Dead Trees Standing
A Landowners’ Guide
to Beech Bark Disease

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“The management of beech bark disease in the Haliburton County region requires the assistance of all landowners.”

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Introduction

This guidebook has been created to provide landowners in the Haliburton County area with information on how to identify and to make informed decisions on the management of beech bark disease on their property.

This guidebook explains the ecological importance of beech trees and provides background information on the progressive stages of beech bark disease, management practices, replacement options for beech trees and supplementary resources to contact for further information on beech bark disease, tree removal and replacement.

Top Five Take-Home Points for Landowners

This guidebook provides detailed information on beech bark disease and we encourage all landowners to read the entire document. Here are the “Top Five Take-Home Points”:

1. Beech bark disease is present in Haliburton County and spreading quickly;
2. Virtually all beech trees in the County will be affected. Very few, if any, will develop a significant resistance to the disease;
3. For safety and to prevent damage to buildings and other property, keep an eye on all beech trees on your property that are close to buildings or where people walk;
4. Diseased beech trees in proximity to people and buildings should be cut down as early as possible by someone knowledgeable about the dangers inherent in felling these diseased trees;
5. Consider planting red oak and black cherry trees as replacements for felled beech trees.
1.1 Ecological importance of beech trees

The American beech (*Fagus grandifolia*) is a primary hardwood species found in forests throughout southern and central Ontario and as far north as the north shore of Georgian Bay. Beech trees are typically found in mixed forests that contain sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), and hemlock (*Tsuga canadensis*) trees. Beech trees play an important role in a forest’s ecosystem. This includes providing habitat and nesting sites for birds, providing canopy coverage and travel pathways for mammals and producing beechnuts that are an important food source for many wildlife species such as black bears, birds, deer, and some rodents. In some more northern areas of the beech tree’s range, the beechnut is the primary source of food for bears and other wildlife. The ecological value of beech trees has been compromised by the devastating beech bark disease which is expected to eventually wipe out the beech tree family.

Beech bark disease has been around since 1890, when it was accidentally introduced into Nova Scotia on beech trees imported from Europe. Since then it has spread throughout North America, and recently it has moved into the Haliburton County area. Malcolm Cockwell, General Manager for Haliburton Forest and Wild Life Reserve, states that beech bark disease “is the greatest ecological disaster to affect this region.”

1.2 Beech bark disease

Beech bark disease is a serious issue for the forests and landowners in Haliburton County. It severely degrades beech trees and can adversely impact the health of forest ecosystems. Beech bark disease is composed of an insect-fungal complex, which involves the beech scale insect (*Cryptococcus fagisuga*) and a canker-causing
fungus (Neonectria faginata). Mature American beech trees are the primary hosts for beech bark disease in central Ontario.

1.2.1 Beech scale (Cryptococcus fagisuga)
The disease begins when beech scale insects infest beech trees and begin feeding on the sap of the inner bark. During feeding, the scale insects mature and produce a protective white woolly wax layer (Figure 2). The protective coating on the scales is commonly observed once the insect has wounded the bark of the beech trees.

1.2.2 Canker causing fungus (Neonectria faginata)
Bark wounds caused by scale insects allow the fungus (Neonectria faginata) to enter the compromised tree and subsequently colonize the bark, cambial layer, and sapwood. Once established, the fungus produces cankers that vary in type and size (Figure 3). At this stage of the illness, when both scale insects and fungus have infested the tree, significant die-back can occur within the beech tree community.

1.3 Stages of beech bark disease invasion
Beech bark disease has three distinct developmental phases, which are identified as the advancing front, killing front, and aftermath forest.
1.3.1 Advancing front

In the first phase, known as the advancing front, the beech scale insect is introduced to an ecosystem by wind, animals and or human transport. This introduction can lead to colonization by the beech scale insect in a forest stand (Figure 4). The beech scale insect feeds on the living bark of a beech tree, causing puncture holes that can lead to cracking of the bark. Beech scale insects establish in these cracks and secrete a waxy-woolly protective layer (Figure 5). Once established, the beech scale insect causes superficial, localized necrotic bumps (Figure 6). With time, damage can become more severe leading to deep cracks in the bark. These deep cracks can lower the resistance of trees to other types of infection and disease. The damage caused by scale insects during the advancing front period precipitates the second phase of the disease, known as the killing front.

1.3.2 Killing front

The killing front occurs when other types of infection and disease enter the wounded beech tree. For instance, the fungus *Neonectria faginata* can infect beech trees.
whose bark has been compromised by beech scale insects causing small cankers to appear on the bark of beech trees (Figure 7). This fungus produces fruiting bodies that are small and circular with colour ranging from orange to red (Figure 8). Beech bark disease cycles through beech tree communities through the spread of fungal spores carried by wind and rain. Spores infect other beech trees that were initially damaged by scale infestations. This insect-fungal complex can lead to tree mortality within 3 to 6 years after initial beech scale insect colonization. This can be observed in the final course of endemic beech bark disease, referred to as the aftermath forest.

### 1.3.3 Aftermath forest

In the *aftermath phase* remaining beech trees gradually die and new beech trees become infected. When new beech sprouts and seedlings appear, the disease causes severe deformations or eventually leads to tree mortality. In the course of the disease cycle, beech trees have the potential to create pure stands because they can choke out other competitor species. This is problematic since the beech bark disease cycle thrives in such an environment. Once a pure stand is created, seedlings will grow into mature trees and beech bark disease will kill off the entire forest stand.
1.4 Impacts of beech bark disease

1.4.1 Wildlife food and habitat

The insect-fungal complex has led to extensive mortality of beech trees causing a ripple effect throughout the forest. Since the beech tree has the ability to choke out other species, it can result in a loss of diversity within an ecosystem. This potentially changes the food availability for wildlife. Species that rely heavily on beech tree-dominated ecosystems, such as bears, birds, and deer, suffer significantly due to the adverse impact of beech bark disease on the ability of trees to provide a source of food and habitat.

1.4.2 Human activities

The disease has also made beech trees a safety hazard in developed areas where recreational activities occur. One hazard is “beech snap”, (Figure 11). This occurs when the decay-causing fungus weakens a tree structurally and then wind or other factors cause the trunk or the branches of the tree to snap (i.e. break off). A beech tree that appears healthy can be hazardous because it is decaying from the inside out. Not only does this raise safety concerns but it also impacts forest communities. The decrease in canopy coverage favours beech sprouts and seedlings, which are produced in larger amounts around other dead beech trees. In time, emergent sprouts and seedlings will become infected and the cycle of beech bark disease continues.
1.4.3 Beech thickets and biodiversity

Researchers have noted that extensive loss of the tree canopy (overstory) can result in prolific root-sprouting which leads to the development of understory thickets of small-stemmed beech. In other words, when roots of the beech tree become damaged it can cause more beech trees to sprout from the damaged part of the root(s). The sprouts are often already diseased. This damage often occurs when people try to manage the disease by cutting beech trees down. Inevitably, the beech sprouts will successfully crowd out other species as they succumb to the disease. The competitive success of the sprouts will ultimately impact the biodiversity found within that particular ecosystem.

1.5 Managing beech bark disease

1.5.1 Landowner control options

The Haliburton Forest and Wild Life Reserve has been studying beech bark disease in partnership with the Ontario Ministry of Natural Resources and Forestry (MNRF) and the University of Toronto. The initial management approach in Haliburton County was to try and save as many beech trees that are resistant to this disease as possible. This, on average, has resulted in 1 out of 1000 resistant beech trees being saved. Figure 13, which shows a canker-free tree next to a heavily diseased tree, demonstrates that there are some trees resistant to beech bark disease. Unfortunately, saving individual resistant beech trees is not proven to be an effective management practice to protect the species as a whole. The management approach has shifted from preserving the beech tree species...
to facilitating the growth or regrowth of other species to ensure diversification in the forest. Forest expert, Malcolm Cockwell states that “The management of beech bark disease in the Haliburton County region requires the assistance of all landowners.”

1.5.2 Removal of diseased beech

Beech trees that are close to a dwelling, located along a trail or are in another spot where they could cause harm to people or damage to property should be taken down as soon as possible due to the potential danger. Caution should be taken because of the associated hazards, such as beech snap. Landowners are advised to get professional assistance in the assessment and removal of these trees (see “Resources” below). Beech trees located in an area where they do not present a danger can be left in place. Nature will take its course.

1.5.3 Other options

Landowners with beech trees in a forest larger than 4 hectares (9.88 acres) may want to consider a managed forest plan (see “Resources” below). If a managed forest plan is already in place but does not include management of beech bark disease, it is recommended that the plan be updated.

1.6 Replacing the beech tree

1.6.1 Red oak (Quercus rubra)

Red oak is currently the best replacement option for beech trees in Haliburton County and other parts of central Ontario because it can grow in similar environmental conditions in which beech trees are found. This includes a high tolerance to varying moisture content levels and soil types. Red oak can also be used to replace food resources and habitat. These trees produce acorns which provide food for many wildlife species such as bears, birds, and deer. With maturity, the red oak provides a large canopy that provides habitat for a variety of species. Overall, red oak can increase the biodiversity found within an area impacted by beech bark disease.
1.6.2 Black cherry (*Prunus serotina*)

Another replacement option that can be used is black cherry trees. These trees have significant value in an ecosystem because they produce fruit (cherries) that wildlife can use as a food resource—serving as a replacement for beechnuts.

1.6.3 Replacement problems with red oak and black cherry

Black cherry and red oak trees are not as tolerant to shade as the beech tree and may not flourish in some of the areas where beech trees grow.

1.6.4 Other options for replacement:

Although there aren’t any other native trees that fulfill the same ecosystem roles, landowners might want to consider including one or two of the following for small spaces:

- **‘Autumn Spire’ Red maple** (*Acer rubrum ‘Autumn Spire’*) The narrow upright growth of this native cultivar suits small, tighter residential lots. It displays lovely, showy red flowers and the red fall colour of the native red maple.

- **‘Spring Flurry’ Serviceberry** (*Amelanchier laevis ‘Spring Flurry’*) This cultivar has an upright, oval growth and, with its strong central leader, can be more tree-like than shrub-like. It has three seasons of interest - white flowers in spring, fruit in summer and great colour in the fall. About twenty species of birds will eat the fruit. The whole plant (buds, leaves, flower, fruit, bark and twigs) is available forage for one type of wildlife or another.

- **Pagoda dogwood** (*Cornus alternifolia*) More than twenty-five species of birds are attracted to this small tree/large shrub. The almost horizontal branching gives it a ‘pagoda’ appearance which is quite attractive. It prefers a moist situation, so is happy along shorelines. Lovely white flowers, purple berries, scarlet fall colour and interesting winter profile make this an appealing four-season specimen.
1.7 Resources

- For more information regarding beech bark disease contact Forests Ontario. (www.forestsontario.ca)
- For landowners with more than 4 hectares (9.88 acres) of forest and advice about registering properties as managed forests, contact the Managed Forest Tax Incentive Program. (www.ontario.ca/page/managed-forest-tax-incentive-program)
- Local landowners seeking advice on forestry consulting and management services can contact the office of Haliburton Forest and Wildlife Reserve. (www.haliburtonforest.com)
- For inquiries about specific invasive species, contact the Invasive Species Centre. (www.invasivespeciescentre.ca)
- The International Society of Arboriculture lists qualified arborists in Haliburton, Algonquin Highland and Minden – search by area. (www.isaarbor.com/findanarborist/arboristsearch.aspx)
- The Eastern Ontario Model Forest lists certified forest managers in the region. (www.eomfcert.ca/eomf-forest-certification-program/forest-manager-listing)
- The Coalition of Haliburton Property Owners Associations (CHA) provides resources for shoreline re-naturalization that have met the CHA’s requirements to be recognized Lake Protector Service Providers. (www.cohpoa.org/shoreline-health/naturalization-resources/landscapers/)

1.8 Acknowledgements

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1.9 References


Centre for Community-Based Research

Halls and Hawk Lakes Property Owners Association

Municipality of Dysart et al