COSEWIC
Assessment and Status Report

on the

Common Hoptree
Ptelea trifoliata

in Canada

SPECIAL CONCERN
2015

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

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Previous report(s):

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Ambrose, J.D. 2002. Update COSEWIC status report on the common hoptree *Ptelea trifoliata* in Canada, *in* COSEWIC assessment and update status report on the common hoptree *Ptelea trifoliata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-14 pp.

Ambrose, J.D. 1984. COSEWIC status report on the hop tree *Ptelea trifoliata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 31 pp.

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Common Hoptree — Photo courtesy of Dr. Tyler Smith.

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COSEWIC
Assessment Summary

Assessment Summary – November 2015

Common name
Common Hoptree

Scientific name
Ptelea trifoliata

Status
Special Concern

Reason for designation
In Canada, this small, short-lived tree occurs in southwestern Ontario, colonizing sandy shoreline habitats. A long-term decline in habitat quality and extent is predicted due to the effects of shoreline hardening, and historical sand mining in Lake Erie. One subpopulation depends on continuing management efforts. Improved survey effort has significantly increased the number of mature individuals, which reduces the overall risk to this species.

Occurrence
Ontario

Status history
Designated Special Concern in April 1984. Status re-examined and designated Threatened in November 2002. Status re-examined and designated Special Concern in November 2015.

COSEWIC
Executive Summary

Common Hoptree
Ptelea trifoliata

Wildlife Species Description and Significance

Common Hoptree (*Ptelea trifoliata*) is a small tree in the rue family (Rutaceae). It has alternate trifoliate leaves which are aromatic; flowers bloom in early summer; they are borne in terminal clusters, cream coloured with 4-5 petals. Fruit, which matures in late summer, is dry, disk-shaped, and bears 2-3 seeds.

Common Hoptree is often a component of the stabilizing vegetation along sections of the Lake Erie shoreline. It has had a long history of medicinal and economic usage, including use by First Nations. It is one of two native Canadian species on which the larvae of the Giant Swallowtail butterfly feeds and is the primary nectar source for early adults of Juniper Hairstreak. It is also the sole host for larvae of the Hop-tree Borer. Hoptree Leaf-roller Moth and the Hoptree Barkbeetle are also specialist herbivores of the Common Hoptree.

Distribution

The typical subspecies (*P. trifoliata* ssp. *trifoliata*) occurs naturally from the lower Great Lakes to Texas, eastward from eastern Pennsylvania and southern New England to northern Florida. Other subspecies occur further south and west into Mexico.

Habitat

In Ontario, Common Hoptree occurs almost entirely along or near the Lake Erie shoreline. It is often found in areas of natural disturbance where it forms part of the outer edge of shoreline woody vegetation.

Biology

Common Hoptree is dioecious (male and female flowers on separate trees) with insect-pollinated flowers. The fruit is primarily wind-dispersed and may occasionally raft on lake ice or debris. Seedlings readily establish in open or disturbed sites.

Population Sizes and Trends

The trend in the Canadian population is unknown; however, within sites where subpopulation data are available the number of mature individuals appears to have increased by approximately 200% since the last report in 2002. Numbers at nine sites are increasing; three small sites were extirpated due to development and 34 lack comparable data to ascertain a trend. Eleven previously undocumented sites were recorded and two of the three sites identified as extirpated in 2002 were rediscovered. In total, an estimated 12,000 mature individuals occur in Canada.

Threats and Limiting Factors

In Canada, Common Hoptree rarely colonizes open inland habitats, being mostly limited to shoreline sites. The main threats to the species are loss of habitat resulting from altered coastal process, habitat succession and shoreline development.

Protection, Status and Ranks

In Canada, Common Hoptree is listed as Threatened at both the federal (Schedule 1, Threatened) and provincial level and is protected by both the *Species at Risk Act* (*SARA*) and the Ontario *Endangered Species Act* (2007). A recovery strategy for the species was published in 2012 and several of the key objectives have been addressed. COSEWIC assessed this species as Special Concern in November 2015.

Common Hoptree has been given a global rank of demonstrably secure (G5) by NatureServe; however, it is listed as critically imperiled (S1) in New Jersey and New York, apparently secure (S4) in Virginia and vulnerable (S3) in Ontario. Common Hoptree has not been assessed for the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species.

TECHNICAL SUMMARY

Ptelea trifoliata

Common Hoptree Ptéléa trifolié

Range of occurrence in Canada (province/territory/ocean): Ontario

Demographic Information

Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines (2011) is being used)	Unknown. Likely 3 to 20 years.
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Unknown. Although the population appears to be increasing based on data available at monitored sites, declines are projected based on the suite of threats.
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Not applicable.
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	Unknown. Within sites where subpopulation data are available, the number of mature individuals appears to have increased by approximately 200% since 2002.
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Unknown. Continued population growth at many sites seems likely, but suspected to be offset by habitat reduction over the next 10 years.
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future. *Observed 152% increase of monitored sites since 1982*.	Unknown.
Are the causes of the decline a. clearly reversible and b. understood and c. ceased?	a) Not applicable. b) Not applicable. c) Not applicable.
Are there extreme fluctuations in number of mature individuals?	No.

Extent and Occupancy Information

Estimated extent of occurrence	23,285 km² (12,485 km² if the waters of Lake Erie are excluded)
Index of area of occupancy (IAO) (Always report 2x2 grid value).	172 km²
Is the 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"[1] (use plausible range to reflect uncertainty if appropriate)	Location is either not applicable or equals the number of subpopulations (12).
Is there an [observed, inferred, or projected] decline in extent of occurrence? *The apparent increase in extent of occurrence is extremely large. It is suspected that this is the result of a change in methods*.	Uncertain.
Is there an [observed, inferred, or projected] decline in index of area of occupancy?	Uncertain.
Is there an [observed, inferred, or projected] decline in number of subpopulations? *Some sites have been extirpated (e.g., Cedar Beach Conservation Area). Only one subpopulation has been lost; however, this subpopulation consists entirely of planted trees, introduced as part of a previous conservation initiative.*	No
Is there an [observed, inferred, or projected] decline in number of "locations"*?	Not applicable.
Is there an [observed, inferred, or projected] decline in [area, extent and/or quality] of habitat?	Yes, observed.
Are there extreme fluctuations in number of subpopulations?	No.
Are there extreme fluctuations in number of "locations"[1]?	No.
Are there extreme fluctuations in extent of occurrence?	No.
Are there extreme fluctuations in index of area of occupancy?	No.
Subpopulations (give plausible ranges) (see Table 1 for locality)	# of Mature Individuals
A Brant County	9
B Elgin County	73
C Essex County 1	10,413
D Essex County 2	1,459
E Chatham-Kent County 1	100
F Chatham-Kent County 2	6
G Lambton County 1	2
H Lambton County 2	9
I Niagara Regional Municipality 1	202+
J Niagara Regional Municipality 2	Unknown
K Niagara Regional Municipality 3	Unknown (excluded)
L Norfolk County	6
Total (*rounded to nearest thousand to account for uncertainty)*	~12,000
Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Not done.

[1] See Definitions and Abbreviations on COSEWIC website and IUCN (Feb 2014) for more information on this term

Threats (actual or imminent, to populations or habitats, from highest impact to least)

Assessed Medium Threat Impact based on. i. 7.3 Other ecosystems modifications (medium) ii. 1.1 Housing & urban areas (low) iii. 7.1 Fire & fire suppression (low) iv. 11.1 Habitat shifting & alteration (low) v. 8.1 Invasive non-native/alien species (unknown) vi. 11.4 Storms & flooding (unknown) Was a threats calculator completed for this species and if so, by whom? Yes: 15 December 2014 by Bruce Bennett, Vivian Brownell, Tammie Dobbie, Karen Timm, Joyce Gould, Cary Hamel, Tyler Smith, Victoria Nowell, Eric Lamb, and Jim Pojar.

Rescue Effect (immigration from outside Canada)

Status of outside population(s) most likely to provide immigrants to Canada.	New York, S1. Michigan and Ohio, SNR (not ranked) but considered common.
Is immigration known or possible?	Immigration is not known but is possible through fruit dispersal.
Would immigrants be adapted to survive in Canada?	Likely, if from a northern source.
Is there sufficient habitat for immigrants in Canada?	Yes.
Are conditions deteriorating in Canada?[2]	Yes.
Are conditions for the source population deteriorating?[3]	The species is Critically Imperiled (S1) in New York, but unranked in Ohio and Michigan where local botanists report it is relatively common.
Is the Canadian population considered to be a sink?[4]	No.
Is rescue from outside populations likely? *Rescue is possible, as fruit is easily transported around the lakes by wind over snow, ice and sand and can disperse over water by rafting on ice or debris. However, in the event that the species is extirpated from Canada, the neighbouring US populations will likely also be much diminished*.	Unknown.

Data Sensitive Species

Is this a data sensitive species? No.

[3] See Table 3 (Guidelines for modifying status assessment based on rescue effect)

Status History

COSEWIC: Designated Special Concern in April 1984. Status re-examined and designated Threatened in November 2002. Status re-examined and designated Special Concern in November 2015.

Status and Reasons for Designation:

Status: Special Concern	**Alpha-numeric codes:** Not applicable
Reasons for designation: In Canada, this small, short-lived tree occurs in southwestern Ontario, colonizing sandy shoreline habitats. A long-term decline in habitat quality and extent is predicted due to the effects of shoreline hardening, and historical sand mining in Lake Erie. One subpopulation depends on continuing management efforts. Improved survey effort has significantly increased the number of mature individuals, which reduces the overall risk to this species.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Does not meet criteria.
Criterion B (Small Distribution Range and Decline or Fluctuation): Does not meet criteria. Although IAO is below the threshold for Endangered and there is an observed decline in area, extent and quality of habitat, the species occurs in >10 locations, is not severely fragmented, and does not undergo extreme fluctuations.
Criterion C (Small and Declining Number of Mature Individuals): Does not meet criteria. Exceeds thresholds for number of mature individuals.
Criterion D (Very Small or Restricted Population): Does not meet criteria. Exceeds thresholds for number of mature individuals and IAO.
Criterion E (Quantitative Analysis): Not applicable. Not done.

PREFACE

Since the last status report in 2002, the number of mature Common Hoptrees in Canada appears to have increased. Subpopulation size at nine sites is increasing, three small sites were extirpated due to development and 11 previously undocumented sites were recorded.

Several large occurrences of Common Hoptree have been thoroughly surveyed, leading to a substantial increase in the number of documented Common Hoptrees in Canada. More than 12,000 mature individuals are known to occur in Canada, which is an increase from the estimate of 920 to 1025 given in the 2002 report. Over 90% of the mature individuals occur at Point Pelee National Park.

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS
(2015)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

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Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

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WILDLIFE SPECIES DESCRIPTION AND SIGNIFICANCE

Name and Classification

Scientific Name: *Ptelea trifoliata* L.

Common Names: Common Hoptree; Ptéléa Trifolié, Stinking-ash, Three-leaved Hop Tree, Wafer-ash, Orme de Samarie

Family Name: Rutaceae (Rue family)

Major Plant Group: Angiosperm (dicot flowering plant)

Common Hoptree, a member of the Rutaceae, or Rue, family, occurs with no related species in its northern range. Only subspecies *trifoliata* is found in Canada, though it occurs with other *Ptelea* species and with other subspecies of *P. trifoliata* in southern North America. Details of related species and named subspecific taxa are given in Bailey (1962) and summarized in the original COSEWIC status report (Ambrose and Aboud 1982).

Morphological Description

Common Hoptree is a small tree or large shrub with smooth reddish-brown bark and alternate trifoliate aromatic leaves (Figure 1). It produces flowers in early summer; they are fragrant and cream-coloured with 4-5 petals, borne in terminal clusters with each tree having all-male or all-female flowers (dioecious). Rare individuals with predominantly male clusters have a few female flowers in the centre (Ambrose *et al.* 1985). The fruit is winged, disk-shaped, indehiscent and dry, containing 2(-3) seeds (Figure 1). For a full description see Bailey (1962) and Ambrose and Aboud (1982). Additional photographs can be accessed from Environment Canada (2014) and ROM/OMNR (2014).

Population Spatial Structure and Variability

There are no apparent geographical, ecological or biological barriers to gene flow among the Canadian Lake Erie shoreline subpopulations of the Common Hoptree, or between Canadian and American populations. Fruits are easily transported by wind over snow, ice and sand and could travel large distances over water by rafting on ice or debris (Ambrose *et al*. 1985). However, there are no empirical data to confirm the absence of spatial structure or strong demographic isolation of any Canadian population.

Figure 1. Characteristic trifoliate leaves and fruit of Common Hoptree. Photo courtesy of Dr. Tyler Smith.

Designatable Units

The Canadian population comprises a single designatable unit within the Great Lakes Plains Ecological Area (COSEWIC 2014). All occurrences are in similar habitat types and are limited to extreme southern Ontario, namely the Lake Erie shoreline and a few inland sites. There is no evidence to support segregating populations into distinct DUs. Occurrences in Quebec (see Canadian Range) are reported to represent introductions and are therefore excluded from this assessment.

Special Significance

In Canada, Common Hoptree occurs almost entirely along the Lake Erie shoreline, where it is a component of the stabilizing vegetation. It is one of two native species on which the larvae of the Giant Swallowtail (*Papilio cresphontes*) feeds (Layberry *et al.* 1998) and is the primary nectar source for early adults of Juniper Hairstreak (*Callophrys gryneus*) (Denomme-Brown and Otis 2012). It is also the sole host for larvae of the Hop-tree Borer (*Prays atomocella*) (COSEWIC 2015). In their Canadian ranges, Giant Swallowtail and Juniper Hairstreak are sporadic and localized, respectively (Layberry *et al.* 1998) and the Hop-tree Borer is known only from two subpopulations (COSEWIC 2015).

Common Hoptree, with its aromatic and bitter substances, has had a long history of medicinal and economic usage, reviewed by Bailey (1960). Alkaloids with bactericidal and cytotoxic activity were isolated and identified from this species (Mitscher *et al*. 1975; Petit-Paly *et al.* 1989). There are four citations for the use of the root bark on the Native American Ethnobotany Database website (University of Michigan 2014): for lung problems, for making other medicines more potent and as a sacred medicine with multiple uses.

Common Hoptree is available in the specialty and native horticultural trade in Ontario (*e.g*., Acorus Restoration 2014 (now out of business); Nettlecreek 2014; Wheatley Woods 2014) and has been planted in private gardens, including the Royal Botanical Gardens in Hamilton (Cavallin pers. comm. 2015). It has long been appreciated in European gardens, since introduction from the American colonies in the 17th century. It is admired in England for its “picturesque habit” (Clarke and Taylor 1976) and “fragrant flowers equal to the best honeysuckles” (Hillier 1972). It has been described as a “handsome native tree” by local specialty growers (Nettlecreek 2014). Restoration planting of Common Hoptree has taken place at Morgan’s Point Conservation Area (2009) in the Niagara area (NHIC 2014) and at several sites on Pelee Island (2012, 2014) (NCC and Pelee Quarries unpub. data 2012-2014). The Nature Conservancy of Canada (NCC) also plans to collect, propagate and plant Common Hoptree at additional localities on Pelee Island following habitat restoration (McFarlane pers. comm. 2015). Planted trees also occur at Rondeau Provincial Park but are of local origin (Dobbyn 2005).

DISTRIBUTION

Global Range

The nominate subspecies (*P. trifoliata* ssp. *trifoliata*) occurs naturally from the lower Great Lakes to Texas, eastward from eastern Pennsylvania and southern New England to northern Florida (Figure 2). Other subspecies occur farther south into Florida and Mexico, and west to New Mexico and Arizona. The full extent of the range of *P. trifoliata* ssp. *trifoliata* is unclear (Figure 2). Northern populations in Minnesota and Quebec are known to be introductions, as are the only known records from Rhode Island and Delaware. In the southwest, sources conflict as to the occurrence of this subspecies in Arizona and New Mexico (NatureServe 2014; USDA, NRCS 2014).

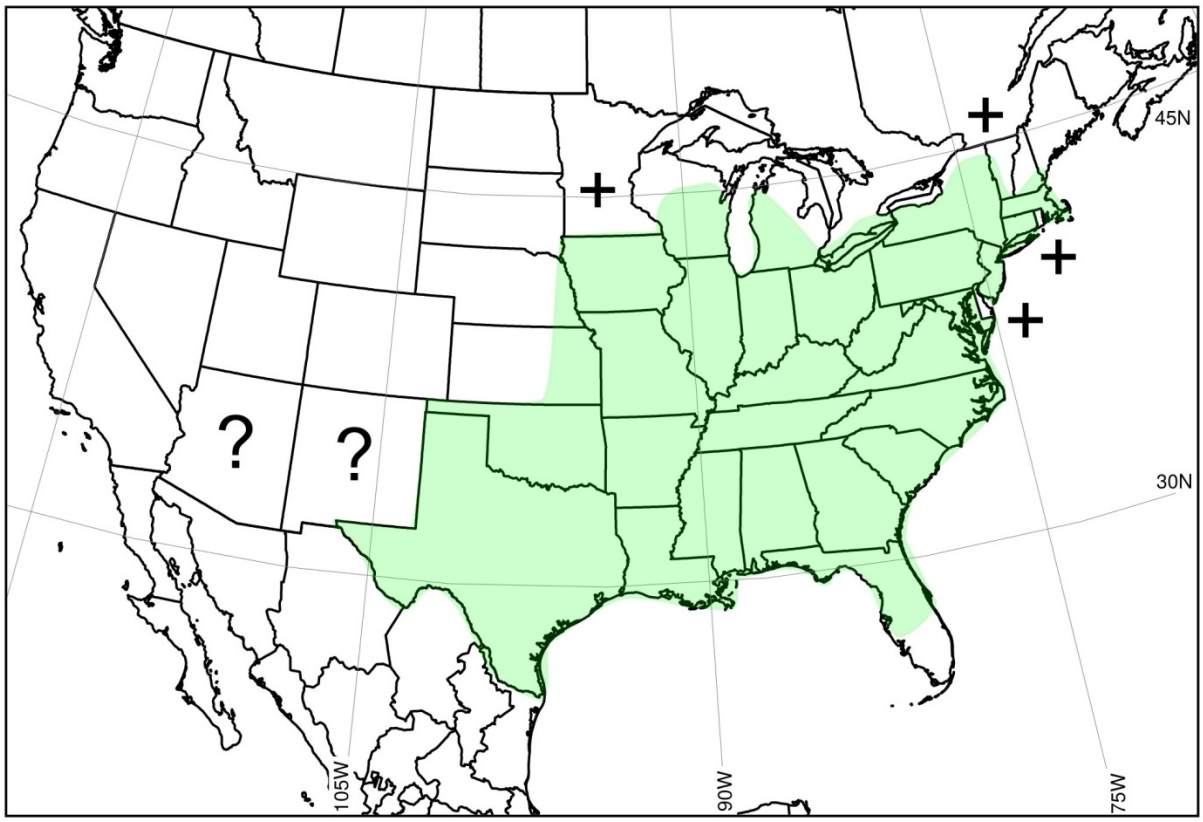

Figure 2. Distribution of *Ptelea trifoliata* ssp. *trifoliata* in North America north of Mexico. '?' indicate areas where sources conflict regarding the presence of this subspecies. '+' indicate areas where *Ptelea trifoliata* ssp. *trifoliata* is introduced outside its natural range (Minnesota, Quebec, Rhode Island and Delaware) (NatureServe 2014; USDA, NRCS 2014).

Canadian Range

Note: In this document, **Site** refers to a group of Common Hoptrees separated by 1 km and generally corresponds with element occurrences for the species given by NHIC (2014); **Subpopulation** refers to a group of sites defined by greater than 10 km separation for occurrences along Lake Erie and greater than 3 km for inland sites following NatureServe (2004); **Population** refers to the sum total of all Common Hoptrees in Canada, including mature and immature individuals.

In Canada, Common Hoptree is limited to extreme southern Ontario, namely the Lake Erie shoreline and a few inland sites (Figure 3). It has been collected in Quebec, but was introduced there (Rousseau 1974) as a horticultural ornamental in 1932 and is now naturalized (Lavoie *et al*. 2012). As such, the Quebec occurrence is considered an "extra-limital introduction" (COSEWIC 2010) that is geographically distinct from naturally occurring subpopulations. It is excluded from this assessment. Common Hoptree has also been introduced at other sites in Ontario (Table 3). Some of these sites are also excluded from this assessment (i.e., sites that are extra-limital or sites that have been planted as horticultural ornamentals which are not contributing to the wild population, K in Table 1, Figure 3). Sites that are intra-limital and are believed to be having a net positive impact on the wildlife species being assessed (i.e., 1, 5, and 6 in Table 3, Figure 4) were included following Guideline #3 (COSEWIC 2010).

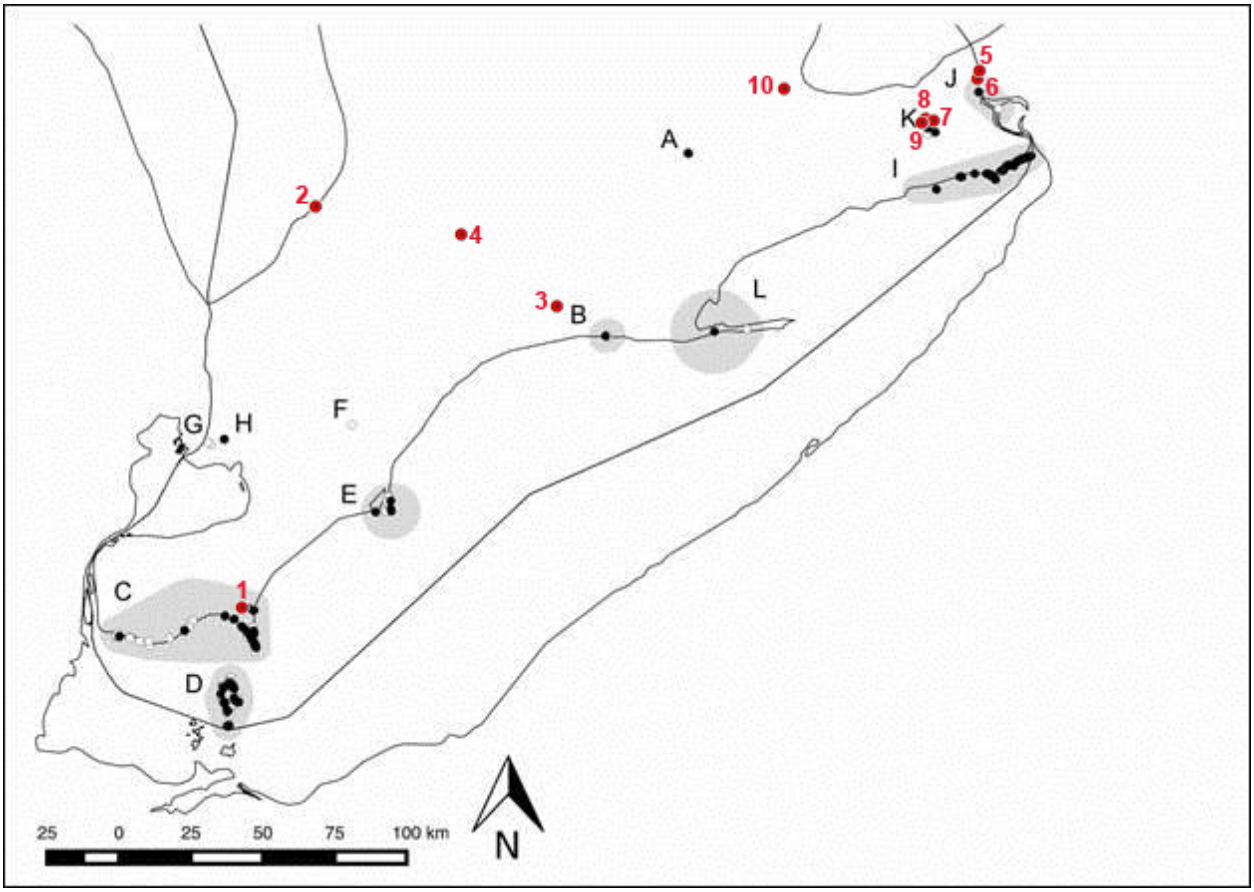

Figure 3. Distribution of Common Hoptree in Canada. Open circles represent observations made prior to 2002, closed circles represent observations made between 2002 and 2014. Grey areas show the boundaries of subpopulations and are denoted by letters which correspond with those given in Table 1. Numbers represent sites known or suspected to be cultivated, and correspond to those given in Table 3. Coordinates of the numbers are estimates only. Precise locality information was not found at time of assessment.

Figure 4. Extensive defoliation of Common Hoptree caused by the Hop-tree Leaf-roller Moth (*Agonopterix pteleae*) at Stone Road Alvar on Pelee Island in July 2014. Photo courtesy of Dr. Tyler Smith.

Table 1. Current abundance data for all known subpopulations of Common Hoptree in Canada. All counts are of mature trees (reproductive or similar size). Sites discovered since the previous status report are italicized.

County or Region	Sub-population	Site	No. Mature Individuals (Year)	Status
Brant County	A	(1) Hardy Road	9 (2014)	Extant
Elgin County	B	(2) Port Burwell Provincial Park	73 (2014)	Extant
Essex County	C	(3) Colchester Public Beach	0 (2000)	Unknown
		(4) 1 km North of Colchester	7 (2000)	Unknown
		(5) Lypps Beach	4 (2000)	Unknown
		(6) Fox Creek Conservation Area	1 (2000)	Unknown
		(7) Linden Beach	No plants located (2000)	Extirpated
		(8) Cedar Beach Conservation Area	No plants located (2014)	Extirpated
		(9) 1.5 km West of Comet	7 (2000)	Unknown

County or Region	Sub-population	Site	No. Mature Individuals (Year)	Status
		(10) Holiday Beach Conservation Area	42 (2014)	Extant
		(11) Hillman Marsh Conservation Area	No plants located (2014)[a]	Unknown
		(12) Point Pelee National Park mainland	~10,351 (2008)	Extant
		(13) Seacliff Beach (West of Leamington ferry dock)	1 (2007)	Presumed Extant
	D	(14) Fish Point Provincial Nature Reserve	134 (2014)	Extant
		(15) Stone Road Alvar	112 (2014)	Extant
		(16) West Shore Pump Station	115 (2014)	Extant
		(17) Red Cedar Savannah	46 (2014)	Extant
		(18) Middle Point	42 (2014)	Extant
		(19) Lighthouse Point Nature Reserve	460 (2014)	Extant
		(20) *Gibwood property*	0 (2014)	Extant
		(21) Middle Island, Point Pelee National Park	550 (2012)[b]	Presumed Extant
Chatham-Kent County	E	(22) Rondeau Provincial Park	69 (2005)[b]	Presumed Extant
		(23) Erieau	31 (2006)	Presumed Extant
	F	(24) 3.5 km east of Thamesville	6 (2000)	Unknown
Lambton County	G	(25) Chematogan: River Road, (Walpole Island)	2 (2000)	Unknown
	H	(26) Old Ferry Road and Snye Road, (Walpole Island)	8 (2007)	Presumed Extant
		(27) *Bluewater Line*	1 (2011)[c]	Presumed Extant
Niagara Regional Municipality	I[f]	(28) *Long Beach Conservation Area*	7 (2011)[c]	Presumed Extant
		(29) *Morgan's Point Conservation Area*	No mature individuals reported (2009)[d]	Presumed Extant
		(30) *Nickel Beach and Lorraine (Cassaday) Point*	6 (2014)	Extant
		(31) *Lorraine Bay*	No abundance data (Parks Canada Agency 2012)	Presumed Extant

County or Region	Sub-population	Site	No. Mature Individuals (Year)	Status
		(32) *Cedar Bay Road beach access*	~10 (2014)	Extant
		(33) *Sherkston Shores*	33 (2014)	Extant
		(34) Point Abino	31 (2014)	Extant
		(35) *Crystal Beach*	4 (2014)	Extant
		(36) *Bernard Avenue beach access*	~30 (2010)	Presumed Extant
		(37) West of Windmill Point	Large grove (2011)	Presumed Extant
		(38) Stonemill Road	No plants located (2014)	Extirpated
		(39) Bertie Bay Road and adjacent beach	41 (2014)	Extant
		(40) Crescent Beach	10 (2010)	Presumed Extant
		(41) *Kraft Drain Mouth*	No mature individuals reported (2007)	Presumed Extant
		(42) Erie Beach/Waverly Beach Park	~30 (2010)	Presumed Extant
	J	(43) Niagara Glen	Several shrubs (1989)	Unknown
		(44) Navy Island	No abundance data (1998)	Unknown
	K	(45) 1.5 km North-Northwest of Ridgeville	No plants located (2014)	Excluded from assessment
		(46) Fonthill, off Forest Hill Boulevard	No plants located (2005)[c]	Excluded from assessment
		(47) Ridgeville Cemetery	No plants located (1982)	Excluded from assessment
Norfolk County	L	(48) Long Point Park	6 (Cairns pers. comm. 2014)	Extant
		TOTAL[e]	**~12,000**	

[a] For Hillman Marsh Conservation Area, plants may have been overlooked during surveys completed in 2014 as Common Hoptrees were observed in 2007. A thorough survey of the area should be conducted before this site is assumed to be extirpated.

[b] Total counts of mature individuals are approximate for Middle Island and Rondeau Provincial Park (see Abundance).

[c] Abundance data based on observations reported to the Natural Heritage Information Centre (NHIC), but which have only undergone preliminary review.

[d] Morgan's Point Conservation Area was established in 2009 as part of mitigation measures by LCN (NHIC 2014). It is unclear if any of the ~150 individuals planted have matured.

[e] The total number of mature individuals has been rounded to the nearest thousand to account for uncertainty.

[f] Sites 30 through 34 and 35 through 42 occur more or less continuously along the Lake Erie shoreline; however, some of the sites (e.g., Sherkston Shores west and Windmill Point) are currently recognized by NHIC as distinct Element Occurrences. Consequently, they are maintained as separate entities here.

Table 2. Subset of Ontario subpopulations of Common Hoptree with comparative data from the previous status report (Ambrose 2002). All counts are of trees (reproductive or similar size) + saplings (non-reproductive and smaller) + seedlings.

County or Region	Sub-population	Site	Ambrose and Aboud (1982)	Ambrose (2002)	Current (2014)	Trend[†]	Threat(s)
Brant County	A	(1) Hardy Road	No data available	1 + 0 + 0	9 + 5 + 0	↑	-
Elgin County	B	(2) Port Burwell Provincial Park	2 + 0 + 10	20-30 + 0 + >50	73 + 89 + 62	↑	11.1
Essex County	C	(8) Cedar Beach Conservation Area	0 + 3 +0	2 + 3 + 18	No plants located	E	-
		(10) Holiday Beach Conservation Area	4 + ~15 + 15	2 + 2 + 0	42 + 24 + 39	↑	1.1
		(11) Hillman Marsh Conservation Area	~20	~28 + additional saplings + 0	No plants located[a]	NA	-
	D	(14) Fish Point Provincial Nature Reserve	248 + up to 100s + up to 100s	96 + 13 + 8	134 + 21 + 2	↑	11.1
		(15) Stone Road Alvar: including Mill Point and South Bay Shore	5 + ~3 + ~10 (does not include abundance data for South Bay Shore)	10 + 4 + up to 100s	112 + 52 + 9	↑	-
		(16) West Shore Pump Station	Common[b]	50 + 57 + 0	115 + 52 + 104	↑	7.3, 1.1
		(19) Lighthouse Point Nature Reserve	11 + ? + ~10	55 + 20 + 0	460 + 227 + 585	↑	-
Niagara Regional Municipality	I	(38) Stonemill Road	1 + 1 + 0	1 + 1 + 0	No plants located	E	-
		(39) Bertie Bay Road and adjacent beach	17 + 0 + up to 100s	10 + 4 + 0	41 + 11 + 0	↑	1.1
	K	(45) 1.5 km NNW of Ridgeville	30 + 0 + up to 100s	No data available	No plants located	NA	-
Norfolk County	L	(48) Long Point Park	No data available	1 + 0 + 0	6 + 0 + 0	↑	-
		TOTAL[c]:	**338 + 122 + 245**	**281 + 104 + 179**	**995 + 481 + 801**	↑	

[a] For Hillman Marsh Conservation Area, plants may have been overlooked during surveys completed in 2014. Hoptrees were observed in 2007 for Hillman Marsh Conservation Area. A thorough survey of the area should be conducted before this site is assumed Extirpated.

[b] No specific numbers recorded during 1982 field season.

[c] Totals based on approximations defined in Ambrose (2002): few = ~3, sev = ~10 num = up to 100s.

[†] Population trend over 10 years is denoted as follows: ↑ = increase, ↓ = decrease, NA = insufficient data, E = extirpated

Table 3. Populations known or suspected to be cultivated (Environment Canada 2012).

County	Site	Reference
Essex	1. Hillman Marsh canoe launch	NHIC unpub. data, Lebedyk pers. comm. 2010, Oldham pers. comm. 2010
Lambton	2. Ausable River Cut Conservation Authority	Woodliffe pers. comm. 2010
Elgin	3. Aylmer	Ambrose and Aboud 1984
Middlesex	4. University of Western Campus, Thames River, and waste places, London	Ambrose and Aboud 1984
Regional Municipality of Niagara	5. Niagara Parks Commission School of Horticulture and possibly other trees in the vicinity	Ambrose and Aboud 1984
	6. Upper Whirlpool Woods – two saplings planted by the Niagara Parks Commission in 2003 or 2004 with funding from the Habitat Stewardship Program	Ritchie pers. comm. 2010
	7. Fonthill – var. *mollis* at edge of a Norway Spruce shelter belt, near Woodstream and Forest Hill Boulevards	Ambrose and Aboud 1984
	8. Ridgeville – 1.5 km north northwest – edge of Norway Spruce shelterbelt, near the site of a plantation and former tree nursery	Ambrose and Aboud 1984
	9. Ridgeville Cemetery – now extirpated	Ambrose and Aboud 1984
Municipality of Hamilton Wentworth	10. Hamilton Harbour – shrubby hillside	Ambrose and Aboud 1984
Metro Toronto	11. Don Valley and other waste places and ravines	Ambrose and Aboud 1984
Quebec	12-15. Four populations	Rousseau 1974, Ambrose and Aboud 1984, Ambrose 2002

Overall, the distribution of Common Hoptree in Canada does not appear to have changed significantly since at least the 1880s (NHIC 2014). There are 12 subpopulations of Common Hoptree in Canada. Ten subpopulations are either confirmed or presumed to be extant while the status of one subpopulation is unknown and one is excluded following Manipulated Population Guideline #3 (COSEWIC 2010; Table 1). The boundaries of each subpopulation are shown in Figure 3.

Including all extirpated, excluded, and presumed extant sites, a total of 48 sites for Common Hoptree have been documented in Canada (Table 1). Eleven sites (20, 27, 28, 29, 30, 31, 32, 33, 35, 36 and 41 in Table 1) are newly documented since 2002: ten are near known sites and may have been overlooked in previous surveys while one (29) was planted as part of a mitigation project (NHIC 2014). Three sites are currently considered extirpated (7, 8, 38): three sites have been excluded from the assessment (following Guideline #3, COSEWIC 2010) including one site (the Ridgeville/Fonthill site listed in Table 3) which was determined to be extirpated by Ambrose and Aboud (1982). Three sites (7, 13 and 42) were reported extirpated in Ambrose (2002), but two of them (13 and 42) were rediscovered in 2007 and 2005, and two sites (8, 38) were not located during surveys in 2014, and are considered extirpated. Eighteen of the 42 sites not considered extirpated were confirmed extant by field surveys in 2014 (Table 1). Of the remaining 24 sites, 14 are presumed to be extant, as observations have been reported to Natural Heritage Information Centre (NHIC) since 2000, while the status of sites of the remaining 10 sites is unknown (NHIC 2014).

Of the 42 presumed extant or unknown sites for Common Hoptree in Canada, 31 sites occur along the shoreline of Lake Erie. The remaining 11 sites are inland on beach sand, alvars and soils with heavy lake bottom clays and clay-loams.

Extent of Occurrence and Area of Occupancy

The extent of occurrence (EOO) for Common Hoptree in Canada is 23,285 km^2 with 10,800 km^2 of the area over Lake Erie. The index of area of occupancy (IAO) is 172 km^2.

While the EOO appears to have increased over the last 10 years, this is likely attributable to greater survey effort and possibly changes in methodology. Previously undocumented sites, including one new subpopulation, have been recorded for the species since 2002, and all are in close proximity to sites identified in the 2002 status report (Ambrose 2002).

Search Effort

To determine the Canadian range of Common Hoptree, observation and survey data were retrieved from the Natural Heritage Information Database (NHIC 2014), Parks Canada (Jalava *et al.* 2008; PPNP unpub. data), Ontario Parks (Dobbyn 2005), and the 2002 COSEWIC status report (Ambrose 2002). In addition, herbarium records for the species were compiled from the Canadian Museum of Nature, which had digital records available to view. No additional herbarium work was done for this report.

Search areas were determined using GPS coordinates, descriptions from previous fieldwork and communication with previous status report writer Dr. John Ambrose. While Common Hoptree is fairly distinctive, it occurs in a heavily urbanized and industrialized region of Ontario (Crins *et al*. 2009). During surveys in summer 2014, much of the shoreline of Lake Erie was inaccessible to surveyors because public access to the beach was restricted. Additional sites for Common Hoptrees may be found along the coastline of Lake Erie on private property.

Between 2000 and 2001, 28 sites were surveyed for the 2002 status report (Ambrose 2002). Counts were made of trees (reproductive or similar size), saplings (non-reproductive and smaller) and seedlings and UTM coordinates were recorded at each site (Ambrose 2002). Since 2001, targeted surveys have been completed at Rondeau Provincial Park (Dobbyn 2005) and Point Pelee National Park mainland (Jalava *et al*. 2008) and Middle Island (PPNP unpub. data). For these surveys, the sites and/or individual trees were mapped using UTM-based coordinates.

In summer 2014, fieldwork was coordinated to visit sites for Common Hoptree that were identified in the previous status report (Ambrose 2002) and by the NHIC (2014). Survey sites for fieldwork were prioritized based on the Element Occurrence Quality Rank assigned by NHIC (2014). High priority was given to sites with high estimated viability; these sites have more individuals than the low-viability sites, and as a consequence contribute much more to the total population of the species. Between July 29 and August 7, 2014, 21 sites in southern Ontario were surveyed following the methods used during surveys for the previous status report (Ambrose 2002). Counts were made by Victoria Nowell, Dr. Tyler Smith, Nadia Cavallin, and Jennifer McPhee for a total of 200 person-hours. Of the 21 sites visited, plants were not located at four sites; three of these are considered extirpated based on observed development, while additional surveys are required at one site as there was a lack of sufficient information to relocate the plants. Two additional sites were not visited because landowner permission was denied.

HABITAT

Habitat Requirements

The Lake Erie shoreline, where most of Canada's Common Hoptrees occur, is characterized by a long growing season and a moderated climate (Crins *et al*. 2009). On the Point Pelee and Fish Point sandspits it is common on the windward west shore but rare on the leeward side and inland.

Common Hoptree is often found in areas of high natural disturbance where it forms the outer edge of shoreline woody vegetation. It usually grows on nutrient-poor sand, but occasionally occurs on other droughty substrates such as thin soil over limestone. This species shows little tolerance for deep shade. Small groves of large trees (4-6 m tall) may persist under closed forest canopy, as at Stone Road Alvar on Pelee Island. However, in these conditions no seedlings or saplings were observed (Smith pers. obs. 2014) suggesting recruitment may not be possible. Most subpopulations are on beach sand, including the inland subpopulation at Thamesville, but some subpopulations also occur on other soils, such as on the Pelee Island alvars and along drainage ditches where soils are heavy lake bottom clays and clay-loams. In the southern portion of the range of Common Hoptree in the United States, it is associated with rocky bluffs and outcrops (Weakley 2012)

Co-occurring vegetation documented during 2014 surveys included: Common Hackberry (*Celtis occidentalis*), Roughleaf Dogwood (*Cornus drummondii*), Canada Wild Rye (*Elymus canadensis*), Green Ash (*Fraxinus pennsylvanica*), Eastern Black Walnut (*Juglans nigra*), Common Juniper (*Juniperus communis*), Switchgrass (*Panicum virgatum*), Virginia Creeper (*Parthenocissus quinquefolia*), Eastern Cottonwood (*Populus deltoides*), Chinquapin Oak (*Quercus muehlenbergii*), Red Oak (*Quercus rubra*), Fragrant Sumac (*Rhus aromatica*), Staghorn Sumac (*Rhus typhina*), Black Raspberry (*Rubus occidentalis*), willow (*Salix* sp.), Poison Ivy (*Toxicodendron radicans*), and River Bank Grape (*Vitis riparia*).

Habitat Trends

Overall, habitat for Common Hoptree in Canada is declining. The Point Pelee sand spit, where approximately 16,983 individuals (of which approximately 10,000 are considered mature) are found (Jalava *et al*. 2008), is eroding faster than it has been accreting. In the next 50 years, 126 ha (1.26 km^2) could be lost from the western shore if mitigation measures are not taken (Baird and Associates Coastal Engineers 2010). While erosion is most extreme on the eastern shore of the point, it is also significant along the western shore where the bulk of the hoptrees occur (see Figure 3.41b in Baird and Associates Coastal Engineers 2008). Furthermore, shoreline development along Lake Erie and forest succession, resulting from a decrease in disturbance events (*e.g*., ice scour), continue to degrade available habitat.

BIOLOGY

Details on population and reproductive biology of Common Hoptree are from Ambrose *et al.* (1985) while information regarding the germination ecology of the species is from McLeod and Murphy (1977a, b). Additional information included here is from observations made during surveys in 2002 and 2014 or as indicated.

Life Cycle and Reproduction

Flowers appear at the end of the new growth in late spring, typically during the first two weeks of June in its Ontario range. Flowers, which are insect-pollinated, were observed with a large variety of insect visitors, primarily bees, flies and beetles (Ambrose 2002). The species is dioecious with ratios skewed towards males. Fruit matures late in the summer and is dispersed during late fall to winter. Seedlings develop in full sun to partial shade after winter stratification breaks dormancy. Increasing shade appears to suppress flowering and in areas where a full forest canopy has developed this species rarely persists (Ambrose 2002).

Common Hoptree appears to be short-lived (*i.e*., living less than 20 years, Ambrose 2002), which could be explained by its occurrence on dynamic sites where frequent disturbance kills older individuals. While the species is not rhizomatous, it was observed during 2014 surveys that trees vigorously sucker from the roots and broken branches when damaged. Similar observations were recorded by Jalava *et al.* (2008). Given its remarkable ability to sucker, the root system of plants could be much older than stalks above ground.

Physiology and Adaptability

Common Hoptree is adapted to live in dynamic habitats. Seedlings readily establish in open habitats, replacing lost vegetation, and damaged trees vigorously sucker from the roots. Common Hoptree tolerates a range of substrates (see Habitat section).

Dispersal and Migration

Seeds are wind-dispersed within the dry-winged indehiscent fruit during the fall and winter. Fruits are easily transported over snow, ice and sand and could travel large distances over water by rafting on ice or debris (Ambrose *et al.* 1985). Individual fruit typically contain two seeds. Thus an individual dispersal event to a distant site could produce a male and female seedling, allowing for continued reproduction.

Interspecific Interactions

Several species of insects are dependent on Common Hoptree, where they are known to feed on its twigs, leaves and nectar. Species include: a twig-boring beetle the Hoptree Barkbeetle (*Phloeotribus scabricollis*) (Ambrose 2002), the Hop-tree Borer (COSEWIC 2015), the Hop-tree Leaf-roller Moth (*Agonopterix pteleae*) (Scarr *et al*. 2007; Smith pers. obs. 2014), the Giant Swallowtail (Layberry *et al*. 1998) and the Juniper Hairstreak (Denomme-Brown and Otis 2012). The larvae of the Eastern Tiger Swallowtail (*Papilio glaucus*) feed on Common Hoptree in Ontario (Hall *et al*. 2014)

POPULATION SIZES AND TRENDS

Sampling Effort and Methods

Between July 29 and August 7, 2014 for this report, 21 sites from seven subpopulations were surveyed in southern Ontario for Common Hoptree.

Surveys were conducted by walking through suitable habitat and counting trees (reproductive or greater than 2 m tall), saplings (non-reproductive and less than 2 m tall) and seedlings (less than 1 m tall). An effort was made to count individual plants rather than stems, as trees were observed to sucker from roots and broken branches. Search areas were determined using GPS coordinates, descriptions from previous fieldwork and communication with the previous author, Dr. John Ambrose.

For sites not visited in 2014, recent counts were obtained from observations of Common Hoptree submitted to the NHIC (2014) and from reports received from Parks Canada (Jalava *et al*. 2008; PPNP unpub. data) and Ontario Parks (Dobbyn 2005). Cairns (pers. comm. 2014) provided abundance data for Long Point Provincial Park.

Abundance

During surveys completed in summer 2014, 1959 mature trees, 852 saplings and 1002 seedlings were counted at 21 sites in southern Ontario. Six mature individuals were observed at Long Point Provincial Park by Melody Cairns (pers. comm. 2014). Post-2002 observation data were available for 15 additional sites from the NHIC (2014) or from reports received from Parks Canada and Ontario Parks. A further 11 sites have not been surveyed since 2002 and are of unknown status. Available abundance data for all documented subpopulations of Common Hoptree in Canada are summarized in Table 1.

!To determine the total number of mature individuals in Canada, the most recent available census data were tallied for all extant and presumed extant sites as well as those of unknown status. In addition, demography was approximated for Point Pelee National Park Middle Island and Rondeau Provincial Park as the surveys did not distinguish between juvenile and mature trees. For sites where complete data were recorded in 2002 and 2014, an approximate ratio of 1:1 mature individuals to immature individuals (saplings + seedlings) was observed. This ratio was applied to the two sites where the separation of juvenile and mature trees was not recorded, leading to a total combined estimate of approximately 12,000 mature individuals in Canada, 90% of which are within Point Pelee National Park (Table 1). Together with juvenile individuals, approximately 21,000 Common Hoptrees are estimated to occur in Canada. The rounding of estimates is assumed to be within the range of uncertainty.

Additional sites for Common Hoptrees are believed to occur along the coastline of Lake Erie on private property.

Fluctuations and Trends

Between 2002 and 2014, knowledge of the number of extant localities for Common Hoptree in Canada increased, as 11 previously undocumented sites were recorded for the species. All of these are near previously known sites and may have been overlooked in earlier surveys. In addition, two of the three sites identified as extirpated in 2002 were rediscovered in 2005 and 2007. Common Hoptree numbers at nine sites are increasing, three small sites were extirpated due to development and 34 sites lack comparable data to ascertain a trend.

Over the last 10 years, the number of documented Common Hoptrees in Canada has increased substantially from fewer than 2,000 recorded individuals in 2002, to greater than 20,000. This is in part the result of comprehensive surveys being completed at Point Pelee National Park at mainland (Jalava *et al*. 2008) and Middle Island (PPNP unpub. data) and at Rondeau Provincial Park (Dobbyn 2005). At Point Pelee National Park mainland, in particular, the recorded number of individuals increased from 350 to ~16,983. To avoid influencing the analysis of population fluctuation and trends, these sites were excluded and only those that were thoroughly surveyed in 2002 and in 2014 were used (Table 2). Within sites where subpopulation data are available, the number of mature individuals appears to have increased by approximately 200% since the last status report. However, this only represents a small proportion of the Canadian population.

Rescue Effect

The Canadian population of Common Hoptree occurs in close proximity to populations of the species in upstate New York, Ohio, and Michigan. In New York, there are few native occurrences of the species (NYNHP Conservation Guide 2013) while in Ohio and Michigan, local botanists report it is relatively common (Gardner pers. comm. 2015; Michigan Flora Online 2015; Rabeler pers. comm. 2015). Immigration is not known, but is possible through dispersal of fruit (Ambrose 2002). Because of their northern position, survival of immigrants from these populations is likely, but suitable habitat is often degraded (Ambrose 2002).

THREATS AND LIMITING FACTORS

Direct threats facing Common Hoptree assessed in this report were organized and evaluated based on the IUCN-CMP (World Conservation Union-Conservation Measures Partnership) unified threats classification system (Master *et al*. 2009). Threats are defined as the proximate activities or processes that directly and negatively affect the Common Hoptree population. Results on the impact, scope, severity, and timing of threats are presented in tabular form in Appendix 1. This exercise was completed by a group of experts including an expert on applying the threats calculator and was chaired by the responsible COSEWIC Vascular Plant Species Specialist Sub-committee co-chair. The results were reviewed. The threats calculations were based on the concentration of over 90% of mature individuals in two extant subpopulations (*i.e*., Point Pelee National Park Mainland 86% and Middle Island 4.5%).

The overall Threat Impact for Common Hoptree is Medium, with the impacts of Natural Systems Modifications being the greatest threat. The impacts of other possible threats, Invasive Non-native/Alien Species (8.1) and Storms & Flooding (11.4), are unknown (Appendix 1). Most of the damage to the species and its habitat occurred historically through loss of forests and habitat fragmentation. Threats and limiting factors applicable to Common Hoptree are further discussed below under the IUCN-CMP headings.

Threats

Natural System Modifications

Other ecosystem modifications (impact: medium) (7.3)

The primary threat to Common Hoptree in Canada is loss of habitat resulting from altered coastal processes along Lake Erie. Sand dunes and beaches are a naturally dynamic habitat maintained by erosion and deposition of sand. Shoreline hardening (*i.e*., through the construction of bulkheads, jetties, seawalls or groins) alters these natural processes, resulting in reduced levels of sand deposition and loss of beach and dune habitat. Historical sand mining has also affected the sand budget as it resulted in the formation of large craters in the lake bottom, exacerbating shoreline erosion along Lake Erie (Dobbie pers. comm., 2015).

In the next 50 years, up to 126 ha (1.26 km^2) of habitat could be lost from Point Pelee National Park mainland (Baird and Associates Coastal Engineers 2010) where 86% of all Common Hoptrees in Canada are located. Hoptree depends on colonizing newly created beach habitat, and under current conditions habitat is not being created fast enough to counter losses due to erosion. Erosion issues are also reported for Rondeau Provincial Park (OMNR 1991) and may be affecting additional sites along Lake Erie. According to the Point Pelee National Park Management Plan, erosion of the Point Pelee sand spit could be slowed if collaborative management efforts are instituted (Parks Canada Agency 2010).

Fire & fire suppression (impact: low) (7.1)

Common Hoptree thrives in early successional habitats such as sand dunes, savannah and road side verges, which are maintained by periodic disturbance. Shading by canopy trees including oaks, ashes, and Hackberry appears to limit persistence of the species, suppressing flowering and limiting recruitment.

Decreased disturbance including suppression of fire in savannah and alvar habitats has allowed for successional forests to develop, shading out Common Hoptree (Ambrose 2002). At Point Pelee National Park and Stone Road Alvar on Pelee Island, succession is being actively addressed by prescribed burns and physical removal of encroaching vegetation from savannah and dune habitats. At this time it is unknown whether similar initiatives are occurring at other sites.

Housing & urban areas (impact: low) (1.1)

Cottage and resort development, in conjunction with recreational activities, are a significant threat to individual trees along the shoreline of Lake Erie. During surveys completed in July and August 2014, intensive beach grooming by some property owners was observed, including the removal of all beach vegetation. In two sites bulldozers were located on the beach.

Habitat shifting & alteration (impact: low) (11.1)

Decreased disturbance, including reduced ice-scour in recent years, has allowed for successional forests to develop, shading out Common Hoptree (Ambrose 2002).

Limiting Factors

In the previous status report, Problematic Native Species (8.2), specifically Double-crested Cormorants (*Phalacrocorax auritus*) and a twig-boring beetle, were reported as actual or imminent threats to Common Hoptree in Canada (Ambrose 2002). These are now considered limiting factors rather than threats to the species.

The second largest occurrence (~550 mature individuals) of Common Hoptree in Canada is located at Point Pelee National Park Middle Island where there is a large nesting population of Double-crested Cormorants. High levels of cormorant activity not only impact individual tree health (Koh *et al*. 2012), but also affect the composition of the understory vegetation by altering soil properties (Boutin *et al*. 2011). Since 2008, cormorant numbers have been managed by Parks Canada. Provided nesting remains at its current level, the effect of cormorants on Common Hoptree is expected to be lessened (Dobbie pers. comm. 2015).

Insect herbivory, by the twig-boring beetle and other species (*e.g.*, Hop-tree Leaf-roller Moth), has been observed to cause extensive damage to Common Hoptree, particularly small trees and seedlings (Figure 4). However, the impact of these species on the Common Hoptree population is predicted to be minimal and may therefore be better described as a limiting factor until further research on their effect is completed.

Invasive alien species (8.1) are widespread within the range of Common Hoptree in Canada, readily establishing in disturbed areas, the principle habitat of Common Hoptree. In general, invasive species may outcompete trees for resources such as light, water, and nutrients and/or facilitate succession. Exotic plants were observed at nearly all populations of Common Hoptree surveyed in 2014, and 276 species are established in Point Pelee National Park alone (Mosher 2012). At Middle Island, Boutin *et al*. (2011) noted that exotic species comprised 33 and 40% of species in the seedbank and aboveground vegetation, respectively. However, there is uncertainty as to the degree of impact of invasive species, in terms of mortality, on Common Hoptree. In some areas of Point Pelee National Park, there are negative effects on seedling establishment, but it is unclear as to whether this is a threat or limiting factor.

Number of Locations

The most imminent threat to the species is ongoing erosion of the Point Pelee sand spit where the largest population of Common Hoptree in Canada is located. Erosion issues are reported for Rondeau Provincial Park and may be affecting additional sites along Lake Erie.

Habitat change (due to ecological succession) and shoreline development are ongoing, observable threats affecting individual sites throughout the entire Canadian range of the species. Habitat succession was observed at all 21 sites surveyed in July and August 2014 and almost certainly occurs at most or all other sites of Common Hoptree in Canada. Development primarily affects sites on private property and is not considered a major threat to Common Hoptree on federal, provincial or conservation authority land.

As most of the Canadian Common Hoptree subpopulations are not affected by any rapid threat there are two suggested options: (a) number of locations is not used (*i.e.*, the subcriteria that refer to the number of locations consequently are not met), especially if the unaffected area is more than half the taxon's range; (b) number of locations in the unaffected areas is set to the number of subpopulations in those areas, especially if there are several subpopulations (IUCN 2014). Following this guidance, number of locations is either not applicable or equals the number of subpopulations (12).

PROTECTION, STATUS AND RANKS

Legal Protection and Status

In Canada, Common Hoptree was previously assessed as Threatened by COSEWIC in 2002 and is protected under Schedule 1 of the *Species at Risk Act* (*SARA*). More recently, COSEWIC assessed this species as Special Concern in November 2015. Common Hoptree is also listed as Threatened in Ontario and is protected by the Ontario *Endangered Species Act* (2007). Several sites (*e.g.*, Point Pelee National Park and Rondeau Provincial Park) are afforded some measure of protection either through the *Canada Parks Act* (2000) or the *Ontario Parks and Conservation Reserves Act* (2006).

A recovery strategy for Common Hoptree was published in 2012 (Parks Canada Agency 2012). To date, several key actions have been implemented. Culling of Double-crested Cormorants at Point Pelee National Park Middle Island has taken place yearly since 2008 by Parks Canada and vegetation management activities are being implemented at Point Pelee National Park to counteract habitat succession and invasive, exotic plants (Dobbie pers. comm. 2014).

Non-Legal Status and Ranks

NatureServe gives the subspecies (*Ptelea trifoliata* ssp. *trifoliata*) a global and U.S. rank of Secure (G5T5; N5); however, it is listed as Critically Imperiled (S1) in New Jersey and New York, Imperiled (S2) in Wisconsin, Vulnerable (S3) in Maryland, and Apparently Secure (S4) in West Virginia and Virginia. In Canada and in Ontario it is ranked Vulnerable (N3 and S3) by the most recent listing (2003) (NatureServe 2014). It is unranked (SNR) in all other states where it is found. Common Hoptree has not been assessed for the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (IUCN 2014).

Habitat Protection and Ownership

The large occurrences at Point Pelee National Park (including Middle Island), Lighthouse Point Nature Reserve, and Fish Point Provincial Nature Reserve are under federal and provincial ownership, respectively. Many Common Hoptrees on Pelee Island are on property owned by the Federation of Ontario Naturalists, the Nature Conservancy of Canada (NCC), and the Essex Region Conservation Authority. Collectively, these sites account for >95% of known mature Common Hoptrees in Canada and are actively managed with respect to the species. Smaller sites are on federal, provincial, conservation authority and local municipality public lands, but not necessarily managed for conservation of Common Hoptree (*e.g.*, road verges and drainage ditches; beaches).

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BIOGRAPHICAL SUMMARY OF REPORT WRITER(S)

Victoria Nowell is currently completing her Master of Science in Biology at Carleton University in Ottawa. She previously received a B.Sc. in Biology from Dalhousie University in Halifax. Victoria's research is focused on the population genetics and habitat of the endangered sedge Few-flowered Club-rush (*Trichophorum planifolium*). In addition to plants, Victoria has also worked with mites (Acari) and flies (Diptera) as a curatorial and database technician with the Canadian National Collection of Insects Arachnids and Nematodes. Following graduation, Victoria plans to pursue a career in conservation management and consulting.

Tyler Smith is a plant taxonomist working for Agriculture and Agri-Food Canada (AAFC). He received a B.Sc. in Ecology (Botany Minor) from the University of Guelph and a Ph.D. in Plant Science from McGill University. He completed a postdoctoral fellowship at Saint Mary's University in Halifax, and was an assistant professor at Eastern Kentucky University for two years before moving to AAFC in 2011. Tyler has authored or co-authored 6 COSEWIC status reports: the recovery strategy for Few-flowered Club-rush (*Trichophorum planifolium*), the management plan for Frosted Glass-whiskers (*Sclerophora peronella*), and the action plan for Boreal Felt Lichen (*Erioderma pedicellatum*). He has also chaired the Few-flowered Club-rush recovery team, and was a member of the Red Mulberry (*Morus rubra*) recovery team. He has extensive field experience across eastern North America, from the Gulf Coast to the James Bay lowlands.

Nadia Cavallin is the Herbarium Curator and Field Botanist at the Royal Botanical Gardens, Ontario. She received her B.Sc. in Biodiversity and Conservation from the McGill University School of Environment (Quebec) in 2003 and her M.Sc. in Biology from the University of Moncton (New Brunswick) in 2008. Nadia has been practising field botany in eastern Canada since 1999. Before her appointment at the Royal Botanical Gardens, she worked five years at the McGill University Herbarium as the associate curator and database assistant.

Jennifer McPhee is currently a Botany Intern at the Royal Botanical Gardens in Hamilton. From 2009 to 2011, Jenn worked for the Nova Scotia Department of Natural Resources, as a Field Biologist, evaluating strip mine reclamation methods and writing project reports. She then graduated from Western University with an M.Sc. (Environment and Sustainability) in 2013. Her master's research focused on the implications of increasing atmospheric nitrogen deposition on tallgrass prairie restoration. In early 2014, she wrote a Property Management Plan for Thames Talbot Land Trust's conservation property, Wardsville Woods. Jenn has a passion for botany, especially species-at-risk, and for nature.

COLLECTIONS EXAMINED

With good data on collection and site records from the Natural Heritage Information Centre (NHIC 2014) and the 2002 COSEWIC status report, field time was concentrated on visiting representative sites. Herbarium records for the species were obtained from the Canadian Museum of Nature in Gatineau.

Appendix 1. Threats Classification Table for Common Hoptree

Species or Ecosystem Scientific Name	Common Hoptree
Element ID	**Elcode**
Date (Ctrl + ";" for today's date):	15/12/2014
Assessor(s):	Bruce Bennett, Vivian Brownell, Tammie Dobbie, Karen Timm, Joyce Gould, Cary Hamel, Tyler Smith, Victoria Nowell, Eric Lamb, Jim Pojar
References:	

Overall Threat Impact Calculation Help:

Threat Impact		Level 1 Threat Impact Counts: high range	low range
A	Very High	0	0
B	High	0	0
C	Medium	1	1
D	Low	2	2
Calculated Overall Threat Impact:		Medium	Medium

Assigned Overall Threat Impact:	
Impact Adjustment Reasons:	
Overall Threat Comments	NOTE: Generation time used from previous status report, no recent evidence to support. For purposes of the threats assessment, group agreed a longer generation time was more likely, therefore 10 years was used for generation time.

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
1	Residential & commercial development	D	Low	Small (1-10%)	Serious (31-70%)	High (Continuing)	
1.1	Housing & urban areas	D	Low	Small (1-10%)	Serious (31-70%)	High (Continuing)	
1.2	Commercial & industrial areas		Negligible	Negligible (<1%)	Serious (31-70%)	High (Continuing)	
1.3	Tourism & recreation areas						
2	Agriculture & aquaculture						
2.1	Annual & perennial non-timber crops						
2.2	Wood & pulp plantations						
2.3	Livestock farming & ranching						
2.4	Marine & freshwater aquaculture						
3	Energy production & mining						
3.1	Oil & gas drilling						

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
3.2	Mining & quarrying						
3.3	Renewable energy						
4	Transportation & service corridors						
4.1	Roads & railroads						Point Pelee - significant numbers of Common Hoptree are growing along roadways (more light to grow more vigorously) (if there was no road there would not be this issue). Park policy allows trimming along roadways with SAR authorization. Managed in Park to avoid losses (and collect seeds for replanting) to the extent possible.
4.2	Utility & service lines						
4.3	Shipping lanes						
4.4	Flight paths						
5	Biological resource use						
5.1	Hunting & collecting terrestrial animals						
5.2	Gathering terrestrial plants						
5.3	Logging & wood harvesting						
5.4	Fishing & harvesting aquatic resources						
6	Human intrusions & disturbance		Not a Threat	Pervasive (71-100%)	Neutral or Potential Benefit	High (Continuing)	
6.1	Recreational activities		Not a Threat	Pervasive (71-100%)	Neutral or Potential Benefit	High (Continuing)	ATV use was discussed. Effect of recreation is likely large or pervasive on this species and is ongoing; however, severity is likely neutral. Park education and management is likely of great benefit in relation to the potential for impact of this threat. Currently ATVs are restricted from Point Pelee. The impact of ATVs and recreational use outside the park is mixed. The heavy beach grooming at Nickel Beach and intense use of high dunes at Sherkston are probably detrimental to the subpopulations at those sites. On the other hand, the subpopulation at Rondeau is being encroached upon by planted Scots Pine (*Pinus sylvestris*), and would benefit from more disturbance, particularly if it reduced tree cover.

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
6.2	War, civil unrest & military exercises						
6.3	Work & other activities						
7	Natural system modifications	C	Medium	Pervasive (71-100%)	Moderate (11-30%)	High (Continuing)	
7.1	Fire & fire suppression	D	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	Overall, unknown extent as to which fire suppression has affected habitat for this species. Managed (to maintain savannah habitat) inside Park. Outside the Park, fire suppression is likely having a negative impact.
7.2	Dams & water management/use						
7.3	Other ecosystem modifications	C	Medium	Pervasive (71-100%)	Moderate (11-30%)	High (Continuing)	Hardening of shoreline removes the source of sand but there are other factors that contribute to overall sand budget. Park Ecologist indicates there are many studies that show that the Point should be shifting, not shrinking, as is currently happening. Sand sucking (from freighters) historically caused a sand deficit and craters in lake bottom. Building of marinas traps sand (historically dredged and taken away). Effects of historical sand mining are still seen today (even though stopped in 80s). High water levels in Lake Erie 2014 have resulted in some losses of trees close to western shoreline. Some uncertainty on total number of losses. This is the highest threat but how it manifests (over the 10-year timeframe) is difficult to ascertain in terms of probabilities.
8	Invasive & other problematic species & genes		Unknown	Pervasive - (71-100%)	Unknown	High (Continuing)	
8.1	Invasive non-native/alien species		Unknown	Pervasive (71-100%)	Unknown	High (Continuing)	Hoptrees most commonly occur in disturbed areas which are also generally the best areas for invasive alien species that could impact this species. There is uncertainty as to degree of impact, however (in terms of mortality). In some areas of Point Pelee, there are negative effects on seedling establishment but it is uncertain as to whether this is a threat or limiting factor.

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
8.2	Problematic native species		Not a Threat	Small (1-10%)	Neutral or Potential Benefit	High (Continuing)	Main threat is on Middle Island where there is a large population of Double-crested Cormorants. However, as long as the population continues to be managed, at current nesting levels, impacts are not high (or of a negative effect). Uncertainty points to more research needed to distinguish effects of Hoptree Borer as limiting factor rather than a threat.
8.3	Introduced genetic material						
9	Pollution						
9.1	Household sewage & urban waste water						
9.2	Industrial & military effluents						
9.3	Agricultural & forestry effluents						
9.4	Garbage & solid waste						
9.5	Air-borne pollutants						
9.6	Excess energy						
10	Geological events						
10.1	Volcanoes						
10.2	Earthquakes/tsunamis						
10.3	Avalanches/landslides						
11	Climate change & severe weather	D	Low	Large - Small (1-70%)	Slight (1-10%)	High (Continuing)	
11.1	Habitat shifting & alteration	D	Low	Large - Small (1-70%)	Slight (1-10%)	High (Continuing)	Reduced ice scour recently compared to historical events.
11.2	Droughts						
11.3	Temperature extremes						
11.4	Storms & flooding		Unknown	Unknown	Unknown	High (Continuing)	Historically, theory is that this species evolved with storm and flood events - belief is that climate change is impacting the timing and intensity which may impact the species but is overall unknown.

Classification of Threats adopted from IUCN-CMP, Salafsky *et al*. (2008).