

**Ontario Species at Risk Evaluation Report for**  
**Pumpkin Ash**  
**Frêne pubescent**  
**(*Fraxinus profunda*)**

Committee on the Status of Species at Risk in Ontario  
(COSSARO)

Assessed by COSSARO as Endangered

November 2022

Final

## Executive summary

Pumpkin Ash (*Fraxinus profunda*) is a medium-sized, broad-leaved hardwood tree in the Olive Family (Oleaceae). It can attain a height of 15 to 30m and a diameter at breast height of 173 cm under optimal conditions. It is notable for developing a conspicuous swollen, buttressed trunk base in very wet conditions. It has opposite, pinnately-compound leaves 20-45 cm long with densely pubescent leaflets on the bottom surface or, occasionally, only on the veins. Pumpkin Ash has the largest winged fruit (samaras) of any ash (COSEWIC IN PRESS, 2022).

Like most ash species in Canada, Pumpkin Ash is threatened by Emerald Ash Borer, an invasive non-native insect. Other threats include land conversion to agriculture, roads and utilities, logging and wood harvesting, recreational activities, climate change, deer-browsing and ecosystem modification by non-native plant species (COSEWIC IN PRESS, 2022).

Pumpkin Ash occurs in the Carolinian Zone of southern Ontario, with only two mature individuals known and fewer than ten are expected to remain in Canada. It is estimated that over 90% of decline has occurred due to Emerald Ash Borer. Over 400 known seedlings and saplings are also at continued risk from Emerald Ash Borer (COSEWIC IN PRESS, 2022).

Pumpkin Ash is important to Indigenous Peoples recognizing the importance of the interrelationships of all species within the ecosystem (COSEWIC IN PRESS, 2022).

Pumpkin Ash (*Fraxinus profunda*) is classified as Endangered in Ontario based on meeting criteria A2abce+3ce+4abce C1 and D1.

# 1. Eligibility for Ontario status assessment

## 1.1. Eligibility conditions

### 1.1.1. Taxonomic distinctness

Pumpkin Ash is very similar to other ashes in the Meliodes Section (i.e. green ash and white ash). It is taxonomically distinct with no recognized subspecific taxa or varieties (COSEWIC IN PRESS, 2022).

### 1.1.2. Designatable units

Pumpkin Ash only occurs in the Great Lakes Plains area and constitutes one Designatable Unit (DU).

### 1.1.3. Native status

Pumpkin Ash has similar morphological characteristics to Green Ash and because of this, has been overlooked until 1992 when it was first discovered in Essex County. Since this discovery, a concerted field study effort was undertaken to gather numbers of mature individuals (COSEWIC IN PRESS, 2022).

### 1.1.4. Occurrence

All subpopulations are located in extreme southwestern Ontario where approximately 0.8% of the global range occurs in Canada.

## 1.2. Eligibility results

Pumpkin Ash (*Fraxinus profunda*) is eligible for status assessment in Ontario.

# 2. Background information

## 2.1. Current designations

- GRANK: G4 (NatureServe, 2022)
- IUCN: Critically Endangered (2017)
- NRANK Canada: N1
- COSEWIC: Endangered (May 2022)
- SARA: not listed
- ESA 2007: not listed
- SRANK: S1 (ranked in 2022)

## 2.2. Distribution in Ontario

Pumpkin Ash is only found in southwestern Ontario where it was previously reported from 39 subpopulations in Elgin, Essex, Lambton, Norfolk, and Middlesex counties, the Municipality of Chatham-Kent and the Regional Municipality of Niagara. There are currently 13 extant and 15 extirpated or presumed extirpated subpopulations. Surveys for Pumpkin Ash in Canada were conducted between August 4<sup>th</sup> and September 12<sup>th</sup>, 2012 where individuals were found within three areas: Backus Woods, Lower Big Creek and Sydenham River Nature Preserve. One additional mature individual was located during seed collection activities in October 2021 (COSEWIC IN PRESS, 2022).

## 2.3. Distribution, status and the broader biologically relevant geographic range outside Ontario

Pumpkin Ash is native to most adjacent jurisdictions including Michigan, New York, Pennsylvania and Ohio (NatureServe, 2022). Conditions in all of its range is declining due to the prevalence of Emerald Ash Borer. Although parts of Pumpkin Ash’s range are not currently infected with Emerald Ash Borer, the rate at which Emerald Ash Borer has spread is cause for serious concern. Studies have shown that Emerald Ash Borer can spread rapidly, infest both healthy and stressed trees, and that ash mortality across an entire forest stand exceeds 99% within six years of infestation (Knight *et al.*, 2013, Klooster *et al.*, 2014, McCullough *et al.*, 2008).

Table 1. Condition of the Species in Adjacent Jurisdictions and Broader Biologically Relevant Geographic Range

<b>Adjacent Jurisdictions</b>	<b>Biologically Relevant to Ontario (n/a, yes, no)</b>	<b>Condition</b>	<b>Notes &amp; Sources</b>
Quebec	n/a	-	-
Manitoba	n/a	-	-
Michigan	yes	S2 Imperiled	NatureServe
Minnesota	n/a		
Nunavut	n/a		
New York	Yes	S1 Critically Imperiled	NatureServe
Ohio	Yes	S3 Vulnerable	NatureServe
Pennsylvania	Yes	S1 Critically Imperiled	NatureServe
Wisconsin	n/a	-	-
<i>Other Relevant Jurisdiction</i>	n/a	-	-

## 2.4. Ontario conservation responsibility

Ontario's conservation responsibility is low with less than 1% of the global range occurring in Ontario.

## 2.5. Direct threats

Like most ash species in Canada, Pumpkin Ash is threatened by Emerald Ash Borer, an invasive non-native insect. Emerald Ash Borer attacks both healthy and stressed ash trees where adult beetles feed on the foliage while larvae tunnel through the trees' vascular system effectively girdling the tree (COSEWIC IN PRESS, 2022).

Pumpkin Ash occurs in the Carolinian Zone of southern Ontario, with only two mature individuals known and fewer than ten are expected to remain in Canada. It is estimated that over 90% of decline has occurred due to Emerald Ash Borer. Over 400 known seedlings and saplings are also at continued risk from Emerald Ash Borer (COSEWIC IN PRESS, 2022). Studies have shown that Emerald Ash Borer can spread rapidly, infest both healthy and stressed trees, and that ash mortality across an entire forest stand exceeds 99% within six years of infestation (Knight *et al.*, 2013, Klooster *et al.*, 2014, McCullough *et al.*, 2008). Emerald Ash Borer can infest ash saplings as small as 2 cm dbh, well before trees reach reproductive maturity (McCullough *et al.* 2008, Aubin *et al.*, 2015).

A substantial amount of forest and wetland habitat has been lost within the Canadian range of Pumpkin Ash since the arrival of Europeans. The Great Lakes Plains National Ecological Area has been dramatically altered over the past 180 years with wetland loss in Ontario within the Mixedwood Plains Ecozone estimated at 72% for wetlands larger than 10 ha. This loss may be even greater in Ontario's Carolinian Zone, within which the entire Canadian range of Pumpkin Ash occurs (COSEWIC IN PRESS, 2022).

Other threats include land conversion to agriculture, roads and utilities, logging and wood harvesting, recreational activities, climate change, deer-browsing and ecosystem modification by non-native plant species (COSEWIC IN PRESS, 2022).

## 2.6. Specialized life history or habitat use characteristics

Pumpkin Ash (*Fraxinus profunda*) is a medium-sized, broad-leaved hardwood tree in the Olive Family (Oleaceae). It can attain a height of 15 to 30m and a diameter at breast height of 173 cm under optimal conditions. It is notable for developing a conspicuous swollen, buttressed trunk base in very wet conditions. It has opposite, pinnately-compound leaves 20-45 cm long with densely pubescent leaflets on the bottom surface or, occasionally, only on the veins. Pumpkin Ash has the largest winged fruit (samaras) of any ash (COSEWIC IN PRESS, 2022).

It is distinguished with the following combination of characteristics distinguishing it from other ash species:

- Underside (abaxial) of leaflets lacking tiny nipple-shaped outgrowths (papillae) or

- with only a few sparse papillae (>40x magnification),
- Average length of unwinged portion of petiolules >7mm,
- Petiole, rachis and abaxial surface of leaflets tomentose,
- Base of leaflet blades rounded and truncate (only a short continuation of blade tissue extending down the petiolule, such that the petiolules are unwinged for most of their length),
- Fruiting calyx >4mm long

Pumpkin Ash is a bottomland species throughout its range and typically occurs in freshwater swamps, floodplain forests, and some brackish tidal wetlands. It is an obligate wetland species within a coefficient of wetness of -5. It is a habitat specialist which occurs in both permanently and seasonally flooded habitats and is adapted to long periods of inundation (COSEWIC IN PRESS, 2022). Pumpkin Ash is sensitive to drought and hydrological changes, which can cause canopy dieback and eventual death of trees. Pumpkin Ash has a shallow root system which makes it susceptible to windthrow and could conceivably limit uptake of water and nutrients during dry conditions (COSEWIC IN PRESS, 2022).

Flowers are unisexual and wind-pollinated, and emerge between late April and mid-May, generally at the same time as the leaves (COSEWIC IN PRESS, 2022). Further studies have shown that ash seeds only remain viable in the forest seed bank for two or three years (Klooster *et al.*, 2014). Seed banks are unlikely to persist at sites where sexually mature individuals have been killed by Emerald Ash Borer. Seeds germinate best on bare soil with little competing vegetation and are tolerant of high soil moisture and shade (COSEWIC IN PRESS, 2022).

## 2.7. Existing Conservation and Recovery Actions

Agencies in the United States and Canada have determined that eradication of Emerald Ash Borer is not possible and have focused efforts on slowing range expansion, population control measures, and developing resistant ash trees (COSEWIC IN PRESS, 2022).

Ash trees survive for about five years after infestation by Emerald Ash Borer; however, the time for parasitic wasp populations (predator of the Emerald Ash Borer) to establish and increase is considerably longer than that. Thereby, biological control measures of Emerald Ash Borer are expected to assist in their management but not stop their spread (COSEWIC IN PRESS, 2022).

## 3. Ontario status assessment

### 3.1. Application of endangered/threatened status in Ontario

#### 3.1.1. Criterion A – Decline in total number of mature individuals

Meets Criterion A2abce+3ce+4abce for Endangered. There is an estimated 90% past,

current and future decline of mature individuals based on (a) direct observation, (b) an index of abundance, (c) a decline in extent of occurrence and quality of habitat and (e) the effects of introduced Emerald Ash Borer.

### 3.1.2. Criterion B – Small distribution range and decline or fluctuation

Does not apply.

### 3.1.3. Criterion C – Small and declining number of mature individuals

Meets Criterion C1 for Endangered where there is an estimated continuing decline of >90% within two generations due to the presence of Emerald Ash Borer.

### 3.1.4. Criterion D – Very small or restricted total population

Meets Criterion D1 for Endangered where there is an estimate of less than ten mature individuals.

### 3.1.5. Criterion E – Quantitative analysis

Does not apply.

## 3.2. Application of Special Concern in Ontario

Does not apply.

### 3.2.1. Ontario's conservation responsibility

Does not apply. Ontario contains 0.8% of the global range.

### 3.2.2. Status modification based on level of risk in broader biologically relevant geographic range

Does not apply. Assessed by IUCN redlist as critically imperiled in its global range where it faces a similar threat impact of very high due to the prevalence of Emerald Ash Borer.

### 3.2.3. Rescue Effect

Unassisted, the movement of Pumpkin Ash from the United States into Canada has not been observed. Long-distance dispersal of ash samaras by wind is possible during large storm events, but wind dispersal of samaras into Canada is predicted to be a rare event and not a significant contributor to rescue. Typical dispersal distance by wind is approximately 1.4km, which is shorter than the distance from the nearest United States population to suitable habitat in Canada. Additionally, researchers in the United States

have not observed any apparent resistance to Emerald Ash Borer in Pumpkin Ash (COSEWIC IN PRESS, 2022).

### 3.3. Other status categories

#### 3.3.1. Data deficient

Does not apply.

#### 3.3.2. Extinct or extirpated

Does not apply.

#### 3.3.3. Not at risk

Does not apply.

## 4. Summary of Ontario status

Pumpkin Ash (*Fraxinus profunda*) is classified as Endangered in Ontario based on meeting criteria A2abce+3ce+4abce C1 and D1.

*This status of this species is consistent with the definition of Endangered under the Endangered Species Act, 2007.*

## 5. Information sources

Aubin, I., Cardou, F., Ryall, K., Kreuzweiser, D. and Scarr, T. 2015. Ash regeneration capacity after emerald ash borer (EAB) outbreaks: Some early results. *The Forestry Chronicle* 91(3): 291-298.

COSEWIC. 2022. IN PRESS. COSEWIC assessment and status report on the Pumpkin Ash *Fraxinus profunda* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 49 pp. (<http://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>).

Klooster, W., Herms, D., Knight, K., Herms, C., McCullough, D., Smith, A., Gandhi, K. and Cardina, J. 2014. Ash (*Fraxinus* spp.) mortality, regeneration, and seed bank dynamics in mixed hardwood forests following invasion by emerald ash borer (*Agrilus planipennis*). *Biological Invasions* 16: 859-873.



Knight, K., Brown, J. and Long, R. 2013. Factors affecting the survival of ash (*Fraxinus* spp.) trees infested by emerald ash borer (*Agrilus planipennis*). *Biological Invasions* 15: 371-383.

McCullough, D.G., Schneeberger, N.F. and Katovich, S.A. 2008. Emerald ash borer pest alert. NA-PR-02-04. USDA Forest Service

NatureServe. 2014. NatureServe Explorer: An Online Encyclopedia of Life. Arlington, Virginia. Available at: <http://explorer.natureserve.org>. (Accessed: July 18, 2014).

<sup>1</sup> A change in the classification of a species during reassessment by COSSARO may be for genuine or non-genuine reasons. Genuine reasons may include a reduction in threats to a species such that status of the species has improved, or the continuation of threats to the species such that the status of the species has further deteriorated. Non-genuine reasons may include new information on population size or threats that was not available during a previous assessment, the use of previous COSSARO criteria that may have yielded a different result or, taxonomic revisions that result in changes in range, population sizes or designatable units.

## Appendix 1: Technical summary for Ontario

Species: Pumpkin Ash (*Fraxinus profunda*)

### Demographic information

Demographic attribute	Value
Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.	40-50 years (IUCN, 2017); maximum age 200-300 years.
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes based on continuing declines observed and expected to be >90% because of Emerald Ash Borer as well as other threat.
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Unknown, but expected to be >90% within two generations due to Emerald Ash Borer.
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Unknown, but expected to be >90% within two generations due to Emerald Ash Borer.
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	Ongoing death of >90% individuals that reach maturity is suspected due to Emerald Ash Borer.
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over any 10 years, or 3 generations, over a time period including both the past and the future.	>90% suspected reduction over 3 generations.
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	<p><b>a.</b> No, Emerald Ash Borer is well established and expected to persist across this species' range.</p> <p><b>b.</b> Yes, cause of decline is understood.</p> <p><b>c.</b> No, threats are persisting in Canada.</p>
Are there extreme fluctuations in number of mature individuals?	No

### Extent and occupancy information in Ontario

<b>Extent and occupancy attributes</b>	<b>Value</b>
Estimated extent of occurrence (EEO). <i>If value in COSEWIC status report is not applicable, then use <a href="http://geocat.kew.org">geocat.kew.org</a>. State source of estimate.</i>	7,930 km <sup>2</sup> 14,620 km <sup>2</sup> (including unknown status)
Index of area of occupancy (IAO). <i>If value in COSEWIC status report is not applicable, then use <a href="http://geocat.kew.org">geocat.kew.org</a>. State source of estimate.</i>	68 km <sup>2</sup>
Is the total population severely fragmented? i.e., is >50% of its total area of occupancy in habitat patches that are: (a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	a. No. b. No.
Number of locations. <i>See Definitions and Abbreviations on COSEWIC and IUCN websites for more information on the term "location". Use plausible range to reflect uncertainty if appropriate.</i>	One (based on the threat of Emerald Ash Borer)
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	26
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of mature individuals in each sub-population or total population (if known)

<b>Sub-population (or total population)</b>	<b>Number of mature individuals</b>
Ontario	Two confirmed (estimated to be fewer than 10)

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is [unknown].

## Threats

A threats calculator was prepared for Pumpkin Ash with an overall threat impact of Very High. Threats include:

- i. Emerald Ash Borer (IUCN Threat 8.1 Invasive Non-native Species). Threat impact = Very High.
- ii. Logging and Wood Harvesting (IUCN Threat 5.3). Threat impact = Medium.
- iii. Annual and Perennial Non-timber Crops (IUCN Threat 2.1). Threat impact = Medium to Low.
- iv. Roads and Utility Lines (IUCN Threats 4.1 and 4.2). Threat impact = Low.

## Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Yes
Status of outside population(s) most likely to provide immigrants to Ontario	Status in the United States is unknown, however populations are showing similar declines due to Emerald Ash Borer.
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Not known and unlikely. Water dispersal between the United States and Canada may be possible, but this has not been confirmed.
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Yes, however given the presence of Emerald Ash Borer, immigrants would likely not survive.
Are conditions deteriorating in Ontario?	Yes
Is the species of conservation concern in bordering jurisdictions?	Yes
Is the Ontario population considered to be a sink?	No
Is rescue from outside populations likely?	No

## Sensitive species

Not a data sensitive species.

## Acronyms

COSEWIC: Committee on the Status of Endangered Wildlife in Canada  
COSSARO: Committee on the Status of Species at Risk in Ontario  
ESA: Endangered Species Act  
EO: Element occurrence (as defined by NHIC)  
EOO: extent of occurrence  
GRANK: global conservation status assessments  
IAO: index of area of occupancy  
IUCN: International Union for Conservation of Nature and Natural Resources  
MNRF: Ministry of Natural Resources and Forestry  
NHIC: Natural Heritage Information Centre  
NNR: Unranked  
NRANK: National conservation status assessment  
SARA: Species at Risk Act  
SNR: unranked  
SRANK: subnational conservation status assessment  
S1: Critically Imperiled  
S2: Imperiled  
S3: Vulnerable  
S4: Apparently Secure  
S5: Secure  
IUCN: International Union for Conservation of Nature and Natural Resources  
CDSEPO: Le Comité de détermination du statut des espèces en péril en Ontario