THE NATURE of LIMERICK FOREST

Stewart Hamill, Valerie Kirkwood and Geoff McVey

LIMERICK FOREST 75 YEARS
LEEDS & GRENVILLE'S COMMUNITY FOREST
1940–2015

Leeds Grenville

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ACKNOWLEDGEMENTS

In April of 1940 the United Counties of Leeds Grenville entered into the Agreement Forest Program with the province of Ontario. Shortly thereafter the first trees were planted in Limerick Forest. This year we celebrate the 75th anniversary of this event which has resulted in the acquisition, planting and management of almost 6000 ha's of property here in the Counties. Limerick Forest is a combination of plantations, wetlands and natural forests which provide habitat for a wide variety of flora and fauna. More than that, this jewel in the Counties crown has become our "Community Forest", enjoyed by all. Limerick Forest is many things to many people, providing a host of benefits and opportunities. It is up to all of us to take care of it and ensure future generations have an opportunity to experience all that their Community Forest has to offer. On behalf of everyone who enjoys Limerick Forest, thank you to all staff, Friends of Limerick and County Councils, past and present, for many years of dedicated and loyal support. This publication is dedicated to all those who had a hand in making Limerick Forest what it is today and to those in the future who will have the pleasure of enjoying our Community Forest.

Geoff McVey
Forest Manager

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Introduction and History

Limerick Forest is the Community Forest of the United Counties of Leeds and Grenville (UCLG) and is located in compartments scattered across the Counties. The forest cover of this part of Ontario is a mixture of natural woodland, wetland, and plantation. Limerick Forest is no exception and is made up of approximately equal amounts of each category.

The bedrock underneath almost all of Limerick Forest is primarily limestone of the Paleozoic era. This bedrock is very close to the surface in parts of the forest, most notably Limerick North, located near Merrickville, which is part of a zone called the Smiths Falls Limestone Plain.

This part of North America was glaciated repeatedly; the most recent glaciers melted away about 12,000 years ago. The process of glaciation removed almost all loose material from the highest areas of bedrock and deposited it in formations such as moraines, kames, and eskers. It also left behind occasional granite boulders, known as erratics, plucked from the Canadian Shield and carried long distances by the ice.

The great weight of the glacier depressed the bedrock to below sea level and allowed the Atlantic Ocean to flow up the St. Lawrence valley into Ontario about 11,500 years ago. This body of brackish water covered all of eastern Ontario east of Pembroke, Carleton Place, Westport, and Brockville, and is known as the Champlain Sea. Along the shorelines of the Champlain Sea, wind and wave action modified the sands left by the glacier into beach and dune formations. With the weight of the glacier removed, the land began to rise from its depressed position in a process called isostatic rebound. This still continues today, as evidenced by the small earthquakes which occur here. By 9000 years ago, the Champlain Sea was gone and vegetation, animals, and the paleo-aboriginals returned. Later the Iroquoians maintained agricultural communities on the better soils, with communities surrounded by fields of corn, beans, squash, and tobacco. In some areas near present-day Limerick Forest properties, these settlements had been abandoned by the time the bulk of the European settlers arrived.

European settlement of the Limerick Forest area took place largely in the 1860 to 1880 period, with the initial waves being mostly United Empire Loyalists from the United States. These were generally British subjects who wished to remain as such and began departing the USA during the War of Independence. These settlers were assigned their farms with little regard to the type or depth of soil. They proceeded to remove the forest in order to plant oats, barley, potatoes, and hops, and to raise cattle and poultry.

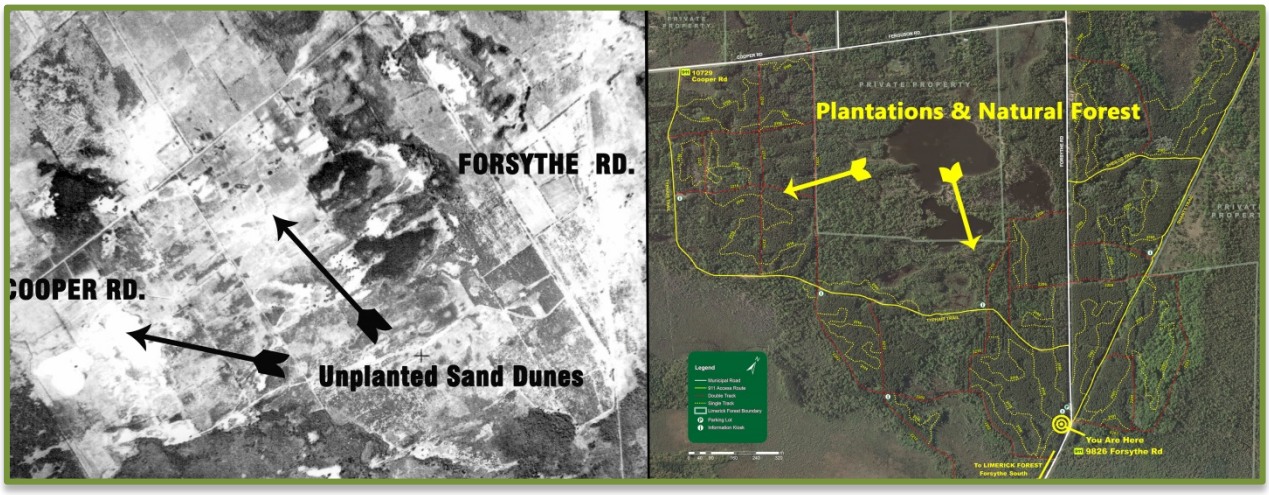
The organic soil layer under the forest canopy sustained crops for a scant few decades before it began to deteriorate. With the protective forest cover removed, the cultivation and cropping practices of the day allowed the sandy soils to erode in the wind. Sometimes the drifting sand

was so thick that it was difficult to see across the roads. In the future Limerick North block, the very shallow soil over the bedrock suffered from lack of moisture in the summer, and became parched and unusable.

By the 1920s, farms on the Limerick Forest lands were starting to fail. Some people sold their farms and moved away. Some lost their farms to mortgage defaults or tax arrears. What had been vibrant communities all but vanished. A few farms on better soil managed to hang on. Limerick became a place of desperate people trying to eke out a living.

On April 24th, 1940, Leeds Grenville entered into the Agreement Forest program in collaboration with the Ontario Department of Lands and Forests. Tree planting began in an effort to stop wind erosion on land abandoned to the Counties to tax arrears.

The Counties then began to acquire additional at-risk land, much of it for 50 cents to $1.00 per acre, prices which seem unbelievably low by today's standards. Back then, farmers on the edge of financial collapse were glad to sell their failing enterprises and move away. Land purchases dwindled in the 1970s. In 2001, management of Limerick Forest returned to the Counties. Today, Limerick is comprised of 5,987 ha of land in approximately 175 blocks. Nearly nine million trees have been planted in Limerick Forest since 1940.



Forest cover changes in Limerick Forest South from 1949 - 2010

Plantations

When people hear the name Limerick Forest they usually think of plantations, but only about one-third of the forest is "planted". These trees have replaced the original mixedwood forests which were cleared for agriculture by settlers. Tree planting in Limerick began in 1940 under the Agreement Forest program which created and maintained county forests across the province from 1922 until the program ended in the late 1990's. Plantations in Limerick are mostly Red Pine on sand, White and Jack Pine on shallow soils, and White Spruce and Tamarack on wetter sites. There were even a few hardwood plantations established, including a Red Oak plantation in Limerick North. Hardwood plantations usually don't fare well due to browsing and girdling by white-tailed deer and meadow vole.

Over the years, trees on deeper soils grew, were thinned, matured, and are now being harvested. Thinning provides space for native trees and shrubs to return, and provides the remaining trees room to grow. Some of the older Red Pine is now large, tall, and straight enough to command high prices for use as utility poles; smaller trees are destined for lumber or pulp. On shallow soils the slow growing plantations have been allowed to be overtaken by natural regeneration and are slowly returning to native forest without intervention.

THE NORTHERN GOSHAWK

The Northern Goshawk is a large raptor, belonging to the group of hawks called 'accipiters'. It can be recognized by a prominent white stripe above the eye. Its prey includes Snowshoe Hare, Ruffed Grouse, and Red Squirrel. It nests in forests with large trees, particularly conifers. In Limerick Forest it can be found in plantations, where it builds and defends a stick nest. It will call loudly and fly at humans who approach the nest.

Mature plantations now provide forest habitat for a variety of wildlife and plants, but in particular for those birds which prefer conifers, including Hermit Thrush, Red-breasted Nuthatch, Pine Warbler, and Northern Goshawk. The conifer understory usually has few plants due to deep shade and thick fallen needles, but it provides a good habitat for Pink Lady's-slipper, which blooms in the spring.

Good places in Limerick from which to start a plantation visit are the parking lots at the gravel pit on Forsythe Road, or at the intersection of Forsythe Road and Shanty Trail in Limerick South. The parking lot located at the west end of Craig Road is an excellent area to start a hike through the Limerick North plantations. Vestiges of early settler activity can be seen within the plantations, including log barn ruins, cellar pits, stone fencerows, and the crumbling walls of large stone houses.

Old stone foundation, Limerick South

Typical Limerick Red Pine plantation, Limerick North Augusta

Pink Lady's Slipper in Limerick North red pine plantation

Natural Forests

Natural hardwood regeneration in Limerick North Red Pine plantation

Although much of the original forest cover of what is now known as Limerick Forest was cut for building materials and/or agriculture by settlers in the mid 1800's, not all of that land was reforested. Those lands regenerated naturally to various states of mixedwood forest and now represent almost one-third of the forest cover in Limerick. Trees growing here include all of the native species of eastern Ontario, including Sugar Maple, Oak, Beech, Hemlock, Black Cherry, Ash, Basswood, Elm, Hickory, Ironwood, Balsam Fir, and White Cedar.

As these forests develop, they are first populated by shrubs and fast-growing trees such as Poplar and Birch. The native Prickly-ash and the invasive European Buckthorn grow quickly in these areas before they are later shaded out by trees. These shrublands provide habitat for birds such as Brown Thrasher, Eastern Towhee, Field Sparrow, and Golden-winged Warbler. Prickly-ash is the host plant for the Giant Swallowtail Butterfly, which has recently spread to eastern Ontario from the south and southwest.

White Trillium, Limerick South

Eastern White Cedar is an abundant species in Limerick as it is one of the few trees that can grow in the shallow soils of the Limestone Plain. Soils in these flat, slow-draining areas can be flooded spring and fall, parched dry in the summer, and frozen into broken shards in the winter. Cedar was an important resource for early settlers, as it is soft and easy to cut, split, and burn, but durable and good for log buildings and split-rail fences.

Bird species which cannot tolerate open spaces or small woodlands are found in mature upland forests, including Red-shouldered Hawk, Barred Owl, Eastern Wood-pewee, Wood Thrush, Scarlet Tanager, Rose-breasted Grosbeak, and a variety of wood-warblers (Black-throated Green, Black-throated Blue, Magnolia, Black-and-white, Ovenbird). Plants include Jack-in-the-pulpit, Sarsaparilla, and a variety of ferns.

Barred Owl, Limerick South

Spring in the upland hardwood forest provides a brief time of sunlight on the forest floor before the expanding tree leaves block the sun. This is blooming time for the spring ephemerals, flowering plants which include Trillium, Wild Leek, Hepatica, Wild Ginger, Bloodroot, Blue Cohosh, Solomon's-seal, Foamflower, Trout-lily, and Clintonia.

Pileated Woodpecker, Limerick South

Some of the natural forest in Limerick is now approaching what may be considered to be old growth (100 years old or older, depending on the species), a rare habitat in Ontario. Such areas contain large trees, moss-covered fallen logs, abundant lichens and ferns, and water-filled pits created by the upturned roots of fallen trees. Species such as the Pileated Woodpecker, Brown Creeper, and Flying Squirrel need old, large trees such as those found in these areas. Older forests are particularly good for salamanders because of the abundance of fallen wood under which they live (Red-backed Salamander, Blue-spotted Salamander), and the fish-free vernal pools needed for their eggs and larvae (Blue-spotted Salamander).

Accessible places to visit natural forest in Limerick Forest include the hardwoods south of Scotch Line road in Limerick North, and the area east of the Shanty Trail in Limerick South. One of the oldest hardwood stands in Limerick (~98 years old in 2014) is comprised mostly of hard maple and is located at the junction of the boardwalk trail and the Chalet Loop, north of the Limerick Forest Interpretive Centre at 1175 Limerick Road. A number of cedar stands located throughout Limerick north are approximately 100 years old.

Wetlands

In addition to plantations and natural forest, the final third of Limerick Forest's composition is wetland. This category is composed of areas which are covered by water for all or part of each year, including treed swamp, shrub swamp, marsh, bog, and open water. Those wetlands in Limerick containing trees would only have been accessible for harvest by settlers in the winter and would have been too wet to cultivate in the summer. One could almost describe many parts of Limerick as being a huge wetland interspersed with numerous islands of sandy soil which support both natural forest and plantations.

Depressions on the limestone plain remained full of water after the glaciers receded, 12,000 years ago. The deeper ones exist today as shallow lakes and ponds, such as Cranberry Lake, while others like the Wolford and Merrickville Bogs have gradually filled with soil and detritus to form bogs and marshes. As the deposition of plant material in these open wetlands continues, shrubs begin to grow, and then trees, with the result being a variety of wetland types which are slowly progressing towards solid land through the process called succession.

Many of Limerick Forest's large wetlands have been identified as "provincially significant". One of the bogs (Wolford Bog Complex, Part 3) has also been designated as an Area of Natural and Scientific Interest (ANSI). ANSI's are areas of land or water which have characteristics identified as having earth science or life science values related to protection, scientific study or education.

Wolford Bog, Craig Rd. Block, Limerick North

The ANSI designation is given to these special areas which have scored highly in five categories: (1) representation of the type of ecosystem, (2) condition, (3) diversity, (4) ecological and hydrological features, and (5) other features, such as species at risk, unique or atypical features, and value for scientific or educational purposes.

The open shallow water of lakes and ponds provides habitat for small fish, frogs, Snapping Turtle, Water Snake, Beaver, Muskrat, and a variety of birds, including Black and Common Tern, ducks, geese, and now in some places the re-introduced Trumpeter Swan.

Trumpeter Swans, D. U. Pond, Chalet Loop, Limerick South

Marshes contain both open water and emergent plants such as Cattail, Blue Flag Iris, Pickerelweed, and the floating Water-lily. These areas are important habitat for American and Least Bittern, Virginia Rail, Common Gallinule, Pied-billed Grebe, and Painted Turtle.

Bogs are characterized by a spongy layer of peat moss or Sphagnum. In this grow specialized interesting plants like Cottongrass, Pitcher-plant, and bog orchids such as Grass-pink. Some bogs are now providing habitat for Sandhill Crane.

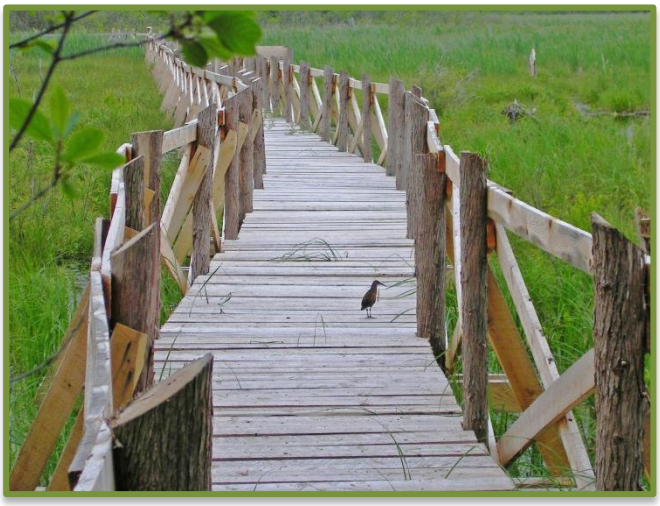
Swamps in Limerick contain shrubs and trees which can tolerate water, including Red, Silver, and Freeman Maple, Black Ash, Elm, and Poplar, and wetland wildflowers such as Showy and Yellow Lady's-slipper. Swamps provide undisturbed habitat for the reclusive Winter Wren, Blue-gray Gnatcatcher, and Canada Warbler.

Great Blue Heron, Groveton Bog, Limerick South

Pitcher-plant, Wolford Bog, Limerick North

A good place to visit and see marshes and ponds in Limerick are found on the Chalet Loop north of the Interpretive Centre on Limerick Road. One of these, the Eastern Ontario Model Forest Memorial (EOMF) Trail viewing platform, looks over the Ducks Unlimited Pond, a managed, constructed wetland controlled by a small dam. The boardwalk off the west side of the Chalet Loop gives access to a larger natural wetland. Good bog examples are accessible from the west end of Craig Road and at the Craig Road and Scotch Line viewing platforms, all in Limerick North near Merrickville.

EOMF Memorial Trail, Chalet Loop, Limerick South



Virginia Rail on the Chalet Loop Boardwalk, Limerick South

Craig Rd. Viewing platform, Limerick North

Sand Plains and Dunes

In Ontario, extensive sandy areas with dry openings are restricted to a few scattered locations, one of which is eastern Ontario. Outwash areas and sand dunes here are the result of glacial recession and inundation by the Champlain Sea, a deep embayment of the Atlantic Ocean which existed from 13,000 to 10,000 years ago. The dunes were formed by the action of wind and water carrying sand left by the glacier. The higher sandy areas were mostly treeless at the time of European conquest due to natural fires and burning by native peoples to improve hunting and cultivation. Although some natural reforestation took place after departure of the natives, most of these trees were later removed by the early settlers of eastern Ontario. Attempts at farming in some of these dry areas resulted in wind erosion and loss of soil and by 1940 areas of open sand existed in what would become Limerick Forest.

Sand Dunes near Typhair Trail, Limerick South

Beginning in 1940, the sandy soils and sand dunes which were incorporated into Limerick Forest were planted with conifers to stop soil erosion. However, by eliminating open sandy areas, a specialized community of plants and insects was all but lost. A few open areas remain where surveys have found sand insects such as the Big Sand Tiger Beetle, the Festive Tiger Beetle, and Antlion larvae, which dig pit traps to catch other insects.

Restoration of a forested sand dune to a natural open sand environment requires removal of all trees and vegetation (while preserving native sand plants), protection from the disturbance of motorized vehicles, and regular maintenance to keep the open sand free from debris and incipient woody and weedy growth. Although very labour intensive, such conversions have been tried in a few jurisdictions with success.

A good place to visit a sand dune is along the east side of Forsythe Road south of the intersection with Ferguson Road in Limerick South.

Species at Risk (SAR)

Limerick Forest contains large areas of native eastern Ontario ecosystems. These wildlands in turn contain most of the native species of wildlife and wild plants which are representative of this part of the province. Unfortunately, some of these species are becoming rarer and have been declared a "species at risk" by the provincial and federal governments. This is due in part to factors such as loss of habitat to urbanization and agriculture, use of pesticides, road development and traffic, climate change, invasive species, and human disturbance. Limerick Forest can play an important role in maintaining suitable habitat for those species which may be at risk in other locations not only because of its size and diverse habitat, but also because management of the forest is compliant with all federal and provincial SAR legislation and polices for both the species and their habitat.

WOOD FROG

The Wood Frog is a small brown frog with a dark mask. It spends most of its life in woodlands, but must travel to woodland pools and swamps in the spring to breed. This species is usually the first frog to call as the snow and ice are melting. The male calls to attract a female, making a quacking sound similar to a duck. The eggs are laid in water and the tadpoles emerge as adults by early summer. These frogs usually hibernate on land under loose soil, leaf litter, or decaying logs. They survive freezing in the winter by producing large amounts of glucose, which acts as a natural antifreeze.

Photo courtesy of iStock

Some species currently found in Limerick Forest which are considered to be "at risk" are highlighted below.

Black Tern

The Black Tern is a freshwater marsh bird which nests in cattail hemi-marsh (wetland with a 50:50 ratio of open water to emergent vegetation). Its eggs are laid on floating vegetation mats just above water level. Loss of habitat is the main factor in its designation as a species at risk, although it has secure habitats in a few locations in Limerick Forest.

Blanding's Turtle

This large turtle inhabits the shallow, weedy waters of ponds, marshes, and swamps which are common in Limerick Forest. Both genders make extensive overland movements each year to find mates and nest locations. The loss and degradation of wetlands and the loss of connections among them are factors in the disappearance of the species. Because of the need to travel, road mortality constitutes a major drain on adult turtle numbers.

Butternut

Butternut trees grow in mixed forests, usually as scattered individuals or in small groups. Because it can't tolerate shade, this species is usually found along old fencerows, open fields, stream banks, and shallow valleys where there is ample sunlight. The nuts are prime food for the Red Squirrel. Butternut is in danger of disappearing because of a fungal disease called Butternut Canker.

Canada Warbler

This wood warbler is a resident of large swamps. It is an interior forest species, meaning that it can't survive near the edge of the forest and therefore can't live in small woodlands with small interior habitat areas. Population declines of this species are related to the loss and fragmentation of swamps and moist woodlands.

Eastern Whip-poor-will

This aerial insectivore lives in open woodlands. It nests on open rock barrens of the Limestone Plain, on sand dunes with open spaces, and in open conifer plantations. Like other aerial insectivores, its numbers are decreasing, possibly due to the reduction in insect numbers caused by the use of agricultural insecticides.

Eastern Wood-pewee

The pewee is a woodland flycatcher which belongs to the aerial insectivore group. This group of birds has experienced population decline due to a decrease in insect numbers as a result of the use of agricultural insecticides. The pewee is also susceptible to woodland loss, but it is easily found in Limerick Forest due to its abundance and distinctive call.

Golden-winged Warbler

Shrubby habitats are needed by this wood warbler. Such areas are now being converted to farmland or are regenerating to forest, making the species rare, even in Limerick Forest.

Least Bittern

This small bittern is a secretive bird which inhabits cattail marshes that also have some open water. It was designated at risk because of habitat loss due to wetland drainage for agriculture, and to invasive plants such as Common Reed. It is rare and difficult to find, even in Limerick Forest.

SALAMANDERS

Salamanders are amphibians, meaning that they have no scales or claws and they prefer cool moist habitats. They therefore live underground, in water, or under the cover of objects such as stones or wood. Several species can be found in Limerick Forest. The Blue-spotted Salamander travels overland each spring to breed in water. The Red-backed Salamander lays eggs on land and never needs to go to water. The Eastern Newt spends most of its life in water, although it usually has a terrestrial phase called the 'red eft', which produces toxic skin secretions for protection from predators. A scientific study showed that forest salamanders outnumber birds and mammals combined; their biomass exceeds that of birds and equals that of small mammals in the woodland.

Photo courtesy of iStock

Monarch Butterfly

The larvae of this migratory butterfly need milkweed as food. In Limerick, Common Milkweed grows in forest openings and Swamp Milkweed grows in wetlands. Loss of milkweed due to agricultural intensification throughout its migratory routes across the United States and Canada, and loss of habitat on its winter range in Mexico have contributed to reduction in Monarch numbers.

Monarch Butterfly, Limerick North

Snapping Turtle

The Snapping Turtle can be found in most permanent water bodies in Limerick Forest. The species moves onto land for nesting and here it is subject to roadkill by vehicles. Despite being designated a species at risk, harvest in Ontario is still legal.

Snapping Turtle, Limerick South

Wood Thrush

This relative of the Robin is relatively common in Limerick Forest. It inhabits deciduous and mixed forests with a closed canopy overhead. Loss of such forests to agriculture or to urbanization is the reason for the SAR designation.

Threats, Challenges, Opportunities

Forest Pests

Fortunately, serious forest pest incidence in Limerick has been relatively low over the years. However, monitoring of the forest for signs of insect or disease infestation or some other factor such as drought remains a priority. The recent increase in invasive exotic plants appearing in Ontario which threaten to crowd out native species also requires constant monitoring in addition to research and education. A few of the forest pests commonly found in and/or adjacent to Limerick Forest properties are highlighted below.

Annosum Root Rot

One of the most destructive of conifer diseases, annosum root rot (*Heterobasidium annosum*), is caused by a fungus which enters trees (usually pines) through freshly cut stumps. It then grows down through the roots and eventually infects other trees via root grafts. In pines, the fungus kills the tree by growing though the root cambium where it girdles and kills the tree.

White Pine Blister Rust

White Pine Blister Rust (*Cronartium ribicola*), is a fungus which affects all five-needled conifers, especially Eastern White Pine in Ontario. It is thought to have been introduced to North America from Asia via Europe, in the early 1900's. Widespread throughout Canada, white pine blister rust is extremely destructive to both natural and plantation White Pine trees. This disease reproduces and spreads with the assistance of an "alternate host", the "Ribes" species (gooseberry/currants). Fungal spores enter the tree through needles in late summer. Spreading from the needles to the twigs and branches, cankers form and eventually the tree dies when the main stem has been girdled by the cankers.

FAIRY RING

A fairy ring is a naturally occurring ring or arc of mushrooms. A ring develops from a piece of mycelium or a spore growing underground from a single point. The uniform outward growth of the fungus results in the development of rings of fruiting bodies (the mushrooms) appearing on the surface. At least 50 species of fungi are known to grow in fairy ring patterns; the most common is the Fairy Ring Fungus (Marasmius oreades). This species produces small brown mushrooms and grows in grassy areas.

Red Pine Dieback

Pockets of red pine growing in plantations with alkaline soils can experience slow growth and eventual mortality due to a combination of attacks from various pathogens and insects. These trees are often shallow-rooted due to alkaline C-horizons in the soil horizon. The alkaline layer in the soil prevents the formation of a deep and healthy root system which eventually weakens the tree leaving it a prime target for other various insects and diseases. Good Red Pine sites should have acidic A and B horizons to a depth of at least 1 metre with an acidic to neutral C-horizon.

Butternut Canker

Butternut canker (*Sirococcus clavigignenti-juglandacearum*), is caused by a fungus which causes a deadly canker disease which quickly girdles and kills the tree. Although the fungus attacks butternut trees it may occasionally be found on other members of the walnut family. This disease, first observed in the late 1960's is believed to have been introduced and is responsible for the death of over 90% of the species across North America. Butternut is now classified as a Species at Risk.

Beech Bark Disease

This disease is an "insect-fungus complex" which is caused by the beech scale insect (*Cryptococcus fagisuga*) introduced from Europe and the native nectria canker fungus (*Neonectria faginata*). Beech Scale insects attack the beech trees and over a number of years the cracking in the bark from the insects feeding holes eventually allows the canker fungus to enter the tree. This disease causes severe die-back in beech trees often resulting in death.

VERNAL POOL & FAIRY SHRIMP

A vernal pool is a temporary pool of water which is usually at its fullest in the spring, which gives it its name ('vernal' meaning 'related to spring'). These shallow bodies of water usually have no fish, as they dry up in the heat of summer. The lack of predatory fish is a necessary condition for a number of amphibians (salamanders and treefrogs in particular) which must lay their eggs in water. If fish are present, the eggs can be totally consumed. These amphibian species can complete their development from egg to adult before the pool disappears. Surrounding shade slows evaporation and fallen wood in the pool provides cover. A characteristic inhabitant of a vernal pool is the Fairy Shrimp. These crustaceans produce eggs which can survive the dry and frozen periods and hatch when the water returns.

Dutch Elm Disease

Dutch elm disease is caused by a fungus (*Ophiostoma ulmi*) that enters the tree via the native elm bark beetle (*Hylurogopinus rufipes*), or the introduced European bark beetle (*Scolytus multistriatus*). The disease can also spread from tree to tree via root systems which have grafted together. The tree will try to prevent the spread of the fungus through the cells which transport water (vascular system) by partitioning off those areas. Unfortunately, as more and more cells become blocked, the entire system clogs up and the tree slowly dies. This disease is responsible for the loss of many of the elm trees across North America.

Emerald Ash Borer

Native to Asia, the Emerald Ash Borer (*Agrilus planipennis*) is a wood-boring beetle which is destructive to native ash species. The rapid spread of this insect has resulted in the loss of millions of native ash trees in North America. Heavy infestations of these insects result in massive amounts of larvae feeding on the inside of the tree. Eventually the tree becomes girdled and dies. Although this insect has been found in Leeds Grenville, it has not yet been identified within Limerick Forest.

EAB galleries in a young ash tree near Mallorytown

Gypsy Moth

Found throughout southern Canada, the Gypsy Moth (*Lymantria dispar*) caterpillar defoliates most hardwoods species but has a special affinity for Oak, Willow, Aspen, Birch and Maple. During periods of high population levels, entire forest canopies may be defoliated, severely stressing the trees leaving them further susceptible to insects, disease or drought. The larvae feed mostly at night and congregate in communal groups throughout the day. These 5-6 cm long caterpillars are easily identified with their distinctive five pairs of blue dots and six pairs of red dots along the back. Gypsy Moth egg masses are a tan colour, slightly "fuzzy" in texture and may be found on the sides of trees or branches or in any sheltered location under furniture, picnic tables, wood piles, etc.

Sirex Woodwasp

Native to Europe, Asia and Africa, the Sirex woodwasp (*Sirex noctilio*) has only been in North America for the past 10-15 years. It has the potential to become a serious pest as it has caused extensive damage to pine plantations in many countries world-wide and unfortunately has no known natural predators. Trees which are already under stress due to other causes are favored by the female for laying eggs. A toxic mucus and fungus is injected into the tree by the female

wasp during egg-laying. The mucus kills the cells around the site and the fungus then feeds on the dead wood. The woodwasp larvae grow and form galleries, feeding not just on the cambium but all through the tree, causing extensive damage. All pine trees are at risk however it is believed that Scots Pine and Red Pine are especially preferred by this woodwasp. Although Limerick has a high percentage of both species the Sirex woodwasp has not yet been found within the forest. Insect surveys for this species continue on an annual basis.

Buckthorn

Introduced into North America from Europe as ornamentals in the mid 1800's, Common Buckthorn (*Rhamnus cathartica*) and Glossy Buckthorn (*Rhamnus frangula*) are invasive exotics which cause long term damage to forests because of their ability to quickly spread and displace native vegetation. Forming a dense understory, Buckthorn prevents the regeneration of other species and destroys wildlife habitat. Closely related, both species grow from seeds which are spread by birds. The ability of these plants to grow and spread quickly in full sun or dense shade and on many site types makes them one of the most serious threats to forest regeneration in Limerick Forest.

Buckthorn spreading through Limerick South

Dog-strangling Vine (DSV)

An extremely aggressive perennial vine and relative of the milkweed family, Dog-strangling vine (*Cynanchum rossicum*) is invading ditches, farmland and woodlots across southern Ontario. Native to Europe, DSV reproduces from seed or through its vigorous root system (rhizomes) creating dense mats of vegetation which quickly choke out all other species. This extremely invasive plant prefers open, sunny locations but will also prosper in the shade of a forest where there are occasional openings in the canopy. However, once established in woodlots or plantations this invasive exotic will cause a significant loss in biodiversity, economic value and recreational appeal. DSV also poses a serious threat to the Monarch Butterfly. These butterflies often mistakenly lay their eggs on the leaves of this plant which cannot support the feeding larvae, leading to their death. The few patches of DSV now growing in Limerick are currently being controlled by staff.

Common Reed

Common Reed, Typhair Trail, Limerick South

An invasive perennial grass from Europe, Common Reed (*Phragmites australis*) is often seen along ditches, wet meadows, wetlands and coastal plains throughout North America. Its underground root system quickly spreads outcompeting native vegetation for water, nutrients and light, especially on disturbed sites. Reproduction and spread of this plant is assisted through the dispersal of seeds and/or rhizomes by wind, water, animals, humans and vehicles such as ATV's, boats, trucks and heavy equipment. Unfortunately this plant is also sold in various horticultural centers. Changes in hydrology and nutrient cycling can occur as a result of the spread of Common Reed resulting in a loss of habitat and biodiversity. Although Common Reed is found throughout Limerick, control is difficult due to its proximity to water. Constant monitoring and public education will be critical to help slow the human-assisted spread of this invasive exotic.

Garlic Mustard

Native to Europe and Asia, Garlic Mustard (*Alliaria petiolata*) is a biennial plant which is rapidly spreading across North America. It is a shade-tolerant species and prefers moist soils, preferably along forest edges. Toxic compounds within the plant which make it unpalatable for animals, a lack of natural predators and the plants ability to produce seeds which can remain viable in the ground for up to ten years all contribute to this plants reproductive success. Garlic Mustard can spread and produce a thick mat of vegetation on the forest floor, changing the herbaceous layer. This can alter the natural regeneration of the forest tree species on site, potentially resulting in a slow change in stand composition thereby changing the surrounding wildlife habitat. Garlic mustard has been found in isolated locations in Limerick Forest.

European Frog-bit

Native to Europe and Asia, European Frog-bit (*Hydrocharis morsus-ranae*) is a small, water lily-like aquatic plant. Introduced to Ontario in the 1930's, it may be identified by its small white flowers with yellow centres. It is found floating in slow moving water in ditches, creeks, streams, rivers, ponds and wetlands. As with most invasive exotics, this plant spreads quickly, choking out native species resulting in a net loss of biodiversity and habitat. Large, impenetrable mats can form creating a risk to recreational users. If these large mats start decomposing oxygen levels in the water may be lowered, negatively affecting surrounding aquatic species. European Frog-bit reproduces by seed, stem fragments and winter buds called turions, all of which can be easily spread by boats or wildlife.

Purple Loosestrife

Purple Loosestrife in Limerick South

This tall wetland plant is easily identified by its bright purple flower. Purple Loosestrife (*Lythrum salicaria*), native to Asia and Europe showed up in North America in the early 19th century. This aquatic plant is extremely invasive, forming dense colonies crowding out native plants with its thick root mass. It reproduces easily via small, mobile seeds carried by wind, water and wildlife. Infestations of this invasive exotic result in the loss of native plant species critical for nesting waterfowl and various other wetland fauna. Fortunately its spread and the subsequent loss of wetland habitat have been significantly slowed with the introduction of two European beetles in the early 1990's, which eat the plant's leaves. Purple Loose-strife may be found throughout Limerick but no longer in large, invasive quantities.

Climate Change

Ice-encrusted pine needles

Climate changes brought on by the human-induced increase in atmospheric carbon dioxide levels could be significant, widespread and difficult to predict. Possible changes include warmer wetter winters with less snow cover and more risk of damaging ice storms, hotter drier summers, unexpected precipitation patterns, and more or more severe storms with significant damage. For wildlife species, earlier seasons and warmer temperatures could mean a disconnect between migration or breeding dates and natural events (e.g., arrival of an insect-eating bird species in the spring before the insects have emerged), invasion of competing southern species, or shifting habitat ranges. For forests and forest managers, warmer average temperatures could mean more tree pests and diseases, more frequent storm damage events, and a shift in optimal conditions for tree growth as suitable climatic conditions for species move north.

Aside from taking action to reduce the production of carbon dioxide from the burning of fossil fuels, one of the best methods to reduce climate change threats to native species is to protect and/or manage for large connected areas of healthy, natural habitat with high biodiversity. This would allow species to gradually move north as the climate warms. Limerick Forest provides large protected areas of natural habitat, but connections among them are mostly across private land. Working with local landowners will be required if connections are to be maintained. Continued long term sustainable management of Limerick to ensure a diverse and healthy forest will also protect it against future impacts of climate change.

Red Oak regeneration, Limerick North

Changing Land Uses & Activities

Private land use is changing around Limerick Forest's scattered blocks. Rural houses, suburban subdivisions, clearing of woodlands for agriculture, and intensification of farming methods combine to reduce habitat. Within the forest, recreational activities are becoming more mechanized, with increased interest in motorized vehicles.

Limerick Forest provides a large repository of natural habitat in eastern Ontario. But without connections across private land and without cooperation from adjacent landowners, the potential to sustain natural habitat and biodiversity may be diminished. It will be important for forest managers to maintain good public relations with neighbours, communicate with forest users, and educate the public on the needs and values of nature in not only eastern Ontario but across the entire landscape.

Fisher

The Fisher is a large member of the weasel family with dark brown to black fur and a long bushy tail. This species originally ranged across all of wooded Canada, but was driven out of southern areas by land clearing. Recent changes, including regeneration of tree cover on abandoned farmland, elimination of predator control programs, and reduced trapping have allowed the Fisher to reclaim some of its territory in southern and eastern Ontario. A large part of its diet is carrion, but also included are Snowshoe Hare, Porcupine, Raccoon, birds, eggs, small mammals, domestic cats, amphibians, reptiles, fruit, and nuts.

Public Use & Awareness

The residents of Leeds Grenville own an unknown gem: a community forest with a multitude of natural habitats and wildlife with incredible opportunities for recreation. The forest managers and the Friends of Limerick have the dilemma of balancing protection and promotion. Promoting use and awareness is necessary to garner support for programs and activities, and for maintaining the forest itself. Promotion and awareness lead to more use which is good, but can also cause problems such as vandalism, littering, trail degradation, and conflicts among users.

Plantation audit

The challenge and opportunity in managing this "multi-use" community forest will be making the most appropriate decisions possible for its long term health. Continuing to manage for long term environmental, social and economic values will help ensure a healthy Limerick Forest for all users for generations to come.

Limerick Forest Interpretive Centre

APPENDICES

Appendix 1
Common and Scientific Names of Species Mentioned in Text

Trees

American Beech			*Fagus grandifolia*
Ash	-	Black Ash	*Fraxinus nigra*
	-	Red/Green Ash	*Fraxinus pennsylvanica*
	-	White Ash	*Fraxinus americana*
Balsam Fir			*Abies balsamea*
Basswood			*Tilia americana*
Birch	-	White Birch	*Betula papyrifera*
	-	Yellow Birch	*Betula alleghaniensis*
Black Cherry			*Prunus serotina*
Butternut			*Juglans cinerea*
Eastern Hemlock			*Tsuga canadensis*
Eastern White Cedar			*Thuja occidentalis*
Elm	-	Rock Elm	*Ulmus thomasii*
	-	White Elm	*Ulmus americana*
Hickory	-	Bitternut Hickory	*Carya cordiformis*
	-	Shagbark Hickory	*Carya ovata*
Ironwood			*Ostrya virginiana*
Maple	-	Freeman Maple (Red/Silver hybrid)	*Acer freemanii*
	-	Manitoba Maple	*Acer negundo*
	-	Norway Maple	*Acer platanoides*
	-	Red Maple	*Acer rubrum*
	-	Silver Maple	*Acer saccharinum*
	-	Sugar Maple	*Acer saccharum*
Oak	-	Bur Oak	*Quercus macrocarpa*
	-	Red Oak	*Quercus rubra*
	-	White Oak	*Quercus alba*
Pine	-	Eastern White Pine	*Pinus strobus*
	-	Jack Pine	*Pinus banksiana*
	-	Red Pine	*Pinus resinosa*
	-	Scots Pine	*Pinus sylvestris*

Poplar	- Balsam Poplar	*Populus balsamifera*
	- Eastern Cottonwood	*Populus deltoides*
	- Largetooth Aspen	*Populus grandidentata*
	- Trembling Aspen	*Populus tremuloides*
	- White Poplar	*Populus alba*
Spruce	- Black Spruce	*Picea mariana*
	- White Spruce	*Picea glauca*
Tamarack		*Larix laricina*

Shrubs

European Buckthorn	*Rhamnus cathartica*
Glossy Buckthorn	*Rhamnus frangula*
Prickly-ash	*Zanthoxylum americanum*
Tartarian Honeysuckle	*Lonicera tatarica*

Fungi

Beech Bark Disease	*Neonectria* spp.
Butternut Canker	*Sirococcus clavigignenti-juglandacearum*
Dutch Elm Disease	*Ophiostoma* spp.
Fairy Ring Fungus	*Marasmius oreades*
Root Rot	*Heterobasidion annosum* (formerly *Fomes annosus*)

Plants

Bloodroot	*Sanguinaria canadensis*
Blue Cohosh	*Caulophyllum thalictroides*
Blue Flag Iris	*Iris versicolor*
Clintonia	*Clintonia borealis*
Common Cattail	*Typha latifolia*
Common Cottongrass	*Eriophorum angustifolium*
Common Milkweed	*Asclepias syriaca*
Common Reed	*Phragmites australis*
Dog-strangling Vine (Swallowwort)	*Cynanchum* spp.
European Frog-bit	*Hydrocharis morsus-ranae*
Flowering Rush	*Butomus umbellatus*
Foamflower	*Tiarella cordifolia*
Garlic Mustard	*Alliaria officinalis*
Grass-pink	*Calopogon pulchellus*

Jack-in-the-pulpit		*Arisaema triphyllum*
Pickerelweed		*Pontederia cordata*
Pink Lady's-slipper		*Cypripedium acaule*
Pitcher-plant		*Sarracenia purpurea*
Poison Ivy		*Toxicodendron radicans*
Purple Loosestrife		*Lythrum salicaria*
Round-lobed Hepatica		*Hepatica americana*
Showy Lady's-slipper		*Cypripedium reginae*
Solomon's-seal		*Polygonatum biflorum*
Sphagnum Moss		*Sphagnum* sp.
Swamp Milkweed		*Asclepias incarnata*
Trout-lily		*Erythronium americanum*
Trillium	- Red Trillium	*Trillium erectum*
	- White Trillium	*Trillium grandiflorum*
Water-lily	- Bullhead Water-lily	*Nuphar variegatum*
	- White Water-lily	*Nympaea odorata*
Wild Ginger		*Asarum canadense*
Wild Leek		*Allium tricoccum*
Wild Sarsaparilla		*Aralia nudicaulis*
Yellow Lady's-slipper		*Cypripedium calceolus*

Birds

American Bittern	*Botaurus lentiginosus*
American Robin	*Turdus migratorius*
Barred Owl	*Strix varia*
Black-and-white Warbler	*Mniotilta varia*
Black Tern	*Chlidonias niger*
Black-throated Blue Warbler	*Dendroica caerulescens*
Black-throated Green Warbler	*Dendroica virens*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Brown Creeper	*Certhia americana*
Brown Thrasher	*Toxostoma rufum*
Canada Warbler	*Wilsonia canadensis*
Common Gallinule	*Gallinula chloropus*
Common Tern	*Sterna hirundo*
Eastern Towhee	*Pipilo erythrophthalmus*
Eastern Whip-poor-will	*Caprimulgus vociferus*
Eastern Wood-pewee	*Contopus virens*

Field Sparrow	*Spizella pusilla*
Golden-winged Warbler	*Vermivora chrysoptera*
Hermit Thrush	*Catharus guttatus*
Least Bittern	*Ixobrychus exilis*
Magnolia Warbler	*Dendroica magnolia*
Northern Goshawk	*Accipiter gentilis*
Ovenbird	*Seiurus aurocapillus*
Pied-billed Grebe	*Podilymbus podiceps*
Pileated Woodpecker	*Dryocopus pileatus*
Pine Warbler	*Dendroica pinus*
Red-breasted Nuthatch	*Sitta canadensis*
Red-shouldered Hawk	*Buteo lineatus*
Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Ruffed Grouse	*Bonasa umbellus*
Sandhill Crane	*Grus canadensis*
Scarlet Tanager	*Piranga olivacea*
Trumpeter Swan	*Cygnus buccinator*
Virginia Rail	*Rallus limicola*
Winter Wren	*Troglodytes troglodytes*
Wood Thrush	*Hylocichla mustelina*

Mammals

Beaver	*Castor canadensis*
Coyote	*Canis latrans*
Eastern Wolf	*Canis lycaon*
Fisher	*Martes pennanti*
Gray Wolf	*Canis lupus*
Meadow Vole	*Microtus pennsylvanicus*
Muskrat	*Ondatra zibethicus*
Northern Flying Squirrel	*Glaucomys sabrinus*
Porcupine	*Erethizon dorsatum*
Raccoon	*Procyon lotor*
Red Squirrel	*Tamiasciurus hudsonicus*
Snowshoe Hare	*Lepus americanus*
White-tailed Deer	*Odocoileus virginianus*

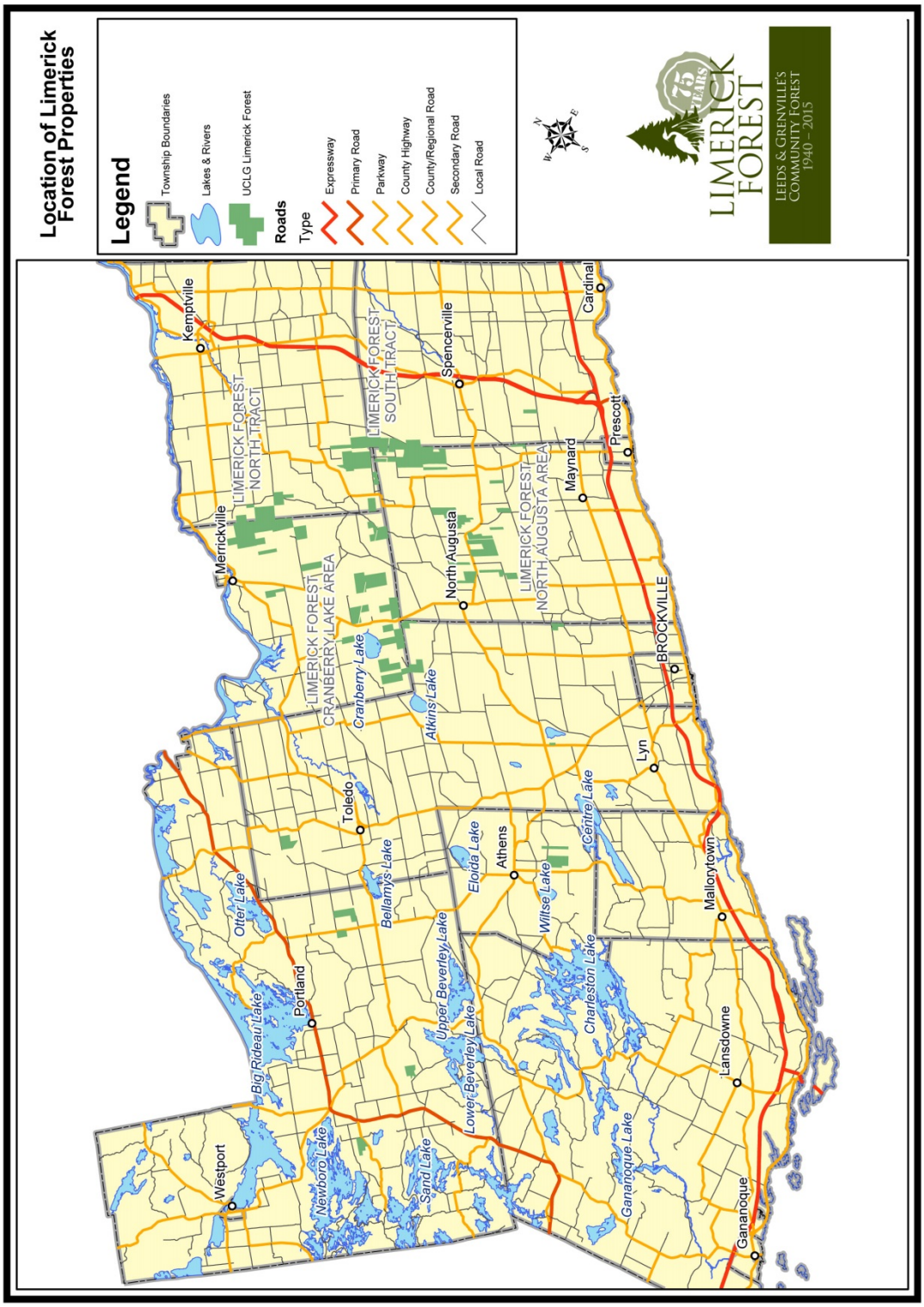
Reptiles & Amphibians

Blanding's Turtle	*Emydoidea blandingii*
Blue-spotted Salamander	*Ambystoma laterale*
Eastern Newt (including Red Eft phase)	*Notophthalmus viridescens*
Northern Water Snake	*Nerodia sipedon*
Painted Turtle	*Chrysemys picta*
Red-backed Salamander	*Plethodon cinereus*
Snapping Turtle	*Chelydra serpentina*
Wood Frog	*Rana sylvatica*

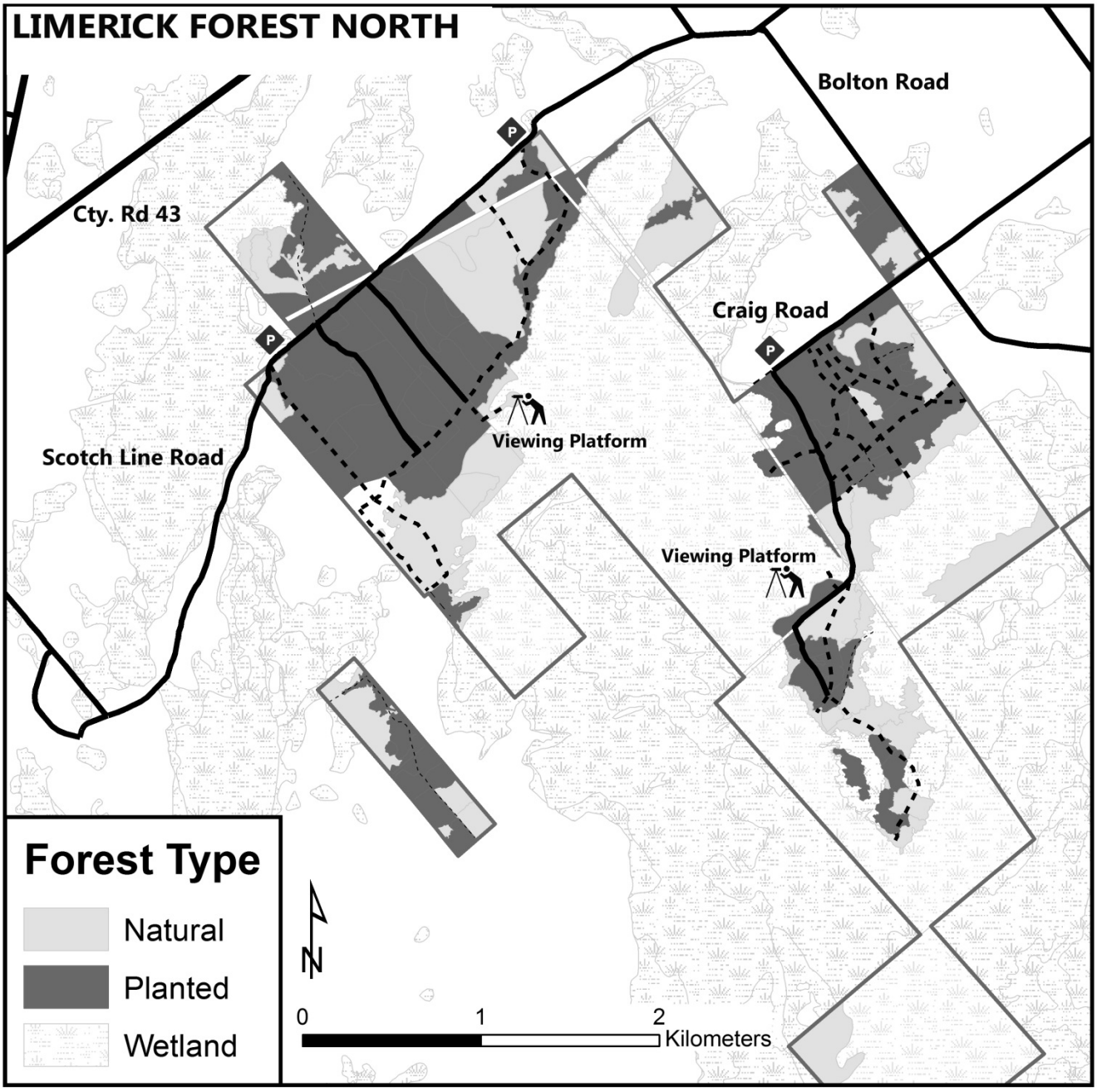
Invertebrates

Antlion	*Myrmeleon* sp.
Asian Long-horned Beetle	*Anoplophora glabripennis*
Beech Scale Insect	*Cryptococcus fagisuga*
Big Sand Tiger Beetle	*Cicindela formosa*
Biting Midge	*Ceratopogonidae* family
Black Fly	*Simuliidae* family
Deer Fly	*Chrysops* spp.
Earthworm	*Lumbricina* suborder
Elm Bark Beetle (native)	*Hylurgopinus rufipes*
Elm Bark Beetle (alien)	*Scolytus spp.*
Emerald Ash Borer	*Agrilus planipennis*
Festive Tiger Beetle	*Cicindela scutellaris*
Fairy Shrimp	*Anostraca* order
Giant Swallowtail Butterfly	*Papilio cresphontes*
Gypsy Moth	*Lymantria dispar*
Horse Fly	*Tabanidae* family
Loosestrife Leaf Beetle	*Galerucella spp.*
Monarch Butterfly	*Danaus plexippus*
Mosquito	*Culicidae* family
No-see-um	*Ceratopogonidae* family
Sand Fly or Sandflea	*Ceratopogonidae* family
Sirex Woodwasp	*Sirex noctilio*

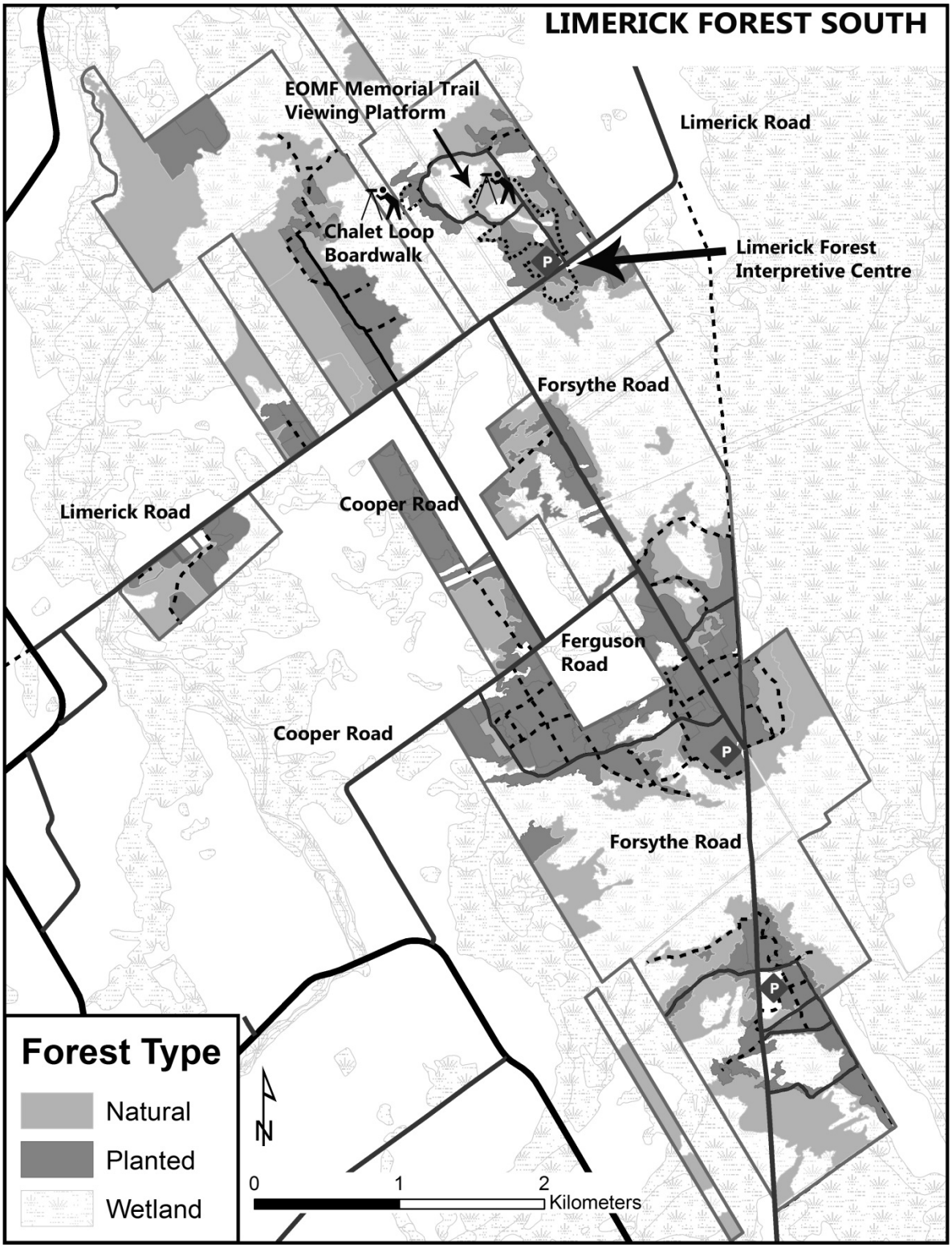
Appendix 2
Limerick Forest Maps
(Limerick Forest Properties)



(Limerick Forest North – Parking)



(Limerick Forest South – Parking)



Appendix 3
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