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Ministry of Natural Resources Ministère des Richesses naturelles

BUTTERNUT ASSESSMENT GUIDELINES

Assessment of Butternut Tree Health for the Purposes of the *Endangered Species Act 2007*

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1 PURPOSE

This purpose of this guideline is to provide direction to Ontario Ministry of Natural Resources (OMNR) employees and to non-ministry Butternut Health Assessors on how to conduct a health assessment for Butternut (*Juglans cinerea* L.) pursuant to Ontario Regulation 242/08 made under the *Endangered Species Act 2007* (ESA).

The guideline also outlines the requirements which a person must satisfy, firstly, to be designated as a Butternut Health Assessor by the Minister of Natural Resources and, secondly, to properly fulfill the responsibilities of a Butternut Health Assessor.

2 OVERVIEW

Butternut is listed as endangered in Ontario Regulation 230/08, also known as the Species at Risk in Ontario List. Butternut is a widespread tree species that can be found throughout much of southern Ontario. However, many Ontario trees are infected with Butternut Canker (*Ophiognomonia clavigignenti-juglandacearum*)¹, a fungal disease suspected to be of Asian origin that often results in tree mortality. The endangered status of Butternut is based on observed and predicted declines due to Butternut Canker.

Given the status of the species, Butternut is protected under section 9 of the ESA.² This section includes prohibitions against activities such as killing, harming, taking, possessing, buying and selling a species listed as extirpated, endangered or threatened. However, there are two principal exceptions to these prohibitions on activities that affect Butternut, both of which are allowed by exemptions provided under Ontario Regulation 242/08.

In the first instance, exemptions apply to Butternut trees that are not naturally occurring. Planted Butternuts and their progeny are not considered to be naturally occurring. They are exempt from certain protections under section 9 of the ESA unless they were planted as a requirement of a permit issued under section 17 of the ESA or they are the progeny of trees that were planted to satisfy the requirements of such a permit.

Secondly, exemptions apply to Butternut trees that are affected by Butternut Canker to such a degree that they are not necessary to retain for the purpose of supporting the protection or recovery of Butternut. All such trees are exempted from protection under section 9 of the ESA. These trees are known as *non-retainable* Butternut trees.

If a Butternut is assessed and found to be both retainable and naturally occurring, its protection under section 9 of the ESA will remain undiminished. A portion of these trees may provide insights into whether or not some Butternut trees are resistant to the Butternut Canker. These are known as *putatively resistant* trees. Insights acquired from the study of

¹ Until recently this fungus was known as *Sirococcus clavigignenti-juglandacearum*.

² Butternut is a transition species included in Schedule 3 of the ESA. Accordingly, the habitat of Butternut will not be protected under the ESA until June 30, 2013 unless a regulation prescribing habitat for the species comes into force at an earlier date.

putatively resistant trees may inform improved silvicultural practices that enhance environmentally-based resistance or support a future propagation program to produce genetically resistant trees. Accordingly, some of these trees may be especially important to the recovery of Butternut.

Only a person designated by the Minister of Natural Resources as a Butternut Health Assessor can make the determination of whether or not a Butternut is retainable. A Butternut Health Assessor is also expected to provide an opinion on whether or not a Butternut is naturally occurring or putatively resistant, and to identify trees that may be of hybrid ancestry involving Butternut and introduced Walnuts. Butternut Health Assessors are required to document their health assessments in writing and report this information to their clients and the OMNR in accordance with this guideline.

3 GUIDELINE

3.1 Butternut Health Assessments

A Butternut health assessment is undertaken for two principal purposes. The primary purpose is to determine whether or not a Butternut tree is exempt from certain protections under section 5 of Ontario Regulation 242/08 because it is non-retainable. In addition, the results of the assessment may assist the OMNR in making a recommendation about whether a permit must be issued to allow a retainable Butternut tree to be killed or harmed (e.g. because it is naturally occurring) and, if so, what conditions should be included in such a permit (e.g. conditions that take into account putative resistance).

In general, a Butternut tree is not exempt under section 5 of Ontario Regulation 242/08 and therefore is fully protected under section 9 of the ESA if and only if the following conditions are satisfied:

- (i) it is retainable, and
- (ii)(a) it is naturally occurring or
- (b) it was planted as a requirement of a permit issued under section 17 of the ESA or
- (c) it is the progeny of trees that were planted as a requirement of a permit issued under section 17 of the ESA.

This part of the guideline explains how to determine whether or not a Butternut tree satisfies these conditions. It also provides criteria for judging whether a Butternut tree is likely to be putatively resistant.

Assessment of Retainability: Retainable Butternut trees are those that satisfy the criteria outlined in the manual, *Butternut Health Assessment in Ontario – Finding Retainable Trees*, and in the OMNR protocols for Butternut Health Assessors. The identification of retainable trees is based on an assessment of crown dieback and the percent coverage of the trunk

and root flare by Butternut Cankers. The former must be assessed when leaves are present, i.e. from late May or early June to September.³

One of two sets of conditions should be employed to judge whether or not a Butternut tree is retainable. Which set of conditions is applied depends on whether or not cankers are visible on the main trunk and root flares of the tree.

If cankers are visible on the main trunk or root flares, a Butternut is judged to be retainable if and only if

- (i)(a) greater than 70% of the crown is live and
- (b) less than 20% of the combined circumference of the main trunk, measured at breast height, and root flare is affected by Butternut Canker.

Therefore, if cankers are visible, a tree is judged to be non-retainable if and only if greater than or equal to 20% of the combined circumference of the main trunk and root flare is affected by Butternut Canker or between 0% and 20% of the combined circumference is affected but there is greater than or equal to 30% of the crown no longer live.

If no cankers are visible on the main trunk and root flares, a Butternut is judged to be retainable if and only if

- (ii) 50% or more of the crown is live.

Therefore, if no cankers are visible on the main trunk or root flare, a tree is judged to be non-retainable if and only if less than 50% of the crown is live.

Live crown is defined as the part of the crown that would be expected to produce leaves in the absence of Butternut Canker. Hence, in assessing the percent of live crown, branch mortality attributable to causes other than Butternut Canker is not included in the estimate. For instance, dead interior and lower crown branches should be considered to have died from shading unless cankers are visible on them. Sometimes large parts of a crown are missing, which may result in a percent live crown estimate of 70 or greater based on a very small crown volume. If Butternut Canker is responsible for the loss of crown volume, this typically can be determined based on evidence of canker on the dead limbs or the main trunk. If some other factor such as storm breakage destroyed the crown, the tree should be considered healthy providing that condition (i)(b) above is satisfied.

Assessment of Natural Occurrence: A Butternut that is naturally occurring is a tree that has established without human assistance. In most cases the means by which a Butternut tree has become established is not known with certainty. Hence, it is necessary to consider the available evidence to judge whether or not it is more probable that it was planted or generated naturally from seed.

³ Illustrations of percent crown dieback and the percent coverage of trunk and root flare by Butternut Cankers can be found in the following two publications: 1. Ostry, M., M. Mielke and D. Skilling. 1994. Butternut - Strategies for Managing a Threatened Tree. General Technical Report NC-165. USDA Forest Service, North Central Forest Experimental Station, St. Paul, Minnesota. 2. Forest Gene Conservation Association. 2010. Butternut Health Assessment in Ontario – Finding Retainable Trees. Revised ed. Forest Gene Conservation Association, Peterborough, Ontario.

A Butternut is judged to be naturally occurring if and only if

- (i) it occurs in habitat typically occupied by naturally growing Butternut in Ontario,
- (ii) insufficient evidence is available to support the judgement that on the balance of probabilities it has been planted, and
- (iii) insufficient evidence is available to support the judgement that on the balance of probabilities it is the progeny of Butternut trees that have been planted.

With respect to condition (i), Butternut trees naturally grow in a variety of treed habitats in Ontario. They occur along fencerows, within treed riparian zones, on the lower slopes of treed ravines, and in and around mixed deciduous woodlots and forests, where they grow beneath canopy openings, near forest edges and along forest roads. Trees occur on rich, moist, well-drained loams and on well-drained rocky soils, especially of limestone origin. Butternuts growing in these situations are presumed to be naturally occurring unless there is sufficient evidence available to support the judgement that they have been planted.

Regarding conditions (ii) and (iii), if a Butternut occurs in habitat typically occupied by naturally growing Butternut in Ontario, what constitutes sufficient evidence to support the judgement that it has been planted is circumstance dependent. Sufficient evidence may be documentation such as a planting plan produced by a planting contractor for the lands in question which identifies Butternut as a tree species to be planted. Alternatively, in the absence of contrary evidence, a bill of sale for Butternut seedlings issued to the landowner and dated prior to the date of the Butternut health assessment may be sufficient evidence that Butternuts of appropriate age on the landowner's property were planted.

If a Butternut occurs in habitat not typically occupied by naturally growing Butternut in Ontario, it may be presumed to have been planted. For example, a Butternut growing in a manicured garden or a yard that is not part of a remnant natural area can usually be presumed to be planted.

Assessment of the Applicability of Section 17: If a Butternut was planted as a condition of a permit issued under section 17 of the ESA, evidence of this fact should be available in the documentation pertaining to the issuance of the permit.

A Butternut is judged to have been planted as a requirement of a permit issued under section 17 of the ESA, or to be a tree which is the progeny of trees that were planted to satisfy a permitting requirement under the ESA if and only if

- (i) it occurs in an area identified in the conditions of a permit issued under section 17 of the ESA, or
- (ii) it occurs in an area identified in a planting plan developed pursuant to a permit issued under section 17 of the ESA.

Any Butternut tree occurring in an area, identified as a place where Butternut seedlings were planted, is considered to have been planted to satisfy a requirement of a permit issued under section 17 of the ESA, or to be a tree which is the progeny of trees that were planted to satisfy a requirement under the ESA.

Assessment of Putative Resistance: A putatively resistant tree is a retainable Butternut tree concerning which there is evidence that it has had prolonged exposure to Butternut Canker. Prolonged exposure is determined based on the tree having a minimum diameter at breast height and being within a maximum distance from a tree which is severely affected by the canker. The health of the tree under these circumstances is presumptive evidence that it has some form of resistance to Butternut Canker.

As part of his or her Butternut health assessment, a Butternut Health Assessor may make a preliminary judgement about whether or not a retainable Butternut tree is putatively resistant. A retainable Butternut is judged, on a preliminary basis, to be putatively resistant if and only if

- (i) It has a breast height diameter of at least 20 cm,
- (ii) it occurs in an area where there is a high incidence of Butternut Canker, and
- (iii) it occurs within 40 m of at least one Butternut tree which is severely affected by Butternut Canker.

A definitive judgement concerning the putative resistance of a Butternut tree requires that the extent of crown branches affected by Butternut Canker be assessed directly rather than by means of percent live crown. This is not typically done unless there is a proposal to kill or harm a Butternut tree that appears to be putatively resistant, or a tree has been identified as a source of germplasm as part of a recovery program to assess the genetic resistance of Butternut.

Some publications suggest that trees with cankers overgrown by calloused material may be treated as putatively resistant regardless of whether or not they occur near severely affected trees. However, there are two difficulties with treating this character by itself as a condition of putative resistance. First, no research has been done on the identification of calluses resulting from Butternut Canker as distinct from those resulting from other causes. Second, Butternut Canker has been retrieved from inoculated trunk cankers that callused over, making the spread of the canker to other parts of the tree a possibility. Research on the significance to tree health of callusing is needed.⁴

3.2 Butternut Health Assessors

A Butternut Health Assessor is a person or a member of a class of persons designated by the Minister of Natural Resources to assess Butternut trees for the purpose of determining if they are non-retainable. As part of his or her health assessment, a Butternut Health Assessor is expected to also provide an opinion on whether a Butternut tree is naturally occurring, planted as a condition of a permit issued under section 17 of the ESA and putatively resistant. In addition, a Butternut Health Assessor is expected to identify trees that may be of hybrid ancestry involving Butternut and introduced Walnuts. This part of the guideline explains how a Butternut Health Assessor is to fulfil these responsibilities, with an

⁴ A protocol for ranking the degree of putative resistance of Butternut trees can be found in Brosi, S. L. 2010. Steps toward Butternut (*Juglans cinerea* L.) restoration. Ph.D. dissertation. University of Tennessee, Knoxville, Tennessee.

emphasis on reporting responsibilities. It also provides information on the designation and auditing of a Butternut Health Assessor.

Designation as a Butternut Health Assessor: To be eligible to be designated by the Minister of Natural Resources as a Butternut Health Assessor, a person must complete the training course entitled the *Butternut Health Assessment Workshop* offered by the OMNR or the Forest Gene Conservation Association. Enrolment in the course is at the discretion of the OMNR but will be typically restricted to professional arborists, foresters, forest technicians, dendrologists, horticulturists, botanists, mycologists and plant pathologists. Successful completion of the course requires that a person participate in the training and sign a copy of the *Butternut Health Assessor Code of Ethics and Practice* (Appendix 1). Certificates will be issued to persons who have satisfied these requirements.

The continued designation of a person as a Butternut Health Assessor is conditional on the person remaining in good standing. The standing of a Butternut Health Assessor is determined by means of health assessment audits conducted by the OMNR from time to time.

Responsibilities of a Butternut Health Assessor: Butternut Health Assessors must adhere to the *Butternut Health Assessor Code of Ethics and Practice*, and follow the most up-to-date protocols for Butternut health assessments provided by the OMNR. Butternut Health Assessors must use *Data Form 1 General Butternut Location Data* and *Data Form 2 Retainable Tree Assessment Data* to document the results of their assessments, the *Butternut Retainable Tree Analysis Spreadsheet* to determine the retention value of trees, and the standard template for reporting this information to the OMNR and their clients.

The completed assessment forms should be included in an assessment report and contain the following detailed information:

- (i) Butternut Health Assessor contact information,
- (ii) the location of the property, client information and the date of assessment,
- (iii) the total number of Butternut assessed and the number of these determined to be retainable or non-retainable, and, if assessed, the number determined to be naturally occurring, planted as a condition of a permit issued under section 17 of the ESA, and putatively resistant,
- (iv) the assessment number assigned to each tree, presented with its UTM coordinates, the map datum, the diameter of the tree at breast height or a statement that it is shorter than breast height, and evidence supporting assessments of retainability, natural occurrence, the applicability of section 17 of the ESA, putative resistance and hybrid ancestry,
- (v) relevant maps and photographs.

With respect to (iv), copies of documentary evidence should be included in an appendix to the assessment report. For instance, in cases in which a client provides a Butternut Health Assessor with evidence that a Butternut was planted, this evidence should be contained in the appendix. If a Butternut Health Assessor provides an opinion on the applicability of section 17 of the ESA, he or she should contact the appropriate OMNR district or Ontario Parks office to determine if the area where a health assessment is to be conducted has had

Butternut planted to satisfy a requirement under the ESA. If so, documentation should be acquired and included in the report.

Completed reports must be submitted to the client and to the appropriate OMNR staff. If a Butternut Health assessment takes place in a provincial park, the park superintendent must receive a copy of the assessment report. If a Butternut Health assessment takes place on other lands in an OMNR district, the district manager must receive a copy of the report.

A copy of the report must be sent to the Butternut Health Assessor's client at the same time that it is submitted to the OMNR. The client must be notified by the assessor at this time that the OMNR may be contacting him or her to request access to the property to conduct an audit.

The assessment report must be submitted to the client and the OMNR before the last day of August in any given year. This is to allow the OMNR time to review and potentially audit the Butternut health assessment during the current season.

Audit of a Butternut Health Assessor: If the OMNR requests an audit, the client and Butternut Health Assessor will be notified in writing within 30 days of the OMNR's receipt of the assessment report.

OMNR will conduct audits in a timely manner, within 30 days following the receipt of the assessment report. OMNR will inform the Butternut Health Assessor and client of the results of the audit by letter. Audits may be delayed if assessment reports are received after the growing season is finished.

When an audit reveals problems with an assessment by a designated Butternut Health Assessor, it is at the discretion of the OMNR district or park responsible for the audit to determine the appropriate course of action. Actions may include the revocation of the assessor's designation. If the designation of a Butternut Health Assessor is revoked, it shall remain revoked until such time as the OMNR determines that the assessor is able to undertake Butternut health assessments again. OMNR may require the person to attend another workshop or undergo additional audits or supervised assessments.

4 References

4.1 Legal References

- Endangered Species Act, 2007.
- Ontario Regulation 242/08 (General) made under the Endangered Species Act, 2007.
- Ontario Regulation 230/08 (Species at Risk in Ontario List) made under the Endangered Species Act, 2007.

4.2 Technical References

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Appendix 1

Butternut Health Assessor Code of Ethics and Practice

The following Code of Ethics & Practice list the expected standards of a Butternut Health Assessor (BHA)

As a BHA,

- a) I have participated in the one day Butternut Health Assessment workshop conducted by the Forest Gene Conservation Association (FGCA) or Ontario Ministry of Natural Resources (MNR) on the following date _____;
- b) I am familiar with the ESA 2007 as it pertains to butternut including section 5 of Ontario Regulation 242/08 regarding exemptions applicable to butternut,
- c) I have read the Protocols for Butternut Health Assessors and Assessment of Butternut tree health for the purposes of the Endangered Species Act, 2007 and will adhere to these documents as they may be updated or amended from time to time and to any additional policy or procedural direction provided by MNR regarding butternut tree assessments;
- d) I am capable of correctly identifying butternut trees in any season, and my assessments will also make note of any tree which might be an exotic or hybrid Juglans species;
- e) I will maintain true and accurate records for every assessment I undertake;
- f) I will undertake my assessments only in the green leaf season, except in the circumstances outlined in the Protocols for Butternut Health Assessors and will perform analyses to determine retainable tree status using the methods provided by the MNR (which may be updated from time to time as more science becomes available regarding retainable trees);
- g) I will report assessment information to the local District MNR office within one month of the assessment;
- h) I understand that MNR may audit any and all of my assessments;
- i) I recognize that my designation as a BHA may be revoked or suspended if my actions compromise the program's integrity or if I am not in good standing with audits conducted by MNR.

Duty to the client

As a BHA in independent practice, I shall

- a) advertise my service in a professional manner to inform clients of my knowledge and expertise;
- b) advertise as valid only those assessments for which information has been reported to the MNR;
- c) keep all clients' affairs, practices and processes in the strictest confidence unless released from this obligation by the client.

Duty to myself

As a BHA, I shall

- a) maintain the honour and integrity of my training and act at all times with responsibility and honesty;
- b) avoid and when in doubt disclose any conflict of interest which might influence my action or judgment as a BHA.

I, _____
Print full name

have read the above Code of Ethics and Practice and understand all that is expected of me as a Butternut Health Assessor under the ESA 2007.

signature _____ date - _____
address _____ phone - _____
_____ e-mail - _____

Assigned BHA # ____ _

Appendix 2

Butternut Hybrids

The protections provided under Section 9 of the ESA do not apply to species that are not native to Ontario. Trees having a hybrid ancestry involving both Butternut and introduced Walnut species are not considered to be native to Ontario. Because hybrid trees are relatively abundant in parts of southern Ontario, especially in settled areas, Butternut Health Assessors must know how to differentiate them from Butternuts.

Butternut is known to hybridize with Persian Walnut (*Juglans regia* L.) and, more commonly, with Japanese Walnut (*J. ailantifolia* Carrière). Hybrids of Butternut and Persian Walnut are known as *J. x quadrangulata*. They are not common. In contrast, across a large part of the Butternut's American range, hybrids have been found between Butternut and a variety of the Japanese Walnut known as Heartnut (*J. ailantifolia* var. *cordiformis*). First-generation hybrids are called Buartnuts (*J. x bixbyi*). Buartnuts are highly productive and able to cross with other Buartnuts and trees of both parent species. They may even self-pollinate.

In the field, differentiating Butternut, Heartnut, Buartnut and the second-or-more-generation hybrid progeny of Buartnuts can be difficult. In some instances, only genetic testing can definitively assign a tree to one or another of these lineages. Regardless, the following key provides guidance for the purpose of field identification. To use this key, a Butternut Health Assessor should examine each tree for at least five of the traits listed below. For each trait, assign the tree a score of 0, 1, or 2. Sum the scores for each of the traits used. If the total score for the tree is 3 or less, it is probably a Butternut. If it is greater than 3, it is probably a hybrid or a Heartnut.⁵

TRAIT 1	Leaf Retention	SCORE
	Leaves yellow and drop early in the fall, late August to mid-September.....	0
	Leaves yellow and drop in mid-fall, after the first frost	1
	Leaves stay green late into the fall and drop after a hard frost.....	2
TRAIT 2	Dormant Terminal Bud	
	Terminal bud elongated and slender, conical, and tan-coloured.....	0
	Terminal bud broadest at base, less elongated, slightly green coloured.....	1
	Terminal bud stout, pyramid shaped, green or yellow green in colour.....	2
TRAIT 3	Dormant Twigs	
	Dark olive green or reddish-brown, slender, sometimes with hairs below the terminal bud.....	0
	Tan to brownish green and stout, sometimes with patches of hairs, especially below terminal bud.....	1
	Tan to light green, stout, often with abundant rusty red or tan hairs.....	2
TRAIT 4	Lenticel Shape on New Twigs	
	Lenticels on most recent growth uniformly small, round, white, abundant, and evenly distributed; if some are elongated or dash-shaped, elongation is perpendicular to direction of the branch.....	0
	Lenticels on most recent growth mostly small, round, white, abundant, with patchy distribution; if some are elongated or dash-shaped, elongation is parallel to direction of branch.....	1
	Lenticels on most recent growth large, tan and corky, patchy distribution, many dash-shaped	

⁵ Illustrations of the traits mentioned in this key can be found in Farlee, L., K. Woeste, M. Ostry, J. McKenna and S. Weeks. 2010. Identification of Butternuts and Butternut Hybrids. Purdue University *Forestry and Natural Resources Extension*. FNR-420-W.

and elongated parallel to branch.....2

TRAIT 5 Pith Color of 1-Year Twig

Very dark, chocolate brown.....0
 Medium brown (colour of dark maple syrup).....1
 Tan to honey coloured.....2

TRAIT 6 Leaf Scar

Top edge of most leaf scars straight or slightly arched.....0
 Top edge of some leaf scars with small descending "V" shaped notch.....1
 Top edge of most or all leaf scars with clear descending "V" shaped notch.....2

TRAIT 7 Leaf Length

Most leaves less than 46 cm long.....0
 Many leaves 46 cm or longer.....1

TRAIT 8 Color of Bark Fissures on Mature Trees

Dark grey or black.....0
 Light grey or silvery.....1
 Tan or slightly pinkish.....2

TRAIT 9 Green Hull Characteristics

Densely hairy and very sticky.....0
 Somewhat hairy and only slightly sticky.....2

TRAIT 10 Nut Shape

Nut cylindrical, round in cross section, with thin, sharp corrugations;
 the suture/seam is not easily distinguished from the longitudinal ridges.....0
 Nut slightly asymmetrical, with noticeable valleys between longitudinal ridges.....1
 Nut asymmetric, diamond shaped or flattened, with dull or sparse corrugations;
 the suture/seam is easily identified and forms the widest part of the body of the nut.....2

TRAIT 11 Catkin Length When Fully Extended and Shedding Pollen

Shorter than 11.5 cm.....0
 11.5 – 14 cm.....1
 Longer than 14 cm.....2

Evaluate the tree and sum its score for any 5 of the traits listed above. If the score is:

0 – 3.....Butternut
 > 3.....Hybrid or Heartnut