessary if crowns within the stand are of sufficient size. During this stage of the shelterwood operation crop, trees are selected. Crop trees are the better-quality stems in any stand. These stems may be the largest stems within the stand and will be retained until the removal cut is initiated. Critical to the success of the shelterwood system is the proper application of tending treatments for undesirable regeneration to ensure that desired species are released. The method, timing, and frequency of these treatments will be determined by individual site characteristics and stand prescription.

The seed-tree (regeneration) cut involves the removal of all material growing between the crop trees that are of merchantable size. This allows space and light for seed from the crop trees to establish in the understory.

The removal cut or cuts that will remove the crop trees once the desired regeneration is of a sufficient "Free to Grow" size class and can be safely released in the understory. The timing of this cut is critical and is largely determined by the regeneration rather than overstory conditions.

There are three variations of the shelterwood silviculture system: the uniform shelterwood system, the strip shelterwood system, and the group shelterwood system. Recently, a fourth variation, the irregular shelterwood system, has been recognized provincially and is seeing greater adoption within mixed wood stands. Irregular shelterwood is best categorized as a variant of the uniform shelterwood system and will be treated as such in this FMP. The differences between these variations of the shelterwood system are well described by the names of these three systems. The uniform shelterwood system refers to an operation that encompasses the entire stand in a relatively homogenous pattern. The strip shelterwood system refers to an operation that is performed in strips throughout the stand. The group shelterwood system refers to an operation that encompasses a mosaic across many hectares and many stands.

The shelterwood silviculture system is commonly used in even-aged stands of hardwood or softwood tree species to release semi-intolerant tree species. (SVCA, 2005) Historically this system has been rarely used in the LPRCA Forest, however the shelterwood system may prove beneficial to achieving biodiversity and stand structure objectives. A clear application for this approach includes oak dominated stands that contain a high component of poplar and/or red maple shading out regeneration, which would benefit from the application of the shelterwood system.

Uniform Shelterwood

Uniform shelterwood is a silvicultural system designed to encourage even-aged stands of mid-tolerant species through the creation of consistent and uniform conditions favourable to optimal regeneration. The entire stand is treated in a carefully controlled overstory release through the preparatory (not always performed), seed, and removal cut(s) stages. Through these harvest stages, the overstory is carefully managed to provide optimal light, moisture, and temperature requirements that will encourage regeneration of the target mid-tolerant tree species. Broadly speaking, the seed cut allows for germination and early growth of target species regeneration, while the removal cut(s) allow that well-established regeneration to release and thrive in the new stand. Uniform shelterwood is the most commonly prescribed technique for managing white pine forests in the absence of fire.

Irregular Shelterwood

Irregular Shelterwood is a silvicultural system designed for partial removal of the overstory in successive regeneration cuts with a long and indefinite regeneration period (≥20% of the intended rotation). Within this system, the final removal is delayed or absent, and the resulting stand is typically multi-aged. Irregular shelterwood approaches have been primarily adopted in the heavily degraded forest systems of New England within the US to remedy high-grading practices in the past. While the irregular shelterwood application mimics uniform shelterwood in its homogeneity across the stand, it differs in that it is a continuous-cover forestry approach. At no point is there a final removal cut to fully release regeneration. Rather, the overstory is permanently maintained through successive regeneration cuts.

Uniform Shelterwood A profile of a uniform shelterwood silviculture system. Note that this illustration only provides illustration of the shelterwood system applied to a white pine

forest. Different applications and dynamics are involved when applying this system to hardwood and/or mixed wood stands.

Figure 15: pre-harvest white pine dominated stand

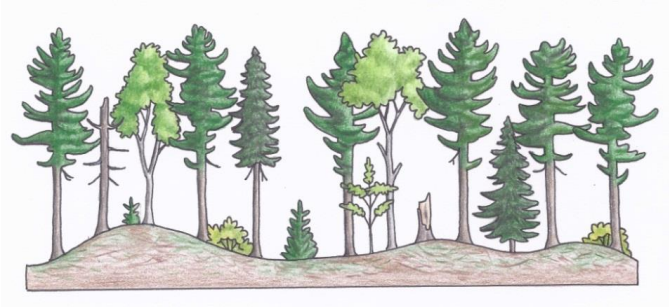


Figure 16: conditions after the regeneration cut

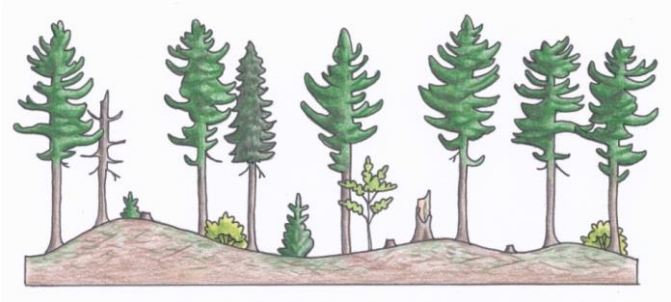


Figure 17: first removal cut

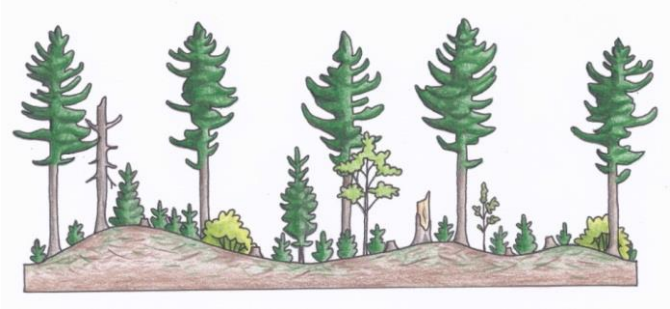
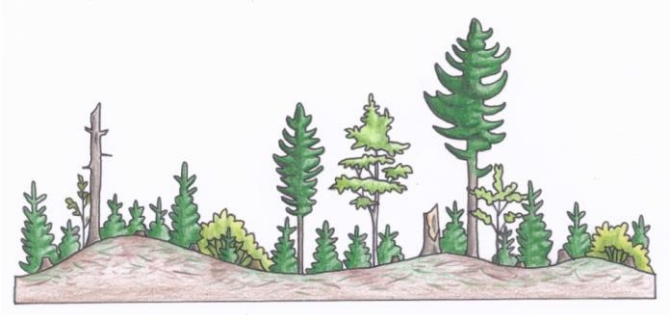


Figure 18: final removal cut with a natural seeding regeneration treatment



Uniform Shelterwood An aerial view of the staged uniform shelterwood application in white pine mixedwood.

Figure 19: an aerial view of a white pine stand directly after a regeneration cut

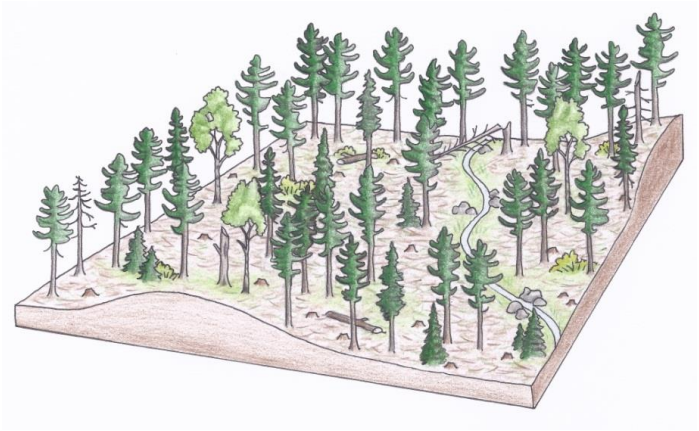


Figure 20: a first removal cut once the regeneration is established

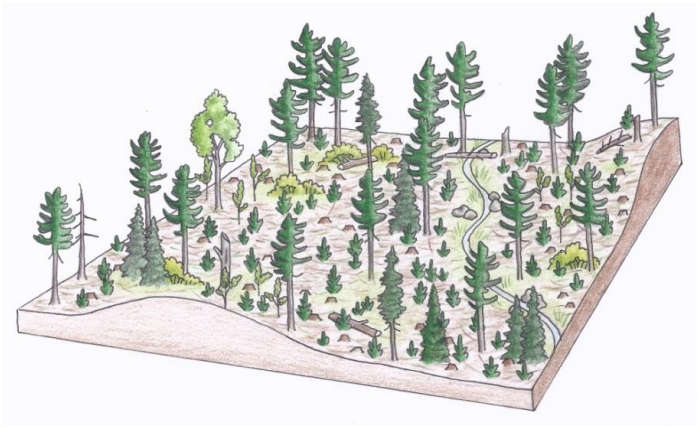
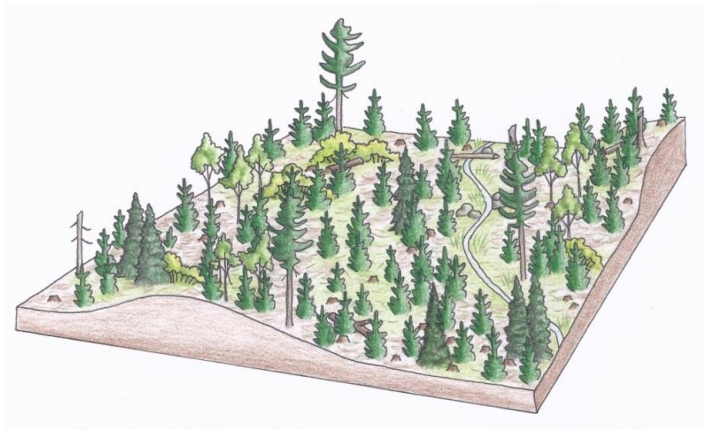


Figure 21: after the final harvest resulting in >70% full sunlight conditions and a new even-aged stand



Irregular Shelterwood Profile of an irregular shelterwood silviculture system. Note that this illustration only provides illustration of the shelterwood system applied to a cedar-leading forest. Different applications and dynamics are involved when applying this system to hardwood and/or mixed wood stands.

Figure 22: a pre-harvest eastern white cedar dominated stand

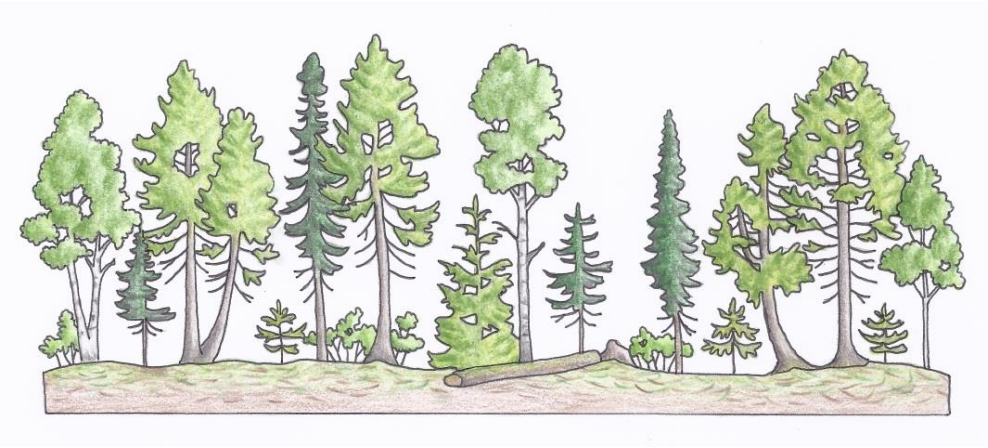


Figure 23: stand conditions 15 years after a first partial harvest

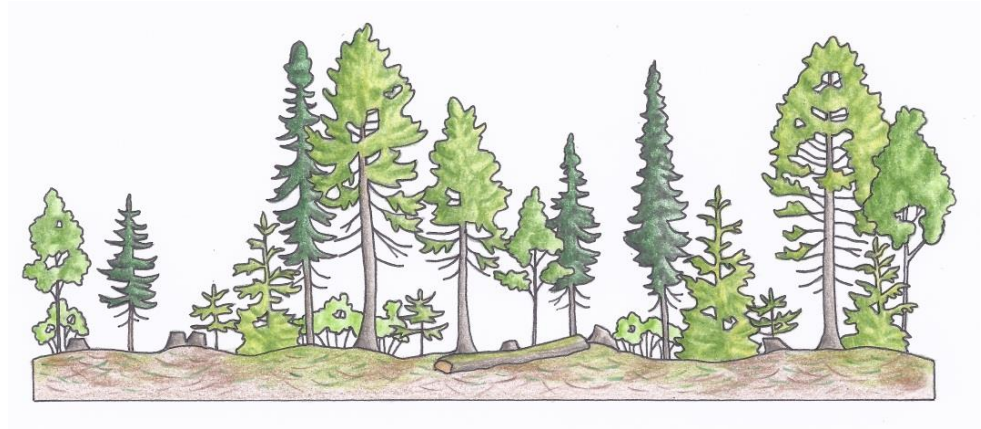


Figure 24: 50 years after partial harvest

Irregular Shelterwood Aerial view of an irregular shelterwood harvest in a cedar dominated stand.

Figure 25: 15 years after harvest

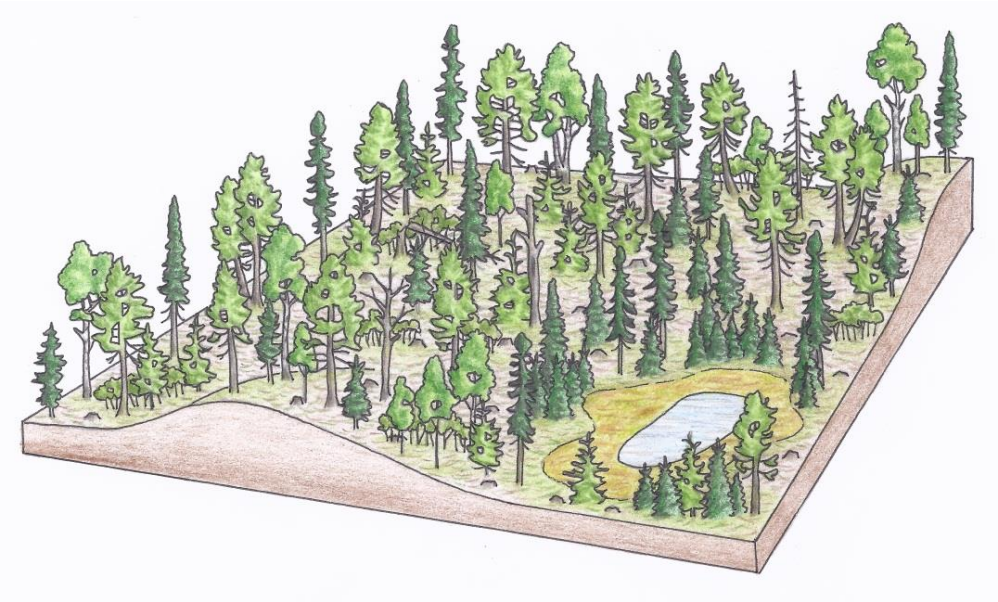
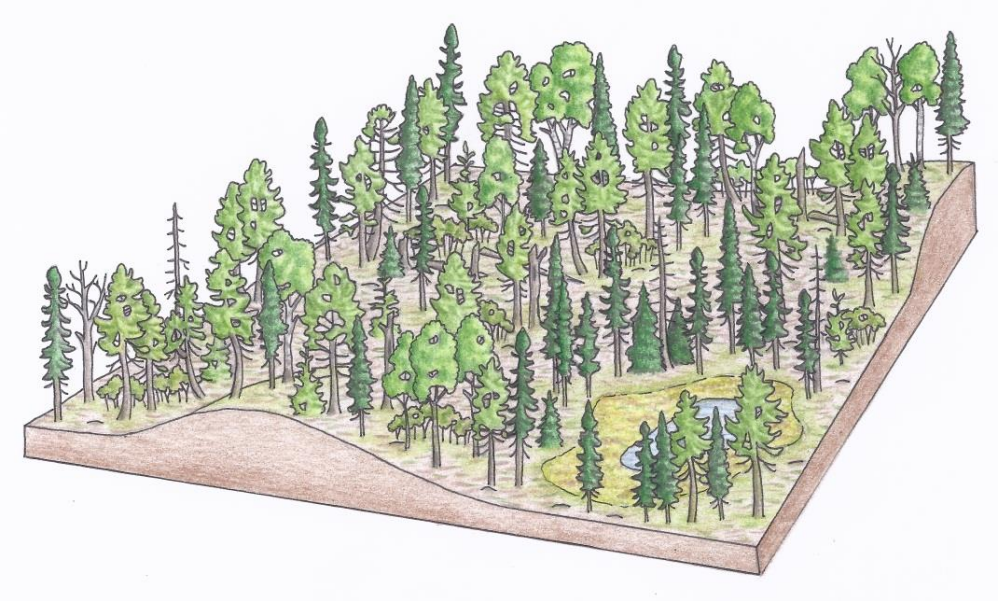


Figure 26: 50 years after establishment resulting in a multi-aged stand



Group Shelterwood

Group shelterwood is a silvicultural system designed to encourage groups of relatively even-aged, mid-tolerant species, and is often employed within uneven-aged hardwood stands. Through the creation of generally circular gaps in the overstory, small group openings (0.02 – 0.2 ha) produce a mosaic of patches that favor regeneration of desired tree species. Matching the size of the gap to the desired species to be regenerated is critically important. Canopy gaps can be expressed in terms of area, but more commonly are expressed and prescribed as a function of proportion of canopy height. Defining group shelterwood gap

size by canopy height at the prescription stage allows for variation in stand height and ensures that residual stocking remains for the future stand.

Clearcut Silviculture System

Currently in the LPRCA Forest, the only silvicultural method accepted as Good Forest Practices approaching the Clearcut System is the Clearcut with Seed Trees approach. The Clearcut with Seed Trees approach is a variation of the Clearcut System in which a small number of seed-bearing trees are left individually or in aggregated patches. The objective is to create an even-aged stand. This system has not been applied during the last planning period, however it is important to include within this FMP as in some extreme cases, such as devastating natural disturbance events or major forest health cases, the system may be employed as a remedial measure to maintain and/or reset stand composition objectives.

From the Ontario Tree Marking Guide: "The clearcut with seed-trees approach is a basic silvicultural treatment normally used to meet one of the following objectives: regeneration of shade intolerant species adapted to fire or other wide-spread disturbance patterns (e.g., red pine forests), or, restoration or maintenance of mid-tolerant species which are too under-stocked for application of the shelterwood system.

The genetic diversity objectives for the forest must be considered when prescribing this treatment. This guidance as well as the current Ontario Silvicultural Guide should be used as the guiding documents for any application of the clearcut with seed trees system in the future. This will be on a case-by-case basis as severe stand disturbance events occur, or where heavily degraded stands require a "reset" in order to address biodiversity and stand structure objectives.

Forest Types

Upland Tolerant Hardwoods

The upland tolerant hardwood group consists primarily of sugar maple, beech, red maple and red oak in the LPRCA Forest. In managing the upland tolerant hardwood working group, forest management relies on basal area calculations and stand inventory information to determine the best management approaches.

The most common method of management applied to upland tolerant hardwood forests in Ontario is single tree selection. The ideal basal area target for upland tolerant hardwoods is generally considered to be $20m^2/ha$. Forests with a basal area of less than $24m^2/ha$ are generally not considered for harvest as volumes are not great enough to support it. Forest stands that exceed $24m^2/ha$ are considered for harvest if site conditions are acceptable. Good forest management practices suggest that for high-density stands no more than one-third be removed during any regular harvest cycle. Under exceptional circumstances or when using a different silvicultural system for management objectives, it may be necessary to remove more [lxx].

Most commonly within the Long Point watershed, the management of upland tolerant hardwoods is carried out in 10-15 year harvest cycles. Stocking, pest outbreaks, and site conditions may warrant deviation from this cycle.

Lowland Hardwoods

Lowland hardwood forests are typically dominated by major species such as red/silver/freeman maple, green/black ash and white elm. Depending upon geography and soil moisture, minor species can include white cedar, yellow birch, hemlock, red/white/black spruce, bur oak, basswood, many aspen species, balsam poplar, eastern cottonwood, black willow, white birch, tamarack, balsam fir, white pine, and shagbark/bitternut hickory.

If areas of lowland hardwood develop or are added to the forest in the future, management direction for these stands would follow the direction provided in the current Ontario Silvicultural Guide. Generally, this would include only the group selection or uniform shelterwood harvest systems. Forest management prescriptions for this working group will rely on basal area calculations and focus on removing those trees that are diseased, poorly formed, and declining in potential value to improve stand health, resiliency, and biodiversity levels.

Mid-Tolerant Hardwoods

There are several mid-tolerant and intolerant hardwood tree species that occur regularly as a component of the tolerant/mid-tolerant hardwood forest but rarely, if ever, occur as the dominant species in the stand. An exception to this is red oak, which does occur as the dominant component for several stands in the LPRCA Forest. When regeneration of these species in the tolerant hardwood forest is an objective, group selection is often the recommended treatment. If a significant component of these species exists on the site they can also be regenerated through an irregular or uniform shelterwood prescription on suitable sites and seedbeds, provided sufficient residual seed trees and/or advanced regeneration are maintained. Forest management prescriptions for this working group will

rely on basal area calculations and focus on removing UGS trees to improve stand health, resiliency, and biodiversity measures. In some circumstances, the selection system may be incorporated with the aim of maintaining a two-aged stand structure.

Early Successional Hardwoods

Early successional hardwood stands typically demonstrate a high proportion of early-successional ("pioneer") species such as poplar, white birch, white spruce, and balsam fir. These are the species that tend to colonize a site following large-scale disturbance events and/or overharvest activities. Through careful management, these stands can be accelerated through the succession process towards a more diverse, resilient, and sustainable composition including mast species for wildlife and variable stand structure. The most common method of management applied to LPRCA Forest early successional hardwood forests is single tree selection. The ideal basal area of the early successional hardwood forests can range from 12-22m^2/ha. Forests with a basal area of less than 24m^2/ha are, generally, not considered for a harvest as volumes are usually not great enough to support a harvest and activities would only open the canopy to such an extent that early-successional species would continue to develop. Forest stands that exceed 24m^2/ha are considered for harvest if the site conditions are acceptable. Some exceptions may also apply in the case of poplar stands where a light removal may not be sufficient to release other hardwood species from clonal poplar root-sucker regeneration. Good forest management practices suggest that for high density stands, no more than one-third be removed during any regular harvest cycle. Under exceptional circumstances, it may be necessary to remove more.

Most commonly, the management of early successional hardwood forests is carried out in 10-15 year harvest cycles. Stocking, pest outbreaks, and site conditions may warrant deviation from this cycle. It is recognized that management of early successional forests in the LPRCA Forest should conform to the silvicultural guidelines for Ontario.

Plantations

Most plantations in the LPRCA Forest are conifer plantations of red and white pine, covering a total of over 650 acres (263.5 ha). Initial conifer plantations were established in the LPRCA Forest following the end of World War II when extensive tree planting initiatives were underway across the province. The Woodlands Improvement Act, and Agreement Forest programs provided for much of the afforestation efforts through the mid-to-late 20th century in southwestern Ontario. These plantations serve as a "nurse crop" whereby the stand is periodically thinned to allow for the establishment of more shade-tolerant species.

While the primary goal of between row thinning in pine stands is to allow for soil stabilization, watershed protection, and regeneration of shade tolerant to mid-tolerant species this does not always occur due to a range of factors at the site level. In these cases, mechanical planting, especially of white pine under the maturing canopy, should be pursued in order to avoid loss of biological and structural diversity.

Eventually, most conifer plantations should mature into hardwood and mixed wood stands with a range of species retained for diversity. In some conifer plantations, however, regeneration of juvenile conifers and hardwoods does not progress appropriately and underplanting of such species should be initiated to assist with stand transition.

Determination of Sustainability Recommendations

1. Consider greater use of shelterwood systems to encourage mid-tolerant tree species, Carolinian species, as well as light-demanding species at risk.
2. Develop and formalize harvest monitoring protocols and regeneration assessment protocol based on the criteria provided in this FMP.
3. Maintain adherence to established silvicultural systems and good forest management practices.

Summary of Recommendations

Forest Health

1. Maintain and enhance the existing forest. The most effective strategy to help guard against pests and disease is to manage for a healthy, diverse forest and retain seed-producing, potentially resistant trees to carry on the gene pool of targeted tree species.
2. Stay current and informed on current and upcoming forest health threats. Staff vigilance, training and the ability to react quickly to native and non-native invaders will be vital to effective forest management.
3. Monitor and maintain an inventory of invasive species occurrences on the Long Point land base.
4. Consistently monitor whenever possible and implement an early detection and rapid response framework to invasives when discovered in LPRCA forest tracts. The cost of monitoring and early management is far surpassed by the cost of inaction, lost diversity and financial return when invasive species populations inevitably grow.
5. Work with operators to reduce the risk of invasive plant seed transfer to LPRCA tracts. A voluntary and educational approach should be taken to encourage equipment cleaning before moving from infested areas. Continue to promote the clean equipment protocol used by many community forests.
6. Manage forests for health, diversity, and resilience against climate change and associated conditions such as extreme wind and drought conditions. Research has shown that dedicated management of forests using the best available forest management approaches produces stands that are best equipped to deal with the extremes and uncertainty associated with climate change.

Management Goals and Objectives Recommendations

1. The Long Point Region Conservation Authority Board of Directors adopt the Management Goals and Objectives in this Forest Management Plan to continue the sustainable management of Authority forest holdings.

2. In consultation with partners, develop standards and guidelines for forestry practice which will protect soil, water quality and quantity, and riparian habitats during and after forest management operations.
3. Identify opportunities for public input to forest management plans, 5-year schedules of management activities and annual work programs.
4. Maintain the highest standards of silvicultural practice on Long Point forest lands.

Sustainable Timber Yield and Available Harvest Area Recommendations

1. The Long Point Region Conservation Authority Board of Directors adopt the 5 Year Operating Plan in this Forest Management Plan.
2. Monitor those tracts listed for management prior to harvest and in the 5 years post-harvest for incidences of invasive species and forest pests and disease.
3. Carefully monitor local timber markets to make best use of forest products within the 5 Year Operating Plan and make minor timing adjustments as required to optimize value.

Priority Functions Recommendations

1) Re-inventory Natural Heritage Woodland properties to ensure that eligibility criteria are met.
2) In cases where Carolinian tree species content is declining, consider silvicultural interventions to remove competing tree species to allow for Carolinian regeneration. These areas would be added to the Available Harvest Area and Operations Schedule as it represents a salvage intervention.
3) Perform field surveys of Moulton and Wilson Tracts to determine if any Areas of Natural and Scientific Interest qualify for designation as Natural Heritage Woodlands.

Determination of Sustainability Recommendations

1. Consider greater use of shelterwood systems to encourage mid-tolerant tree species, Carolinian species, as well as light-demanding species at risk.
2. Develop and formalize harvest monitoring protocols and regeneration assessment protocol based on the criteria provided in this FMP.
3. Maintain adherence to established silvicultural systems and good forest management practices.

Appendix A: Glossary of Technical Terms

A

abiotic factors. The non-living components of the environment, such as air, rocks, soil, water, peat and plant litter.

acre. An imperial measure of land area equal to 43,560 square feet, 4046.7 m2 or 0.4 ha.

advance growth. Young trees that have become established naturally in a forest before cutting or regeneration begin.

advanced regeneration. Trees that have become established naturally under a mature forest canopy and are capable of becoming the next crop after the mature crop is removed.

age.

of a tree:

• **age at breast height**: the number of annual growth rings between the bark and the pith, as counted at breast height.

• **age at harvest**: the number of years required to grow from establishment to maturity.

• **stump age**: the number of annual growth rings between the bark and the pith, as counted at stump height.

• **total age**: the number of years elapsed since the germination of the seed or the budding of the sprout or root sucker.

of a forest, stand or forest type, the average of the trees comprising it:

• **harvest age**: The number of years between the establishment and the final harvest of a forest crop.

• **total age**: The average total age of the trees comprising it.

age class. One of the intervals into which the range of age classes of trees in a stand are divided into for classification and use. Individual trees measured in diameter at breast height (1.3m from ground level) and separated as follows: seedlings = tiny sprouts, saplings = 1-9cm , polewood = 10-25cm (4-10”), small sawlogs = 26-37cm (11-15”), medium sawlogs = 38-49cm (16-20”), large sawlogs = ≥50cm (≥21”).

AGS - *acceptable growing stock*. Trees suitable for retention in the stand for at least one cutting cycle (15 to 25 years). They are trees of commercial species and of such form and quality as to be saleable for sawlog products at some future date.

all-aged. Applies to a stand that contains trees of all ages.

all-aged management. A system of growing forest trees in groups where the individual trees are not the same age (theoretically, an all-aged forest has trees scattered throughout that range in age from one year to the oldest tree, whatever its age may be).

allowable cut. The volume of wood that may be harvested, under management, for a given period.

ANSI - *areas of natural and scientific interest*. Areas of land and water containing natural landscapes or features that have been identified by the Ontario ministry of Natural Resources as having life science or earth science values related to protection, scientific study or education.

AOC - ***area of concern***. An area adjacent to an identified value that may be affected by some (or all) aspects of forest management activity.

aquatic system. Areas where water levels are greater than 2 m in depth.

artificial regeneration. Renewal of a tree crop by direct seeding or by planting seedlings or cuttings.

audit. A formal examination of an organization's or individual's performance.

B

basal area.

• *of a tree*: the cross-sectional area of the bole of a tree, 1.3 m above the ground. Basal area = diameter of tree (cm) squared, times 0.00007854. (Expressed in m2).

• *of a stand of trees*: the sum of all the individual tree basal areas for a given land area. Commonly expressed as m2/ha.

berry. A pulpy, non-splitting fruit developed from a single pistil and containing one or more seeds.

biodiversity - ***biological diversity***. The variety and variability (in time and space) among living organisms and the ecological complexes in which they occur.

board foot (bd. ft.). A volume measure of lumber, being one foot wide, one foot long and one inch thick.

bole. The main trunk of a tree.

breast height. The standard height, 1.3 m above ground level, at which diameter of a standing tree is measured. See also DBH.

broadleaf. See hardwood.

browse. Small bushes, sprouts, herbaceous plants, small trees, etc. that wildlife feed on.

buffer. A zone or strip of land that shields one area from another. Commonly used along streams or as visual barriers

bumper tree. A poor-quality, low-value tree that grows in close proximity to higher-value trees. Skid roads should be located next to bumper trees in order to protect residual trees from damage during a logging operation.

butt. The base of a tree or log.

C

cambium. A layer of cells between the woody part of the tree and the bark. Division of these cells results in diameter growth of the tree through formation of wood cells (xylem) and inner bark (phloem).

canopy. A collective term for the layer formed by the crowns of the taller trees in a forest.

canopy closure. The progressive reduction of space between crowns as they spread laterally, increasing canopy cover.

canopy gap. A hole in the forest canopy that allows light penetration to the forest floor. Can be formed by naturally falling trees, standing dead trees and logging practices.

Carolinian species. A species whose range is restricted entirely to the Carolinian zone.

Carolinian zone. Also known as the Deciduous Forest Region of Canada and recognized as one of the most significant and threatened landscapes in the country.

cavity. An unfilled space within a mass, a hollowed-out space. In forestry and wildlife there are several categories of cavity trees, each with their own importance in the ecosystem:

• **Pileated woodpecker roost cavities**: First priority for retention are living trees with cavities used by pileated woodpeckers for roosting. These are usually large (40+ cm DBH) diameter trees that are hollow and have at least two excavated entrance holes. These holes are somewhat oval, about 7.5 to 10 cm wide and 10 to 12.5 cm high. Holes are symmetrically oval, smooth edged and deep.

• **Pileated woodpecker nest cavities**: Second priority for retention are living trees with cavities used by pileated woodpeckers for nesting. These are usually large (40+ cm DBH) diameter trees in which pileated woodpeckers have excavated one or more nest chambers and associated entrance holes. Nest and roost trees can be distinguished by the number of entrance holes and tree condition. Roost trees may have 2 to 10+ entrance holes and entrance holes may be less than 1 m apart. Condition is probably the best clue to separate nest and roost trees. Pileated woodpeckers excavate nest cavities in trees with white spongy heart rot (not trees with existing hollows). Roost cavities are in hollow trees (look for seams, barreling, etc. to indicate hollowness).

• **Other woodpecker nest cavities or natural nest or maternal den cavities**: The third priority for retention are living trees with cavities excavated by other woodpeckers (e.g. yellow-bellied sapsucker, hairy woodpecker, northern flicker) for nesting or cavities suitable for nesting or denning (by secondary cavity users) that formed from natural decay processes.

• **Escape cavity**: The fourth priority for retention are living trees with natural cavities that provide temporary shelter, escape from predators, food-caching sites, or resting/loafing/ roosting sites. They are not ideal for nests or dens because of location, size, entrance hole size, or orientation.

• **Feeding cavity**: The fifth priority for retention are living trees with feeding excavations created by woodpeckers in search of food. They are generally rectangular, semi-circular, or irregular. Holes do not typically enlarge into chambers suitable for nesting or escape. Edges and surfaces tend to be rough.

• **Potential cavity tree**: Trees with potential to attract excavators or develop natural cavities. Typically they have evidence of advanced heart rot. These living trees are retained when situations arise in areas that do not have at least 6 existing cavities per hectare left after tree marking.

clearcut. An area on which the entire timber stand has been harvested. **see** *reproduction methods*.

codominant trees. Trees with crowns forming the general level of the crown cover and receiving full light from above, but comparatively little from the sides; usually with medium size crowns. **see** *crown class*.

commercial thinning. Removing trees from a developing young stand, so that remaining trees will have more growing space; dead and dying trees will be salvaged; and the operation will make a net profit.

community. An integrated group of species inhabiting a given area and influencing one another's distribution, abundance and evolution.

compartment. A group or stand of trees that is sufficiently uniform in species composition, arrangement, condition, management history, or age class to be a distinguishable unit.

competition. The general struggle for existence within a trophic level in which the living organisms compete for a limited supply of the necessities of life.

composition. The representation of tree species in a forest stand, expressed quantitatively as per cent by volume or basal area of each species.

cone. The male or female reproductive organs of conifers.

conifer. A tree belonging to the order C*oniferae*, usually evergreen with cones, needle-shaped leaves and producing wood known commercially as 'softwood.'

conservation. In forestry, the wise use of natural renewable resources. A key idea for understanding 'conservation' is 'use' by people.

cord. 128 cubic feet of stacked roundwood (whole or split, with or without bark) containing wood and airspace, with all the pieces of similar length and lined up on approximately the same direction. i.e. a pile of firewood 4'x 4' x 8'.

corridor. A band of vegetation, usually older forest, which serves to connect distinct patches on the landscape. Corridors provide connectivity, which permits the movement of plant and animal species between what would otherwise be isolated patches.

cover. Vegetation or other material providing protection. Plants or objects used by wild animals for nesting, rearing of young, resting, escape from predators, or protection from adverse environmental conditions.

crop tree. A tree selected in a young stand, to be retained until final harvest.

crotch. The fork of a tree or branch.

crown. The branches and foliage of a tree.

crown class. A designation of trees in a forest with crowns of similar development and occupying similar positions in the crown cover. Differentiation into crown classes applies to even-aged stands and within small even-aged groups in which trees in an uneven-aged stand are often arranged. Five crown classes are commonly recognized: dominant, codominant, intermediate, overtopped (suppressed), and wolf trees.

crown closure. The time at which the available crown space has become fully occupied.

crown cover. The canopy of green leaves and branches formed by the crowns of all trees in a forest. Generally expressed as a per cent of total area.

crown density. The compactness of the crown cover of the forest; depends on the distance apart and the compactness of the individual crowns. A loose term combining the meanings of 'crown closure' and 'shade density.'

cruising. Measuring standing trees to determine the volume of wood on a given tract of land. Used for harvesting, purchasing and general management.

cubic meter (m3). A volume measure, 1 m by 1 m by 1 m.

cull. A tree or log of merchantable size rendered unmerchantable because of poor form, large limbs, rot, or other defects.

cutting cycle. The planned interval between major harvesting operations in the same stand. A 20-year cutting cycle indicates a harvest is done once every 20 years.

D

DBH - ***diameter at breast height***. The diameter of a tree outside of the bark at roughly breast height. Normally measured 1.3 m off the ground on the uphill side of the tree. It is easier to measure at this height and many trees have large swells in the stem below this point that could increase errors in computing tree volumes.

deadwood. The decaying logs that lie on the forest floor, also called "coarse woody debris".

deciduous. Term applied to trees (commonly broad-leaved trees) that drop all their leaves sometime during the year.

defect. Any irregularity or imperfection in a tree, log, piece, product, or lumber that reduces the volume of sound wood or lowers its durability, strength, or utility value.

defect class. A system of categorizing tree defects by severity of degradation of the tree and/or the merchantable portion of the tree over time:

• **major defect**: The tree will degrade rapidly.

• **moderate defect**: The tree will degrade slowly.

• **minor defect**: The tree will maintain quality over cutting cycle period.

defoliator. An agent that damages trees by destroying leaves or needles.

diameter at breast height. See DBH.

diameter class. One of the intervals into which the range of diameters of trees in a forest is divided for purposes of classification and use. Generally this is done in 2 cm, even increments (40 cm class would contain trees from 39.1 to 41.0 cm)

diameter limit. The smallest (occasionally the largest), size to which trees or logs are to be measured, cut, or used. The points to which the limit usually refer are stump, breast height, or top.

diameter-limit cutting. A system of selection harvest based on cutting all trees in the stand over a specified diameter. This eliminates marking individual trees. This is not a recognized silvicultural system in Ontario.

disease. Harmful deviation from normal functioning of physiological processes, generally pathogenic or environmental in origin.

dominant trees. Trees with crowns extending above the general level of the crown cover and receiving full light from above and partly from the side; larger than the average trees in the stand, with crowns well developed, possibly somewhat crowded on the sides. **see** *crown class*.

downed woody debris (**DWD**). Sound and rotting logs and stumps that provide habitat for plants, animals and insects and a source of nutrients for soil development.

E

Eastern Ontario Model Forest (EOMF). The Eastern Ontario Model Forest is a collection of dedicated individuals and groups working together to sustain and ensure the health of the forests of eastern Ontario. The EOMF has selected the Rainforest Alliance (formerly SmartWood), as the third party auditor. Rainforest Alliance is accredited by FSC and has the authority to certify forests as well-managed in accordance with the *FSC Certification Standard for the Great Lakes - St. Lawrence Region*.

ecology. The science that deals with the interaction of plants and animals with their environment.

Ecological land Classification (ELC). A system devised by OMNR to describe over 80 wetland and terrestrial forest vegetation types in southern Ontario. This preliminary community classification system has six different organizational levels.

ecosystem. A functional unit consisting of all the living organisms (plants, animals and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size–a log, pond, field, forest, or the earth's biosphere–but it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation, for example, forest ecosystem, old-growth ecosystem, or wetland ecosystem.

ecosystem management. The use of an ecological approach to achieve productive resource management by blending social, physical, economic and biological needs and values to provide healthy ecosystems.

edge. The transitional zone where one cover type ends and another begins.

ELC. See Ecological Land Classification.

endangered species. A species of native fish, wildlife, or plants found to be threatened by extinction because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of over-exploitation, disease, predation, or other factors its survival requires assistance.

environment. All elements living and inanimate, that affect a living organism.

EOMF. See Eastern Ontario Model Forest.

even-aged. The conditions of a forest or stand composed of trees having no, or relatively small, differences in age, although differences of as much as 30 per cent are admissible in rotations greater than 100 years of age.

even-aged management. The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 per cent of the age of the stand at maturity. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Cutting methods producing even-aged stands are clearcut, shelterwood, or seed-tree.

exotic. Not native; foreign.

F

felling and bucking. The process of cutting down standing timber and then cutting it into specific lengths for yarding and hauling.

final cutting. The removal of seed or shelter trees after regeneration has been affected, or removal of the entire crop of mature trees under a clearcut silvicultural system.

fire scar. An injury or wound in the bole of a tree caused or accentuated by fire.

fish habitat. Spawning grounds and nursery, rearing food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.

forest. A plant community predominantly of trees and other woody vegetation, growing more or less closely together; An area managed for the production of timber and other forest products, or maintained under woody vegetation for such indirect benefits as protection of site or for recreation.

forest management. The application of business methods and technical forest principles to the management of forest property.

forest structure. The ages and sizes of the various layers of plant vegetation within a forest.

Forest Stewardship Council (FSC). Forest Stewardship Council is an international non-profit organization founded to support environmentally appropriate, socially beneficial and economically viable management of the world's forests. It supports the development of national and regional standards to be used to evaluate whether a forest is being well-

managed. All forest products carrying the FSC logo are independently certified as originating from forests that meet the internationally recognized FSC's 10 guiding Principles.

forest survey. An inventory of forest land to determine size, condition, timber volume and species, for specific purposes or as a basis for forest policies and programs. Also refers to carefully measuring and marking property boundaries.

forest type. A descriptive term used to group stands of similar character in composition and development, to differentiate them from other groups of stands.

forestry. The science, art and practice of managing and using for ecological, economic, and social benefit the natural resources that occur on and in association with forest lands.

form. The shape of a log or tree.

form class. A measure of bole taper derived by dividing diameter inside bark at a given height (usually 5.2 or 10.4 meters) by DBH. These values are often required to use tree-volume tables.

fragmentation. The process of transforming large continuous forest patches into one or more smaller patches surrounded by disturbed areas. This occurs naturally through such agents as fire, landslides, windthrow and insect attack. In southern Ontario, agriculture and development have contributed to forest fragmentation.

free-to-grow. A condition in which a forest is considered established based on a minimum stocking standard, a minimum height and freedom from competition that could impede growth.

FSC. See Forest Stewardship Council.

fuelwood. Trees used for the production of firewood logs or other wood fuel.

fungus. A plant without chlorophyll that derives its nourishment from the organic matter of other plants.

G

gallery. A passage or burrow, excavated by an insect under bark or in wood for feeding or egg-laying purposes.

gap. A site at which a canopy tree has died and at which active recruitment of new individuals into the canopy is occurring.

gene pool. Sum of all genes among scattered populations of a given species.

genetic diversity. The diversity of genes among members of the same species or population.

germination. The resumption of active growth in the embryo of a seed, as demonstrated by the protrusion of a radicle (embryonic root axis).

girdle. To encircle the stem of a living tree with cuts that completely sever bark and cambium and often are carried well into the outer sapwood, done to kill the tree by preventing the passage of carbohydrates to the roots. Also refers to same process caused by animals, such as mice or beavers.

GIS. Geographic Information Systems.

ground cover. The layer of life that carpets the forest floor including plants, mosses, and fungi.

group selection. Modification of the selection system in which trees are removed in small groups rather than as individuals.

growing stock. The sum, by number or volume, of all the trees in a forest or a specified part of it.

growth. The increase in diameter, basal area, height or volume of individual trees or groups of trees during a given period.

growth rate. With reference to wood, the rate at which wood has been added to the tree at any particular point, usually expressed in the number of annual rings per centimeter. May also be stated as "annual leader growth."

H

ha. See hectare.

habitat. The environment in which the plant or animal lives. Also the food, water, shelter, cover and other elements of the environment that living organisms require to survive.

hardwood.

• Generally, one of the botanical group of trees that have broad leaves, in contrast to the needle-bearing conifers.

• Wood produced by broad-leaved trees, regardless of texture or density.

harvest. Extraction of some type of product from the forest. Generally associated with a cutting.

heart rot. A decay characteristically confined to the heartwood. It usually originates in the living tree.

heartwood. The inner core of a woody stem, wholly composed of non-living cells and usually differentiated from the outer enveloping layer (sapwood) by its darker colour.

hectare (ha). An area measure of 10,000 square meters. Basic unit of land area.

herb. A non-woody flowering plant.

high-grading. The removal from the stand of only the best trees or tree species, often resulting in a poor quality residual stand. Not consistent with Good Forestry Practices.

I

ice damage. Breakage of tops and branches and stripping of branches and needles by an ice storm.

immature. Trees or stands that have grown past the regeneration stage but are not yet mature.

improvement cutting. The elimination or suppression of less valuable trees in favor of more valuable trees, typically in a mixed, uneven-aged forest.

increment core. That part of the cross section of a tree extracted by an increment borer. Used to determine tree age and growth.

indicator species. Species of plants used to predict site quality and characteristics.

intermediate trees. Trees shorter than those in the dominant or codominant classes, but with crowns either below or extending into the crown cover formed by codominant and dominant trees; receiving a little direct light from above, but none from the sides; usually with small crowns, considerably crowded on the sides. **see** *crown class*.

intolerance. Trees unable to survive or grow satisfactorily under specific conditions, most commonly used with respect to their sensitivity to shade but also to conditions such as wind, drought, salt and flooding.

invasive exotic species. An invasive exotic species is a non-native plant or animal that threatens the survival of native species.

K

knot. That part of a branch that has been incorporated into the main stem.

L

landing. The area where logs are collected for loading for transport to a mill.

landscape. All the natural features, such as fields, hills, forests and water that distinguish one part of the Earth's surface from another part; usually that portion of land or territory which the eye can comprehend in a single view, including all of its natural characteristics.

leader. The growing top (terminal shoot) of a tree. The distance up the main stem of the tree between each whorl of branches generally represents one year of height growth.

leave tree. Tree left in or just outside a harvest zone (often otherwise a clearcut) to re-seed the area. This is nature's method of reforestation; but it is often slower and it does not have the more assured results of direct seeding or planting. May also refer to trees left after a thinning.

litter. The uppermost layer of the soil, made up of freshly fallen or slightly decomposed organic materials.

log.

• To cut and deliver logs.

• A tree segment suitable for lumber and other products.

logger. A person who is engaged in a logging operation; locally, one who moves logs to landings or skidways.

M

management plan. A written plan for the organized handling and operation of a forest property. It usually includes data and prescribes measures designed to provide optimum use of forest resources according to the landowner's objectives.

marking timber. Selecting and indicating, usually by a paint mark, trees to be cut or retained in a harvesting or tending operation.

mast. The fruit and nuts of trees and woody shrubs used as a food source by wildlife.

mast trees. Trees supporting mast production, e.g. oak, beech, cherry.

maturity. For a given species or stand, the approximate age or condition beyond which the growth rate declines or decay begins to assume economic importance.

mechanical site preparation. Any activity that involves the use of mechanical machinery to prepare a site for reforestation.

merchantable. That part of a tree that can be manufactured into a salable product. Not to be confused with marketable.

merchantable height. The length of the tree stem from the top of the stump to the top of the last merchantable section. Usually expressed in meters or number of logs.

merchantable length. Length of the tree from which could be produced a merchantable product under given economic conditions.

merchantable timber. A tree or stand of trees that may be converted into salable products.

merchantable volume. The amount of wood in a single tree or forest stand that is considered salable.

meter (m). Measure of length equal to 100 cm.

microclimate. Generally the climate of small areas, especially insofar as this differs significantly from the general climate of the region. Stands often create microclimates.

microsite. A portion of a site that is uniform in microtopography and surface soil materials. It can range in size from less than 1 sq.m to occasionally over 5 sq.m. Microsites are dynamic in that their characteristics are ever-changing, imperceptibly or suddenly.

mineral soil. Soil consisting predominately of, and having its properties determined by, inorganic matter. Usually contains less than 20 % organic matter.

MNR/MNRF. See OMNR/OMNRF.

MOE/MOECC. The Ontario Ministry of Environment and Climate Change, formerly Ministry of Environment.

mortality. Death of forest trees as a result of competition, disease, insect damage, drought, wind, fire and other factors.

mycorrhiza. A rootlet of a higher plant modified through integral association with a fungus to form a constant structure that differs from either component but is attached to the root system and functions somewhat as a rootlet. It is usually considered to be beneficial to the associated plant.

N

natural regeneration. The renewal of a forest stand by natural seeding, sprouting, suckering, or, layering seeds may be deposited by wind, birds, or, mammals.

natural thinning. Death of trees in a stand as a result of competition.

NHIC. The Natural Heritage Information Centre, an information sharing and inventory centre of the Ontario Ministry of Natural Resources and Forestry.

nurse crop. Stands of trees, often plantations, that provide the shelter, shade, and moist conditions that allow other species to grow.

nurse tree (**crop tree**). A tree or crop of trees, shrubs, or, other plants that foster another, generally a more important, tree or crop.

nut. A dry, non-splitting, one-seeded fruit with a woody or leathery outer surface, often encased in a husk.

O

old growth. A relatively old forest that shows little or no evidence of human disturbance. This term is misapplied by many to describe any forest that appears to be old. Individual trees in this type of forest are usually over 200 years old and there are large standing and fallen dead trees throughout the stand.

OMNR/OMNRF. The Ontario Ministry of Natural Resources and Forestry, formerly Ministry of Natural Resources.

operation. Used interchangeably for logging jobs, harvesting, cutting, milling, etc. An all-inclusive term for harvesting and hauling out the forest products.

organic litter. The layer of decomposing leaves, bark, twigs and other organic debris that lies on the forest floor.

organic soil. Soil containing a high proportion (greater than 20 or 30 per cent) of organic matter.

overmature. That period in the life cycle of trees and stands when growth or value is declining.

overstocked. A condition of the stand or forest, indicating more trees than desired, normal, or full stocking would require.

overstory. That portion of the trees in a stand forming the upper crown cover.

overtopped tree. Trees with crowns entirely below the general level of the overstory cover, receiving no direct light either from above or from the sides. Also known as suppressed. *See crown class.*

P

partial cutting. Refers generically to stand entries, under any of the several silvicultural systems, to cut selected trees and leave desirable trees for various stand objectives. Partial

cutting includes harvest methods used for seed tree, shelterwood, selection and clearcutting with reserves systems.

patch cutting. A silvicultural system that creates openings less than 1 hectare in size and is designed to manage each opening as a distinct even-aged opening.

pest. A plant, animal, or thing that is troublesome or annoying (from a human value perspective).

pH. A measure of the hydrogen ion on a scale of 0 (very acidic) to 14 (very basic). A pH value of 7 is neutral. Every change in one unit of measure indicates a 10x change in the quantity of hydrogen ions (e.g., a pH of 5.0 is 10x more acidic than a pH of 6.0 and 100x more acidic than a pH of 7.0).

phloem. The tissues of the inner bark, characterized by the presence of sieve tubes and serving for the transport of elaborated foodstuffs.

photosynthesis. The conversion by green plants of light, water and air into food energy.

pioneer (**botanical**). A plant capable of invading bare sites (that is, a newly exposed soil surface) and persisting there until supplanted by successor species. A species planted to prepare a site for such successor species and therefore, a nurse crop.

plantation. An artificially reforested area established by planting or by direct seeding.

plot. A carefully measured area laid out for experimentation; may be permanent or temporary.

point sampling. A method of selecting trees for measurements and of estimating stand basal area at a sample location or point sample. Also called plotless cruising, angle count method. A 360o sweep is made with an angle gauge about a fixed point and the stems with breast height diameters appearing larger than the fixed angle subtended by the angle gauge are included in the sample.

pole.

• A young tree between 10 and 25 cm in DBH.

• A log cut for the manufacture of utility poles (usually conifer trees larger than 33 cm DBH and of top-quality).

polewood. Trees with a DBH between 10 and 25 cm.

precommercial thinning. Removal of some of the trees in a young stand to reduce competition for water, nutrients and light and to accelerate commercial growth on remaining trees. Trees thinned from these stands have no commercial value.

pre-harvest silviculture prescription. A document that applies site-specific field data and develops forest management prescriptions for areas in advance of logging.

preparatory cutting. The removal of trees near the end of a rotation, which permanently opens the canopy and enable the crowns of seed bearers to enlarge, to improve conditions for seed production and natural regeneration. Typically done in the shelterwood system.

prescribed burning. The knowledgeable application of fire to a specific unit of land to meet predetermined resource management objectives.

prescription. A course of management action prescribed for a particular area after specific assessments and evaluations have been made.

primary excavator (**tree cavity**). Animals that excavate their own cavities.

prism. A wedge-shaped piece of clear or amber-coloured glass that is used to select trees for timber sampling or to estimate basal area.

pruning. The removal of live or dead branches from standing trees, usually the lower branches of young trees and the removal of multiple leaders in plantation trees, for the improvement of the tree or its timber; the cutting away of superfluous growth, including roots, from any plant to improve its development. **see** *self-pruning*.

PSW. Provincially Significant Wetland, as designated by the Ontario Ministry of Natural Resources and Forestry.

pulpwood. Wood cut or prepared primarily for manufacture into wood pulp, for later manufacture into paper, fibreboard, or other products.

punky. A soft, weak, often spongy condition in wood; caused by decay.

Q

radicle (root). The seed contains a radicle or root meristem in the embryo from which the first tap root develops.

raptor. A bird of prey.

recruitment. Process of maintaining, restoring, or increasing the seedling and sapling component of a stand.

reforestation. The natural or artificial restocking of an area with forest trees.

regeneration. The renewal of a tree crop whether by natural or artificial means. Also the young crop itself which commonly is referred to as reproduction.

regeneration cut. The second cutting state in the shelterwood silviculture system, often removing 50% of the mature trees in a stand.

release. Freeing a tree or group of trees from competition by cutting or otherwise eliminating growth that is overtopping or closely surrounding them.

removal cut. One or more cuts in the shelterwood system that releases established seedlings. The last removal cut is called the final removal cut.

reproduction.

• The process by which a forest is renewed:

• **artificial**: Renewal by direct sowing or planting.

• **natural**: Renewal by self-sown seeds, sprouts, rhizomes, etc.

• Seedlings or saplings of any origin.

reproduction method.

• **clearcutting**: Removal of the entire forest in one cut. This method perpetuates even-aged stands.

• **seed-tree**: Removal of the mature timber in one cut, except for a small number of seed trees; called a group cutting when the seed trees are left in groups, a reserve cutting when specifically selected seed trees are left for growth, as well as to furnish seed.

• **selection**: Removal of mature timber, usually the oldest or largest trees, either as single scattered trees or in small groups at relatively short intervals, commonly 15 to 25 years, repeated indefinitely. This encourages a continuous establishment of natural reproduction and an uneven-aged stand is maintained.

• **shelterwood**: Removal of the mature timber in a series of cuttings, which extend over a period of years. Usually equal to not more than one-quarter (often not more than one-tenth) of the time required to grow the crop. The establishment of natural reproduction under the partial shelter of seed trees is encouraged, but sometimes these areas must be artificially regenerated.

• **coppice**: Forest regeneration by sprouting (vegetative reproduction) from stumps or roots.

residual basal area. The basal area per hectare of acceptable trees left standing after harvest.

residual stand. Trees, often of sawlog size, left in a stand after thinning to grow until the next harvest. Also called leave trees.

residuals (**residual trees**). Trees left standing after harvesting.

rhizome. A horizontal stem that bears roots and leafy shoots.

roots. The below-ground tree or plant parts that provide physical support, absorb water and nutrients from the soil and store food produced by photosynthesis.

root graft. A functional union of two roots after their formation, commonly between roots of the same individual, or, roots of neighboring trees, of the same species.

rotation. The period of years required to establish and grow a timber crop to a specified condition of maturity, when it may be harvested and a new tree crop started.

rotation age. The age at which a stand is considered ready for harvesting under an adopted plan of management.

rot. Wood in a state of decay.

S

salvage. To harvest trees that are dead or are in poor condition but can still yield a forest product.

sample. A small collection from some larger population.

sample tree. A representative or average-size tree, chosen for detailed measurement of condition, size, growth, or quality.

sapling. A young tree of small diameter, typically 1 to 9 cm DBH.

sapwood. The light-coloured wood that appears on the outer portion of a cross section of a tree. Contains living cells; serves to conduct water and minerals to the crown.

SAR. Species at Risk. Defined to different degrees of risk under provincial Endangered Species Act, 2007.

savannah. A treed community with 11 to 35 % cover of coniferous or deciduous trees.

sawlog. A log large enough to be sawn into lumber.

sawtimber. Trees that yield logs suitable in size and quality for the production of lumber.

scale. The estimated sound volume of a log or group of logs in terms of a given log rule or formula; used to estimate the sound volume of a log or group of logs.

scarify. To disturb the forest floor and top soil in preparation for natural regeneration or direct seeding or planting.

second growth. A second forest that develops after harvest of the original, natural forest.

secondary cavity-user. Wildlife that use decay cavities or ones abandoned by primary excavators.

seedbank. The store of dormant seeds buried in the soil.

seedbed. The soil, forest floor or other media on which seed falls.

seed cutting. Removal of trees in a mature stand to effect permanent openings in the canopy (if not done in a preparatory cutting) and thereby provide conditions for securing regeneration from the seed of trees retained for this purpose. Also the first of the shelterwood cuttings.

seed tree.

• A tree that produces seed.

• Trees reserved in a harvest operation to supply seed.

seed year. A year in which a given species produces a seed crop greatly in excess of the normal. Applied usually to trees of irregular or infrequent seed production.

seed zone. Areas of similar climatic and elevation conditions, used to specify where tree seed was collected and where trees from such seed are most likely to be successfully grown.

seedbed. In natural plant reproduction, the soil or forest floor on which seed falls; in nursery practice, a prepared area in which seed is sown.

seedling. A small tree grown from seed. Usually the term is restricted to trees equal to or less than 1 cm DBH.

seep. A spot where water contained in the ground oozes slowly to the surface and often forms a pool. A small spring.

selection silvicultural system. A periodic partial-cutting, controlled by basal area, using vigor and risk characteristics to determine individual tree selection. An uneven-aged silvicultural system.

selective cutting. The cutting of individual selected trees. There are generally few if any control measures. Also known as high-grading. Not to be confused with the selection silvicultural system.

self-pruning. The natural death and fall of branches from live trees due to causes such as light and food deficiencies, decay, insect attack, snow and ice; also called natural pruning.

senescence. The process of turnover of green biomass into yellow (or dead) biomass. Senescence mainly depends on origin and development of a plant, but it is also influenced by dryness and/or nutrient stress and pest diseases.

shade tolerance. The capacity of a tree or plant species to develop and grow in the shade of and in competition with other trees or plants.

shelterwood. The cutting method that describes the silvicultural system in which, in order to provide a source of seed and/or protection for regeneration, the old crop (the shelterwood) is removed in two or more successive shelterwood cuttings. The first cutting is ordinarily the seed cutting, though it may be preceded by a preparatory cutting and the last is the final cutting. Any intervening cutting is termed removal cutting. An even-aged stand results.

shelterwood silvicultural system. An even-aged silvicultural system where in order to provide a source of seed and/or protection for regeneration, the old crop is removed in two or more successive cuttings:

• **Group Shelterwood System**: Patches of advanced regeneration arising from thinnings or from natural disturbances, commonly developed in even-aged stands. Where this condition is prominent, shelterwood cuttings can be made specifically in relation to the requirements of each group of advanced regeneration. These clumps of regeneration are enlarged by the removal of all or most of the trees above them and initiating preparatory or seeding cuttings around them. The holes created in the canopy are gradually enlarged to keep pace with the establishment of reproduction.

• **Irregular Shelterwood System**: Harvest cutting in which opening of canopy is irregular and gradual; generally in groups, with the final cutting often is strips; regeneration natural; regeneration interval long, often up to half the rotation and the resultant crop considerably uneven-aged and irregular.

• **Strip Shelterwood System**: A shelterwood system in which regeneration cuttings are carried out on fairly wide strips, generally against the prevailing winds and progress rapidly; regeneration is mainly natural, regeneration interval short and resultant crop fairly even-aged and regular.

• **Uniform Shelterwood System**: A shelterwood system in which the canopy is opened fairly evenly throughout the regeneration area; regeneration is mainly natural, though it may be supplemented artificially; regeneration interval fairly short and resultant crop more or less even-aged and regular.

shrub. A woody perennial plant (lives more than one year) that differs from a perennial herb by its woody, persistent stems and from a tree by its low stature and branches that start from the base.

silvics. A knowledge of the nature of forests and forest trees, how they grow, reproduce and respond to changes in their environment.

silvicultural system. A process whereby forests are tended, harvested and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop with a view to regeneration and according to the type of forest thereby produced.

silviculture. The art and science of producing and tending a forest; the theory and practice of controlling forest establishment, composition, growth and quality of forests to achieve the objectives of management.

silviculture prescription. A site-specific operational plan that describes the forest management objectives for an area. It prescribes the methods for harvesting the existing forest stand and a series of silviculture treatments that will be carried out to establish a free growing stand in a manner that accommodates other resource values as identified.

single-tree selection. The cutting method that describes the silvicultural system in which trees are removed individually, here and there, each year over an entire forest or stand. The resultant stand usually regenerates naturally and becomes all-aged. **see** *selection silvicultural system*.

site. An area of land, especially with reference to its capacity to produce vegetation as a function of environmental factors (climate, soil, biology, etc.).

site preparation. Any treatment of a forest site to prepare it for establishment of a plantation or for natural regeneration.

Site Region. Hills (1959) divided Ontario into Site Regions that are considered to be areas of similar potential biological production, based on climate as modified by physiographic landform and proximity to the Great Lakes.

skid road (**skid trail**). A pathway over which logs are dragged (skidded) from the stump to the landing. Logs are dragged by a machine called a skidder or by horses.

skidder. A wheeled or tracked vehicle used for sliding and dragging logs from the stump to a landing.

skidding. The process of dragging logs from the woods to a landing.

slash.

• Tree tops, branches, bark and other debris, left after a forest operation; or

• The process of cutting down undesirable vegetation.

snag. A standing, dead tree or a standing section of the stem of a tree broken off at the height of six meters or more. If less than six meters, it is properly termed a stub.

softwood. One of the botanical group of trees that generally have needle or scale-like leaves, the conifers. Also the wood produced by such trees, regardless of texture or density.

soil. Unconsolidated mineral material or organic material that is greater than 15 cm thick that occurs at the earth's surface, has undergone soil formation processes, usually exhibits a distinct soil profile and is capable of supporting plant growth.

soil horizon. A layer of soil with distinct characteristics that separate it from other soil layers.

soil moisture. The relative amount of water in the soil; usually applied to upper levels of soil, occasionally to humus layer.

soil profile. A vertical section of soil showing the nature and thickness of the various horizons, often used in soil classification.

soil series. Grouping of soils with similar profile characteristics.

soil texture. The relative proportion of various particle sizes such as sand, silt, clay and coarser materials in a mineral soil sample. The Canadian System of Soil Classification describes the basic textural classes (clay, silty clay, sandy loam, *etc.*)

SOP. See Standard Operating Procedures.

spacing.

• The distance between trees in a plantation, a thinned stand, or a natural stand.

• The removal of undesirable trees within a young stand to control stocking, to maintain or improve growth, to increase wood quality and value, or to achieve other resource management objectives.

species (**of trees**). Trees having very similar genetic makeup, so that they freely interbreed and have common characteristics. In common language, a 'kind' or 'variety.' Each species is identified by a scientific name that consists of a genus portion and then a species portion (*Pinus strobus*, white pine).

species composition. The percentage of each recognized tree species comprising the forest type based upon the gross volume, the relative number of stems per hectare or basal area.

stand. An aggregation of trees occupying a specific area and uniform enough in composition (species), age and arrangement to be distinguishable from the forest on adjoining areas.

stand density. The number of trees usually expressed on a per hectare basis.

stand structure. The distribution and representation of age and/or size classes and of crown and other tree classes within a stand.

stand table. A summary table showing the number of trees per unit area by species and diameter classes, for a stand or type. The data may also be presented in the form of a frequency distribution of diameter classes.

Standard Operating Procedure (SOP). Standard Operating Procedures provide the foundation to allow harvest activities to be undertaken in a planned and organized fashion while taking into account landowner objectives, the timber resources available for harvest

and non-timber values which may require special consideration. SOP's are an integral component in ensuring Sustainable Forest Management.

stem. The trunk of a tree.

stick nest. A platform of sticks (twigs up to small branches) constructed by some bird species for nesting.

stocking.

• A qualitative expression of the adequacy of tree cover on an area, in relation to a pre-established norm, expressed in terms of crown closure, number of trees, basal area, or volume.

• **fully stocked**: Productive forest land stocked with trees of a merchantable species. These trees, by number and distribution or by average DBH, basal area, or volume, are such that at rotation age they will produce a timber stand that occupies the potentially productive ground. The stocking , number of trees, and, distribution required to achieve this will usually be determined from yield curves. Sometimes called *normally stocked*.

• **over stocked**: Productive forest land stocked with more trees of merchantable species than normal or full stocking would require. Growth is in some respect retarded and the full number of trees will not reach rotation age according to an appropriate yield and stock tables for the particular site and species.

stream. A permanent or intermittent water course.

structure. See forest structure.

stub. A standing, dead tree or a standing section of the stem of a tree broken off at the height of six meters or less. If more than six meters, it is properly termed a snag.

succession. The replacement of one plant community by another in progressive development towards climax vegetation.

• **primary**: Plant succession on newly formed soils or surfaces, exposed for the first time, that have never borne vegetation.

• **secondary**: Plant succession following the destruction of a part or all of the original vegetation.

sucker.

• A sprout from the lower portion of a stem, especially from the root.

• A shoot or tree originating from adventitious buds on roots.

sunscald. Death of cambial tissue on one side of a tree, caused by exposure to direct sunlight.

supercanopy tree. A living tree that sticks up well above the main canopy of a forest stand.

suppressed tree. *see overtopped*.

sustainability. The concept of producing a biological resource under management practices that ensure replacement of the part harvested, by re-growth or reproduction, before another harvest occurs.

sustainable forest management. Management regimes applied to forest land which maintain the productive and renewal capacities as well as the genetic, species and ecological diversity of forest ecosystems.

sustained yield. A policy, method, or plan of forest management that calls for continuous production, to achieve, at the earliest practicable time, an approximate balance between net growth and amount harvested.

swamp. A mineral-rich wetland characterized by a cover of deciduous or coniferous trees.

T

tally. The count of trees, logs, or other products; to count trees, logs, or other products; to record products, distances, etc. as measured.

taper. The gradual reduction of diameter in a stem of a tree or a log from the base to the top.

tending. Generally, any operation carried out for the benefit of a forest crop at any stage of its life, e.g., cleaning, thinning, pruning.

terrestrial system. Upland areas, where the water table is normally below the soil surface.

thinning. Partial harvesting in an immature stand to increase the growth rate of the leave trees. The goal is to foster quality growth, improve composition, promote sanitation and recover and use material that would otherwise be lost to mortality. Thinning does not generally increase per-hectare volume growth, but can increase lumber yield.

• **thinning from above**. A thinning that favors the most promising (not necessarily the dominant) stems, with due regard to even distribution over the stand, by removing those trees that interfere with them. Also known as *crown thinning*.

• **thinning from below**. A thinning that favors the dominants or selected dominants more or less evenly distributed over the stand by removing a varying proportion of the other trees. Also known as *low thinning*.

types of thinning:

• **low thinning**: The removal of trees from the lower crown classes in a stand. Also known as *thinning from below*.

• **crown thinning**: The removal of trees from the middle and upper crown classes in a stand, to favor the most promising trees of these classes. Also known as *thinning from above*.

• **selection thinning**: Removal of dominant trees to benefit trees in lower crown classes.

• **free thinning**: Removal of trees to benefit best trees, regardless of crown class.

• **mechanical thinning**: Removal of trees based totally on their spacing or arrangement. Also known as *row thinning*.

till. Glacial deposits laid down directly by the ice with little or no transportation or sorting by water.

timber. A term loosely applied to forest stands or their products; often applied to wood in forms suitable for heavy construction.

tolerance. The capacity of a tree or plant to develop and grow in the shade of (and in competition with) other trees or plants; a general term for the relative ability of a species to survive a deficiency of an essential growth requirement (light, moisture, nutrient supply).

top height. The mean height of 100 trees per hectare of largest diameter at breast height.

tree. A woody plant having one well-defined stem and a more or less definitely formed crown, usually attaining a height of at least three meters.

tree age. The number of years since the germination of the seed, or the budding of the sprout or root sucker.

tree length. Entire length of tree, or with the top lopped off at small diameter, as in skidding tree length to a landing for bucking into logs.

tree marking. Selecting and marking trees to be harvested and trees to be left to grow. Selected trees are usually identified with coloured paint on the tree trunk at DBH and at the stump. Normal colours used in Ontario are: orange/yellow for stem removal and blue for residual stems.

U

UGS - ***unacceptable growing stock***. These trees have a high risk of dying and are expected to decline over the next cutting cycle. They include trees that are of poor form and/or low quality.

underbrush. The brush growing in a forest.

undergrowth. Small trees and shrubs and other plants growing under a forest canopy.

underplanting. Planting young trees under a canopy of mature trees.

understory. That portion of the trees or other vegetation in a forest stand below the canopy.

uneven-aged. Applied to a stand in which there are considerable differences in the age of the trees and in which three or more age classes are represented.

uneven-aged management. The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species and the orderly growth and development of trees through a range of diameter or age classes. Cutting methods that develop and maintain uneven-aged stands are single tree selection and group selection.

unmerchantable. A tree or stand that has not attained sufficient size, quality and/or volume to make it suitable for harvesting.

V

vegetation type. The sixth and finest level of resolution in the Ecological Land Classification system. It represents recurring vegetation patterns observed on the landscape, based only on plant species composition. Normally, "Vegetation Types" include the names of dominant plant species of the community, based on relative abundance.

volume. The amount of wood in a tree, stand, or, other specified area according to some unit of measurement or some standard of use (e.g. m3 or m3/ha)

• **Gross Total Volume** (**GTV**): Volume of the main stem, including stump and top, as well as, defective and decayed wood of individual trees or stands.

• **Gross Merchantable Volume** (**GMV**): Volume of the main stem, excluding a specified stump and top, but, including defective and decayed wood of individual trees or stands.

• **Net Merchantable Volume** (**NMV**): Volume of the main stem, excluding stump and top, as well as, decayed wood of individual trees or stands.

volume table. A table showing gross volume of trees, based on given tree measurements (usually DBH and height).

W

water table. The upper surface of the water saturation zone.

wetland. Land that is seasonally or permanently covered by shallow water, or land where the water table is close to or at the surface. In either case, the presence of abundant water has caused the formation of hydric soils and has favored the dominance of either hydrophytic or water-tolerant plants.

wetland system. Areas where water levels fluctuate and are under two meters in depth.

wildlife. All wild mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, fungi, algae, bacteria and other wild organisms.

windfall. A tree uprooted or broken off by wind; an area on which the trees have been thrown by wind. **see** *windthrow*.

windfirm. Descriptive of trees and plantations that, because of species, soil or relative exposure, are unlikely to suffer windthrow.

windthrow. Uprooting or breakage of trees caused by strong winds.

wood. The lignified water-conducting, supporting and storage tissue of branches, stems and roots.

X

xylem. A complex tissue in the vascular system of higher plants that consists of vessels, tracheids, or both together with wood fibers and parenchyma cells, functions chiefly in conduction but also in support and storage and typically constitutes the woody element.

xeric. Describes a dry site.

Y

yield. Growth or increment accumulated by trees at specified ages expressed by volume or weight to defined merchantability standards.

yield curve. A graphical or mathematical representation of the yield of a given species, on a given site, at a given time.

yield table. A summary table for stands (usually even-aged stands) of one or more species on different site qualities, showing characteristics at different ages. The stand characteristics usually include average diameter and height and total basal area, number of trees and volume per hectare.

young growth. Any forest of relatively young age and condition.

Appendix B: Practice of Professional Forestry in Ontario

Role of Ontario Professional Foresters Association

As specified in the Professional Foresters Act, the Ontario Professional Foresters Association (OPFA) is responsible for regulating the practice of professional forestry in Ontario. As part of this responsibility, the OPFA has an ongoing obligation to increase public awareness regarding the role of the Association and its Members. OPFA members are valued professionals, proudly serving and protecting the public interest while delivering professional forestry services on private and public lands throughout Ontario.

Code of Ethics

The following is an excerpt from the OPFA detailing the Code of Ethics governing the practice of forestry in Ontario:

"A professional forester shall be governed by the Code of Ethics set out in this section in carrying out his or her professional duties.

A member of the Ontario Professional Foresters Association observes the duties of the profession and honours his or her duties to citizens, employers and clients, fellow members and Ontario's forests by embracing the following values:

1. Fidelity - A member works in the interest of and with fidelity to citizens, employers, clients and fellow members and provides services that are specifically related to the objectives and requirements of the employer or client.

2. Integrity - A member is obligated to disclose fully any direct or indirect pecuniary interests related to the work undertaken in his or her professional capacity and to take active measures to prevent the perception of any conflict of interest.

3. Credibility - A member shall undertake only work that he or she is competent to perform by virtue of training and experience and, where advisable, shall retain and co-

operate with other professional foresters and specialists and, further, shall endorse only those plans, reports, maps and specifications that he or she produces or directly supervises.

4. Confidentiality - A member shall hold as confidential information concerning the business affairs, technical methods, processes or practices of employers or clients and shall only disclose such information with the consent of the employer or client or where required to do so by law.

5. Diligence - A member shall disclose to his or her employer or client the consequences of any action that may be harmful to their interests or the interests of any other party.

6. Respect - A member shall maintain the honour and integrity of the profession and act at all times with responsibility and dignity. A member is respectful of other professional foresters and behaves with courtesy and good faith toward them and celebrates the accomplishments of other professional foresters.

7. Commitment to learning - A member shall dedicate himself or herself to continuous improvement of his or her forestry science skills and use their knowledge and skills to aid public awareness of forestry in Ontario." O. Reg. 145/01, s. 1 (2).

Standards of Practice

The following is an excerpt from the Ontario Professional Forester's Association guidance documents:

"The scope of practice for professional forestry in Ontario is detailed in the Professional Foresters Act, 2000. The following information comes directly from sections 3(1) and 3(2) of the Act:

The practice of professional forestry is the provision of services in relation to the development, management, conservation and sustainability of forests and urban forests where those services require knowledge, training and experience equivalent to that required to become a member under this Act and includes,

- the designing, specifying or approving of silvicultural prescriptions and treatments, including timber harvesting;
- the appraisal, evaluation and certification of forests and urban forests;
- the auditing of forest management practices;
- the assessment of impacts from planned activities on forests and urban forest
- the classification, inventory and mapping of forests and urban forests; and
- the planning and locating of forest transportation systems, including forest roads.

The practice of professional forestry does not include acts performed in relation to the management or manipulation of forests if they are performed,

- personally by individuals on land which they own;
- by a person acting within the scope of practice of a profession, trade or occupation that is listed in the regulations;

- by persons responding to an emergency situation such as a forest fire;
- by persons acting under the supervision of a member;
- by students enrolled in a forestry education program and under the supervision of the course instructor in the program;
- by a member of the armed forces while on duty; or
- by a person engaged in scientific research."

Use of Seal

The following is an excerpt from the Ontario Professional Forester's Association guidance documents, and details the use of an RPF seal as in this Plan and on forest prescriptions:

The provision of seal is currently required in the Association By-laws, Section 15.2 and is subject to the O.P.F.A. Code of Ethics, which reads: "The Association shall provide a Professional Seal to the members upon registration, which shall remain the property of the Association." The Association delegates the use of the Seal, subject to conditions set out in this policy.

Conditions for Use of Seal

- The application of the Professional Seal to a document or a portion thereof signifies that the contents conform to the Code of Ethics and professional forestry standards. Certification must take the form of the seal's imprint, signature of the member, and current date.
- The Professional Seal should be applied whenever the Registered Professional Forester prepares official estimates, specifications, prescriptions, reports, plans and all other documents in his/her professional capacity.
- The work presented by the sealed document shall have been personally carried out by the member or shall have been carried out under the member's "direct supervision" or review.
- For the meaning of "supervision", see the Association document entitled "Scope of Practice Interpretation". Supervision must be such that the member can reasonably monitor and accept responsibility for the work of the person being supervised. The member must also hold a certificate of registration enabling him or her to supervise the activity in question.
- Alterations or amendments to a document sealed by a Registered Professional Forester, whether made by the author or another individual will immediately void the seal and signature of the Registered Professional Forester. Altered or amended documents can be re-signed and dated by the original Registered Professional Forester or another as the circumstances require.
- There is essentially no difference between using the R.P.F. seal on a paper document or in an electronic document. The same rules apply in both situations. The member is responsible for the use of their assigned seal in any and all formats and shall not delegate its use.

Appendix C: High Conservation Value Framework

Summary

Long Point Region Conservation Authority owns 4,453.61 hectares of forested land. LPRCA also maintains a detailed inventory of the forests and natural heritage values for each property. Maps can be found in the Long Point Region Conservation Authority Managed Forest Plan (2018-2037) http://www.lprca.on.ca/pages/1357673496/Forest-Management. The LPRCA Forest is managed according to the principles of the Forest Stewardship Council (FSC). FSC certification provides the assurance that the forests are sustainably managed to a world-recognized standard.

FSC principle 9 addresses High Conservation Value Forests. It states that "Management activities in High Conservation Value Forests shall maintain or enhance the attributes which define such forests." LPRCA has evaluated the Community Forest using a framework which identifies six potential categories of HCVF. Sources of information for identifying HCVF include the OMNRF's Forest Resource Inventory and Natural Resources and Values Information System (NRVIS), Natural Heritage Information Centre (https://www.ontario.ca/page/natural-heritage-information-centre), natural heritage inventories, and the knowledge of the forest manager and members of the community. The HCVF reports have been reviewed by the LPRCA Staff and peer reviewed by an independent Biologist. The Forest Management Plan (2018-2037) provides guidance for conservation of HCVFs when a timber harvest operation is planned. HCVF include a mapped area of 2,676.81 hectares, and additional unmapped areas of species at risk habitat. The results are summarized in the following table. Additional information related to the High Conservation Value Forest assessment and expert review can be obtained by contacting the Forest Manager.

LPRCA has connections with Six Nations Reserve and New Credit Reserve to stay abreast of the traditional rights and use of the lands within the LPRCA watershed region.

- Six Nations Wildlife Management Office, Paul General, Wildlife Manager

- Mississaugas of the Credit First Nation, Councilor Cathie Jamieson, Pillar 3 Lead: Environment and Sustainability: Stewards of our Air, Land, Water and Natural Resources, Co-Chair: Education and Social Services Committee

EOMF FSC HCV Forest Assessment Framework – Great Lakes-St. Lawrence (GLSL) Forest

This framework is designed to be used in order to help identify potential High Conservation Value Forests (HCVF) in the context of achieving certification to FSC Canada's Great Lakes/St. Lawrence Standard. It is based on a framework originally developed by ProForest and since that time it has been applied in many forest regions around the world.

The framework is organized as a table covering six categories derived from the definition of HCVFs from the FSC standards. The six categories are:

Category 1: Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g., endemism, endangered species, refugia);

Category 2: Forest areas containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance;

Category 3: Forest areas that are in or contain rare, threatened or endangered ecosystems;

Category 4: Forest areas that provide basic services of nature in critical situations (e.g., watershed protection, erosion control);

Category 5: Forest areas fundamental to meeting basic needs of local communities (e.g., subsistence, health); and,

Category 6: Forest areas critical to local communities´ traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

In the assessment each category asks a question or questions that aim to identify whether the management unit contains any of the values relevant to each category. Negative answers to these questions mean that the forest operation likely does not include High Conservation Values (HCV) in that category. Positive answers lead to further investigation. The assessment covers the rationale for the conservation of the particular value, sources of information on these values (e.g., COSEWIC lists in Canada, Conservation Data Centre lists, etc.) and further guidance to help determine whether or not a particular area might be considered a High Conservation Value Forest.

Scale and diversity in the Great Lakes/St. Lawrence region: This toolkit is designed to be used across the GLSL region, and applied in small private forests, on community forests and in large public forests. The manager may be operating in a highly fragmented landscape, where the stands with exceptionally high conservation value may be very small and require a high degree of protection, or in a much more intact landscape, where the HCVF toolkit can help to identify relatively broad features across the landscape in which the changes to management activities may be relatively modest although nevertheless significant at the landscape level. Furthermore, these diverse management regimes occur across a range of ecosystem types, from the Carolinian forests of southwestern Ontario through the mixed wood forests of southern Ontario and Québec and northwards to forests that are in the boreal transition zone. This diversity means that HCVF assessments will be carried out differently on these various forests and will produce vastly different results. In developing a toolkit that is intended to apply across this diversity it is not possible to provide specific thresholds or numerical responses to questions such as "What is the minimum size of a HCVF area?" or "What percentage of a management unit should be designated as HCVFs?"

"Critical habitat" and "Essential Habitat": In this Toolkit, and elsewhere in this standard, the term "Critical habitat" is used only in the context of Species at Risk that have been listed by federal or provincial agencies. It is used in this narrow sense in order to align the use of the

term in this Standard with the legal requirements that exist in federal and provincial legislation pertaining to maintaining and restoring critical habitat for species at risk. "Essential habitat" has the same meaning as "critical habitat," but applies to all wildlife species, and not only to rare, threatened or endangered species.

HCV Summary for Long Point Region Conservation Authority		Total (Hectares)
HCV1	Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia).	0.0
HCV2	Forest areas containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.	0.0
HCV3	Forest areas that are in or contain rare, threatened or endangered ecosystems, e.g. Old growth Ecosystems and ANSI.	887
HCV4	Forest areas that provide basic services of nature in critical situations (e.g. provincially significant wetlands, watershed protection, erosion control).	1789.81
HCV5	Forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health).	0.0
HCV6	Forest areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).	0.0
	Total area	2676.81

*Additional High Conservation Value Forest information can be obtained by contacting LPRCA Forestry Staff.

Acronyms

HCV	High Conservation Value
HCV RN	HCV Resource Network
FMP	Forest Management Plan
FSC	Forest Stewardship Council
SFM	Sustainable Forest Management
DFA	Defined Forest Area
RPF	Registered Professional Forester
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
IUCN	International Union for the Conservation of Nature
LLLF	Large Landscape Level Forests

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