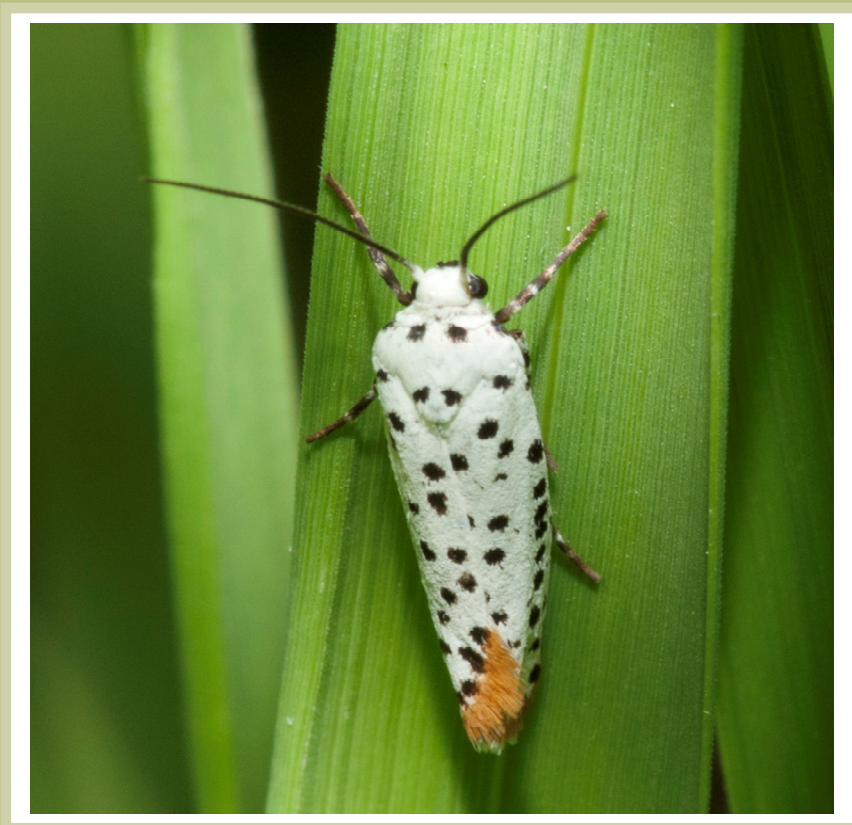


# Recovery Strategy for the Hoptree Borer (*Prays atomocella*) in Canada

## Hoptree Borer



2022



Government  
of Canada

Gouvernement  
du Canada

Canada

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**Official version**

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**Non-official version**

The non-official version of recovery documents is published in HTML format and all hyperlinks were valid as of date of publication.

For copies of the recovery strategy, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the [Species at Risk \(SAR\) Public Registry](#)<sup>1</sup>.

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<sup>1</sup> [www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html](http://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html)

# RECOVERY STRATEGY FOR THE HOPTREE BORER (*Prays atomocella*) IN CANADA

2022

Under the Accord for the Protection of Species at Risk (1996), the federal, provincial, and territorial governments agreed to work together on legislation, programs, and policies to protect wildlife species at risk throughout Canada.

In the spirit of cooperation of the Accord, the Government of Ontario has given permission to the Government of Canada to adopt the *Recovery Strategy for Hoptree Borer (Prays atomocella) in Ontario* (Part 2) and the *Hoptree Borer Ontario Government Response Statement* (Part 3) under Section 44 of the *Species at Risk Act* (SARA). Environment and Climate Change Canada has included a federal addition (Part 1) which completes the SARA requirements for this recovery strategy.

The federal recovery strategy for the Hoptree Borer in Canada consists of three parts:

Part 1 – Federal Addition to the *Recovery Strategy for the Hoptree Borer (Prays atomocella) in Ontario*, prepared by Environment and Climate Change Canada.

Part 2 – *Recovery Strategy for the Hoptree Borer (Prays atomocella) in Ontario*, prepared by A.G. Harris for the Ministry of the Environment, Conservation and Parks.

Part 3 – *Hoptree Borer Ontario Government Response Statement*, prepared by the Ministry of the Environment, Conservation and Parks.

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Part 2 – *Recovery Strategy for the Hoptree Borer (Prays atomocella) in Ontario*, prepared by A.G. Harris for the Ministry of the Environment, Conservation and Parks

Part 3 – *Hoptree Borer Ontario Government Response Statement*, prepared by the Ministry of Environment, Conservation and Parks

**Part 1 – Federal Addition to the *Recovery Strategy for the Hoptree Borer (Prays atomocella) in Ontario*, prepared by Environment and Climate Change Canada**

## Preface

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#)<sup>2</sup> agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress within five years after the publication of the final document on the SAR Public Registry.

The Minister of Environment and Climate Change and Minister responsible for Parks Canada Agency is the competent ministers under SARA for the Hoptree Borer and has prepared the federal component of this recovery strategy (Part 1), as per section 37 of SARA. To the extent possible, it has been prepared in cooperation with the Province of Ontario (Ministry of the Environment, Conservation and Parks) and the Parks Canada Agency as per section 39(1) of SARA. SARA section 44 allows the Minister to adopt all or part of an existing plan for the species if it meets the requirements under SARA for content (sub-sections 41(1) or (2)). The Ontario Ministry of the Environment, Conservation and Parks led the development of the attached recovery strategy for the Hoptree Borer (Part 2) in cooperation with Environment and Climate Change Canada. The Province of Ontario also led the development of the attached Government Response Statement (Part 3), which is the Ontario Government's policy response to its provincial recovery strategy and summarizes the prioritized actions that the Ontario government intends to take and support towards species' recovery.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment and Climate Change Canada, the Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the Hoptree Borer and Canadian society as a whole.

This recovery strategy will be followed by one or more action plans that will provide information on recovery measures to be taken by Environment and Climate Change Canada and the Parks Canada Agency and other jurisdictions and/or organizations involved in the conservation of the species. Implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

The recovery strategy sets the strategic direction to arrest or reverse the decline of the species, including identification of critical habitat to the extent possible. It provides all Canadians with information to help take action on species conservation. When critical habitat is identified, either in a recovery strategy or an action plan, SARA requires that critical habitat then be protected.

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<sup>2</sup> [www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding.html#2](http://www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding.html#2)

In the case of critical habitat identified for terrestrial species including migratory birds, SARA requires that critical habitat identified in a federally protected area<sup>3</sup> be described in the *Canada Gazette* within 90 days after the recovery strategy or action plan that identified the critical habitat is included in the public registry. A prohibition against destruction of critical habitat under ss. 58(1) will apply 90 days after the description of the critical habitat is published in the *Canada Gazette*.

For critical habitat located on other federal lands, the competent minister must either make a statement on existing legal protection or make an order so that the prohibition against destruction of critical habitat applies.

If the critical habitat for a migratory bird is not within a federal protected area and is not on federal land, within the exclusive economic zone or on the continental shelf of Canada, the prohibition against destruction can only apply to those portions of the critical habitat that are habitat to which the *Migratory Birds Convention Act, 1994* applies as per SARA ss. 58(5.1) and ss. 58(5.2).

For any part of critical habitat located on non-federal lands, if the competent minister forms the opinion that any portion of critical habitat is not protected by provisions in or measures under SARA or other Acts of Parliament, or the laws of the province or territory, SARA requires that the Minister recommend that the Governor in Council make an order to prohibit destruction of critical habitat. The discretion to protect critical habitat on non-federal lands that is not otherwise protected rests with the Governor in Council.

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<sup>3</sup> These federally protected areas are: a national park of Canada named and described in Schedule 1 to the *Canada National Parks Act*, The Rouge National Park established by the *Rouge National Urban Park Act*, a marine protected area under the *Oceans Act*, a migratory bird sanctuary under the *Migratory Birds Convention Act, 1994* or a national wildlife area under the *Canada Wildlife Act* see ss. 58(2) of SARA.

## Acknowledgements

This federal addition was prepared by Elisabeth Shapiro and Shady Abbas, with assistance from Angela Darwin, Judith Girard, and Marie-Claude Archambault (Environment and Climate Change Canada Canadian Wildlife Service - Ontario). The document has benefitted from the input and review of Elizabeth Rezek, Krista Holmes, John Brett and Ken Tuininga (Environment and Climate Change Canada – Canadian Wildlife Service - Ontario), Gary Allen, Joanne Tuckwell and Tammy Dobbie (Parks Canada Agency), and Fiona McGuiness (Ontario Ministry of the Environment, Conservation and Parks). Acknowledgement and thanks is given to all other parties that provided advice and input used to help inform the development of this recovery strategy.

## Additions and Modifications to the Adopted Document

The following sections have been included to address specific requirements of the federal *Species at Risk Act* (SARA) that are not addressed in the Province of Ontario's *Recovery Strategy for the Hoptree Borer (Prays atomocella) in Ontario* (Part 2) and/or to provide updated or additional information.

Environment and Climate Change Canada (ECCC) is adopting the *Recovery Strategy for the Hoptree Borer (Prays atomocella) in Ontario* (Part 2) with the exception of section 2.0 Recovery. In place of section 2.0, ECCC has established a population and distribution objective and performance indicators, and is adopting the Government of Ontario's government-led and government-supported actions of the *Hoptree Borer Ontario Government Response Statement* (Part 3) as the broad strategies and general approaches to meet the population and distribution objective.

Under SARA, there are specific requirements and processes set out regarding the identification and protection of critical habitat. Therefore, statements in the provincial recovery strategy referring to identification and protection of the species' habitat may not directly correspond to federal requirements. Recovery measures dealing with the protection of habitat are adopted; however, whether these measures will result in protection of critical habitat under SARA will be assessed following publication of the final federal recovery strategy.



## Recovery Feasibility Summary

Based on the following four criteria that Environment and Climate Change Canada uses to establish recovery feasibility, it is unknown whether recovery of the Hoptree Borer is feasible. In keeping with the precautionary principle, this recovery strategy has been prepared as per section 41(1) of SARA, as would be done when recovery is determined to be technically and biologically feasible. This recovery strategy addresses the unknowns surrounding the feasibility of recovery.

### **1. Individuals of the wildlife species that are capable of reproduction are available now or in the foreseeable future to sustain the population or improve its abundance.**

Unknown – The species was first recorded in Canada in 1927 at Point Pelee National Park, Ontario. Since 1927 there have been only seven confirmed adult records (most recently in 2013), and one larval record (2010), all from Point Pelee National Park, Ontario (COSEWIC 2015a). Targeted surveys in 2010 found probable larval feeding evidence of the species consisting of a total of 84 damaged Common Hoptree (*Ptelea trifoliata*) shoots at Point Pelee National Park (62 shoots) and Pelee Island, Ontario (22 shoots). Additional evidence of larval feeding damage was observed on Pelee Island in 2016 (COSEWIC 2015a; Burrell and Sutherland pers. comm. 2018 in Harris 2018). This recently observed larval feeding damage may provide evidence that individuals capable of reproduction were available as of 2016. However, there remain data deficiencies. The current abundance of Hoptree Borer in Canada is unknown, no population trends are available, and the number of adults needed to sustain a population or improve its abundance is unclear.

### **2. Sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration.**

Unknown – The Hoptree Borer is completely reliant on its sole larval host plant, Common Hoptree, for development of its larva. However, little is known about the habitat requirements of the adults, and therefore suitable habitat requirements are not fully understood. It is unclear if the host plant needs to be a certain age (or branch diameter) in order to be a viable host to Hoptree Borer. There is also no information on appropriate or preferred nectar sources, which are likely required to provide nutritional resources for reproduction. The larval host plant, Common Hoptree, is itself listed as Special Concern under SARA. In Canada, Common Hoptree is located primarily on the shoreline of Lake Erie (COSEWIC 2015b). Hoptree Borer has been documented in only the two largest subpopulations of Common Hoptree, one on the mainland of Essex County (including Point Pelee National Park), and one on Pelee Island (COSEWIC 2015a). These two subpopulations are estimated to contain 80-90% of the tree's Canadian population (COSEWIC 2015b). Targeted surveys for Hoptree Borer have taken place within smaller Common Hoptree subpopulations in Rondeau Provincial Park and Niagara region, but no evidence of the Hoptree Borer was found (COSEWIC 2015a). Habitat management and restoration techniques exist to maintain and perhaps

even increase Common Hoptree at the two subpopulations where Hoptree Borer is known. However, as the current population size and trends of Hoptree Borer are unknown, and as suitable habitat for this species is not fully understood, it is unclear whether enough suitable habitat is available, or could be made available, for this species.

### **3. The primary threats to the species or its habitat (including threats outside Canada) can be avoided or mitigated.**

Unknown – The *Recovery Strategy for the Hoptree Borer (Prays atomocella) in Ontario* lists the most significant threats to the species as: shoreline erosion, succession, storms, invasive non-native plant species, and problematic native species (Harris 2018). The threat assessment conducted as part of the COSEWIC status assessment (COSEWIC 2015a), identified many of the same threats, but ranked a number of them as having an unknown impact, including shoreline erosion, invasive non-native species, pesticides and storms. This uncertainty is due to the indirect impacts these threats pose to the Hoptree Borer, through their direct impact to the Common Hoptree. In addition, the COSEWIC threat assessment did not consider problematic native species to be a threat. It is possible that threats to the Common Hoptree which indirectly impact Hoptree Borer, such as shoreline erosion, vegetation succession, and invasive non-native plant species can be managed to some extent using currently available management tools. However, direct threats to Hoptree Borer remain poorly understood due to data deficiencies (e.g., required nectar sources, competition for food (e.g., with Hoptree Leaf-Roller Moth), larval tree characteristics, tolerance to pesticides), and it is unclear if these can be avoided or mitigated.

### **4. Recovery techniques exist to achieve the population and distribution objectives or can be expected to be developed within a reasonable timeframe.**

Unknown – Techniques exist to manage several threats that indirectly impact Hoptree Borer through their impact on Common Hoptree, such as vegetation succession and invasive non-native plant species. Shoreline erosion, may also be addressed by minimizing further shoreline hardening and restoring the natural movement of sediment to areas where Hoptree Borer and Common Hoptree are found. Filling knowledge gaps will be important in order to effectively address remaining threats. However, given the many unknowns surrounding the life history of Hoptree Borer, as well as the impact of direct threats to the species, it is unknown if recovery techniques exist to achieve the population and distribution objective or can be expected to be developed within a reasonable timeframe.

## 1. COSEWIC\* Species Assessment Information

**Date of Assessment:** November 2015

**Common Name (population):** Hoptree Borer

**Scientific Name:** *Prays atomocella*

**COSEWIC Status:** Endangered

**Reason for Designation:** This species is dependent on its sole larval host plant Common Hoptree, which is confined to a narrow swath of southwestern Ontario and currently assessed as Special Concern. This moth has an even more limited range than that of its host – it is known only from the western shore of Point Pelee, and from Pelee Island. Very few individuals have been detected. The most imminent threats include loss of shoreline habitat through erosion, vegetation succession, and invasive plant species.

**Canadian Occurrence:** Ontario

**COSEWIC Status History:** Designated Endangered in November 2015.

\* COSEWIC (Committee on the Status of Endangered Wildlife in Canada)

## 2. Species Status Information

The Hoptree Borer is listed as Endangered<sup>4</sup> on Schedule 1 of the *Species at Risk Act* (SARA) (S.C. 2002, c.29). In Ontario, the species is listed as Endangered<sup>5</sup> under the *Endangered Species Act, 2007* (ESA) (S.O. 2007, c. 6) and receives species and habitat protection under the ESA.

The global rank for the Hoptree Borer is Unranked (GNR). It is considered Unranked (NNR) in Canada and Unranked (SNR) in Ontario (NatureServe 2019).

In the US it is known from scattered observations in Arkansas, Illinois, Indiana, Kentucky, Michigan, Missouri, Ohio, Tennessee, Texas and Wisconsin, but the species status has not been assessed in these states (COSEWIC 2015a). NatureServe lists the species as occurring in Indiana where it is unranked (SNR) (NatureServe 2019) (Appendix A).

Ontario has the only population of Hoptree Borer in Canada. Based on available records, the range in the United States is geographically broad, but similar to Canada the moth appears to be absent from large portions of the range of Common Hoptree

<sup>4</sup> A wildlife species facing imminent extirpation or extinction.

<sup>5</sup> A species that lives in the wild in Ontario but is facing imminent extinction or extirpation.

(COSEWIC 2015a). From available distribution data, it is estimated that 7% of the species' global range is in Canada (COSEWIC 2015a).

## 3. Threats

### 3.1 Threats Assessment

The Hoptree Borer threat assessment is based on the IUCN-CMP (International Union for Conservation of Nature - Conservation Measures Partnership) unified threats classification system (Salafsky et al. 2008).

Threats are defined as the proximate activities or processes that have caused, are causing or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational). Limiting factors<sup>6</sup> are not considered during this assessment process. For purposes of threat assessment, only present and future threats are considered. Historical threats, indirect or cumulative effects of the threats, or any other relevant information that would help understand the nature of the threats are presented in the Description of Threats section (Section 3.2).

The calculated overall threat impact for Hoptree Borer is Low.<sup>7</sup> The scope, severity and/or impact of many threats is unknown, due to the data deficiencies and knowledge gaps surrounding this species. Given the moth's reliance on its host plant, it is important to consider the indirect effects that threats to Common Hoptree have on Hoptree Borer. The presumed greatest threat to the species is the decline in its host plant, the Common Hoptree, a species that is primarily at-risk due to natural system modifications (IUCN Threat #7) and less the result of human activity; the threat assessment also considers the cumulative result of multiple threats. In recent years, the Common Hoptree has shown a population increase leading to its status downlisting from Threatened to Special Concern under SARA, which is likely due to management activities in protected areas to maintain the host population. Threats are listed in order as they appear in the Threats Classification Table (Table 2).

See Section 1.6 (Threats to Survival and Recovery) in the provincial recovery strategy for more information on threats. The list below identifies how the IUCN threat categories used in Table 2 correspond to the threat categories used in section 1.6 of the provincial recovery strategy.

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<sup>6</sup> Factors that may limit population growth or spread, but do not cause declines.

<sup>7</sup> The overall threat impact was calculated following Master et al. (2012).

**Table 2.** Threat Classification Table for Hoptree Borer

Threat # <sup>a</sup>	Threat Description	Impact <sup>b</sup>	Scope <sup>c</sup>	Severity <sup>d</sup>	Timing
<b>7</b>	<b>Natural system modifications</b>	<b>Low</b>	<b>Pervasive</b>	<b>Slight</b>	<b>High</b>
7.1	Fire & fire suppression	Low	Small	Slight	High
7.3	Other ecosystem modifications	Unknown	Pervasive	Unknown	High
<b>8</b>	<b>Invasive &amp; other problematic species &amp; genes</b>	<b>Unknown</b>	<b>Pervasive</b>	<b>Unknown</b>	<b>High</b>
8.1	Invasive non-native/alien species	Unknown	Pervasive	Unknown	High
<b>9</b>	<b>Pollution</b>	<b>Unknown</b>	<b>Unknown</b>	<b>Extreme</b>	<b>Moderate</b>
9.3	Agricultural & forestry effluents	Unknown	Unknown	Extreme	Moderate
<b>11</b>	<b>Climate change &amp; severe weather</b>	<b>Low</b>	<b>Large-small</b>	<b>Slight</b>	<b>Moderate</b>
11.1	Habitat shifting & alteration	Low	Large-small	Slight	Moderate
11.2	Droughts	Unknown	Unknown	Unknown	Unknown
11.3	Temperature extremes	Unknown	Unknown	Unknown	Unknown
11.4	Storms & flooding	Unknown	Unknown	Unknown	Moderate

<sup>a</sup>**Threat #** - Threats are numbered using the IUCN Classification System. Only those threats relevant to Hoptree Borer are presented in this table and in Section 3.2 Description of Threats and Part 2 (*Recovery Strategy for the Hoptree Borer (Prays atomocella) in Ontario*).

<sup>b</sup>**Impact** – The degree to which a species is observed, inferred or suspected to be directly or indirectly threatened in the area of interest. The impact of each threat is based on Severity and Scope rating and considers only present and future threats. Threat impact reflects a reduction of a species population or decline/degradation of the area of an ecosystem. The median rate of population reduction or area decline for each combination of scope and severity corresponds to the following classes of threat impact. Very High (75% declines), High (40%), Medium (15%), and Low (3%). Unknown: used when impact cannot be determined (e.g. if values for either scope or severity are unknown); Not Calculated: impact not calculated as threat is outside the assessment timeframe (e.g. timing is insignificant/negligible or low as threat is only considered to be in the past); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit.

<sup>c</sup>**Scope**- Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a proportion of the species' population in the area of interest. (Pervasive = 71-100%; Large = 31-70%; Restricted = 11-30%; Small = 1-10%; Negligible <1%).

<sup>d</sup>**Severity** – Within the scope, the level of damage to the species from the threat can be reasonably be expected to be affected by the threat within a 10-year or three-generation timeframe. Usually measured as the degree of reduction of the species' population.

<sup>e</sup>**Timing**- High = Continuing; Moderate = only in the future (could happen in the short term [ $<10$  years or three generations]) or now suspended (could come back in the short term); Low = only in the future (could happen in the long term) or now suspended (could come back in the long term); Insignificant/Negligible = only in the past and unlikely to return, or no direct effect but limiting.

### 3.2 Description of Threats

Hoptree Borer is presumed to be impacted by three primary threats (Table 2 above): natural system modifications (shoreline erosion, natural succession), climate change and severe weather (habitat shifting and alteration, storms and flooding), and invasive & other problematic species (competition with its host plant) and probably to a lesser extent, indiscriminate fire and pollution (pesticides to control gypsy moths). Although recovery typically focuses on addressing direct and human-caused threats, indirect threats to the Hoptree Borer larval host plant are important to consider when planning for its recovery, and especially given its host plant is also at-risk in Canada. It is likely that additional but currently unknown threats exist given how little is known about the Hoptree Borer.

#### **IUCN Threat # 7. Natural system modifications:**

##### *7.1 Fire & fire suppression*

Fire- especially indiscriminate or unmitigated fires, has the potential to destroy both Common Hoptree and Hoptree Borer individuals (COSEWIC 2015a; Harris 2018) in the short-term but opening of habitat can be beneficial in the medium-longer term. Fire suppression can be detrimental in the longer-term as it leads to the loss of early successional habitats that are required by host plant Common Hoptree (COSEWIC 2015a; Harris 2018). Prescribed burns and other forms of vegetation management can open habitats and improve biodiversity and are used to manage habitat at Point Pelee National Park (COSEWIC 2015a; Harris 2018). These management techniques are used to reduce natural succession of large shade-producing plants and invasive species that threaten the host plant and potential nectar species, and indirectly the Hoptree Borer itself. When using fire as a management strategy, steps to protect or avoid host trees and Hoptree Borer individuals, and larval time periods (once better understood), should be taken.

##### *7.3 Other ecosystem modifications*

Both the Ontario recovery strategy and COSEWIC assessment consider the primary threat to Hoptree Borer to be habitat loss through changes in beach sand deposition and erosion (COSEWIC 2015a; Harris 2018). Although it is thought that the vast majority of the population is affected (pervasive in scope), it is not known what degree of population reduction results (unknown severity). As such, the impact of this threat is considered unknown..

See section 1.6 of the provincial recovery strategy: '*Shoreline Erosion*', '*Succession*'

## **IUCN Threat # 8. Invasive & other problematic species & genes:**

### *8.1 Invasive non-native/alien species*

Invasive plant species may threaten Common Hoptree by altering early successional habitats. They can also compete with native flowering plants which may serve as nectar sources for adult Hoptree Borer (COSEWIC 2015a; Harris 2018). Invasive plant species are present in nearly all Common Hoptree populations at Point Pelee National Park (Harris 2018).

See section 1.6 of the provincial recovery strategy: *'Invasive Non-native Plant Species'*

## **IUCN Threat #9. Pollution:**

### *9.3 Agricultural & forestry effluents*

The Canadian Hoptree Borer population occurs within the range of the invasive European Gypsy Moth (*Lymantria dispar*) (COSEWIC 2015a). This moth is controlled using aerially applied Btk (*Bacillus thuringiensis kurstaki*), a broad-spectrum insecticide used to control defoliating Lepidoptera (COSEWIC 2015a; Harris 2018), which is particularly lethal to lepidopteran larvae (Butler 1998). Btk is often applied from early April to early May, which coincides with Hoptree Borer larval feeding activity (COSEWIC 2015a). European Gypsy Moth control measures are not currently in use within Point Pelee National Park, (COSEWIC 2015a). The park has no plans to use this method of control and the risk of drift is considered to be negligible given the isolated nature of the park's forests (Dobbie pers. com. 2021). However, the use of this, or other pesticides within Hoptree Borer's range could negatively impact the moth (COSEWIC 2015a; Harris 2018).

See section 1.6 of the provincial recovery strategy: *'Pesticides'*

## **IUCN Threat # 11. Climate change and severe weather:**

### *11.1 Habitat shifting & alteration*

The shoreline habitats where host plant Common Hoptree is found are dynamic, and subject to high levels of disturbance (COSEWIC 2015a; Harris 2018). Ice scour is a process that helps maintain early successional habitats. Reductions in ice scour along the Lake Erie shoreline has resulted in succession, and the loss of suitable Common Hoptree habitat (COSEWIC 2002; COSEWIC 2015a; Harris 2018).

### *11.4 Storms & flooding*

Despite inhabiting and likely evolving within a dynamic habitat, Hoptree Borer adults and larvae may be impacted by changes to the timing and severity of storms (COSEWIC 2015a; Harris 2018). At some sites, recent storms have eroded beach habitat and damaged Common Hoptree (COSEWIC 2015a; Harris 2018). Given the restricted range of this species in Canada, this threat could quickly impact the entire Canadian population in a short amount of time (COSEWIC 2015a).

See section 1.6 of the provincial recovery strategy: 'Succession'

### Other Potential Threats

Problematic native species were identified as a potential threat in the provincial recovery strategy. The document identified two native insect species which may pose a threat through competition and leaf and shoot dieback of Common Hoptree (Harris 2018); however the IUCN threats assessment presented in COSEWIC 2015a found 8.2 Problematic native species to not be a threat to Hoptree Borer. An additional potential problematic native species not considered in either document is the impact of White-tailed Deer (*Odocoileus virginianus*). Deer may damage individual Common Hoptrees by rubbing against the trunks until the tree is girdled<sup>8</sup>. This has been observed at Point Pelee National Park, particularly in newly open areas where individual Common Hoptrees have been protected during habitat management activities (T. Dobbie pers comm. 2020). Deer browse may also damage Common Hoptree and prevent seedling establishment (Dobbie pers. comm. 2020). While deer populations are currently managed within Point Pelee National Park, they continue to be present in numbers greater than what is considered optimal for the long-term health and regeneration of native vegetation communities.

## 4. Population and Distribution Objectives

Under SARA, a population and distribution objective must be established for listed endangered, threatened and extirpated species when recovery is deemed feasible.

### Population and Distribution Objective:

- Maintain the current distribution (Extent of Occurrence<sup>9</sup> (EOO) (148 km<sup>2</sup>) and Index Area of Occupancy<sup>10</sup> (IAO) (28km<sup>2</sup>)) of the Hoptree Borer in Canada, as well as any expansions to the EOO or IAO due to new observations of the species.

### Short-term statement toward meeting the Population and Distribution Objective:

- Maintain the current amount of suitable habitat available to Hoptree Borer within its current distribution (Extent of Occurrence) by reducing threats to the Hoptree Borer and its host plant Common Hoptree where there is a Hoptree Borer observation, and by addressing data deficiencies.

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<sup>8</sup> Removing a strip of bark around the circumference of a tree. This blocks nutrient flow within the tree.

<sup>9</sup> The area included in a polygon without concave angles that encompasses the geographic distribution of all known populations of a wildlife species. <http://cosewic.ca/index.php/en-ca/assessment-process/wildlife-species-assessment-process-categories-guidelines/quantitative-criteria-definitions>

<sup>10</sup> A biological measure of the occupied habitat within a wildlife species' range, determined by COSEWIC using an Index of Area of Occupancy (IAO). <http://cosewic.ca/index.php/en-ca/assessment-process/wildlife-species-assessment-process-categories-guidelines/quantitative-criteria-definitions>



**Rationale:**

It is unlikely that Hoptree Borer was ever particularly widespread or abundant in Canada, and there is no evidence that its distribution in Canada ever extended beyond Point Pelee National Park and Pelee Island (COSEWIC 2015a). The Hoptree Borer was assessed as Endangered by COSEWIC and listed under SARA due to its limited range in Canada, combined with an inferred decline in area and extent of habitat (e.g., continued erosion of the Point Pelee land spit) (COSEWIC 2015a). As such, the objective addresses maintaining the species' current distribution in Canada. Given that there is no evidence the species ever had a larger range in Canada, it would be inappropriate to focus recovery efforts on expanding the species beyond the currently known range. It is also not possible to set a quantitative population objective at this time, as there is no available information on current or historic population size or trends. However, if the species distribution naturally expands, or if new occurrences are discovered, these new occurrences are included in the population and distribution objective.

The aim is to maintain the EOO and IAO, this will be best achieved through concerted efforts to protect and manage the availability of existing habitat, as described in the short-term statement. This is to address the continuing decline in area and extent of habitat noted in the COSEWIC assessment (COSEWIC 2015a). Meeting the population and distribution objective will also include addressing knowledge gaps relating to the species biology, species population size and trends, host species, and direct threats. Specific emphasis should be on stewardship actions to mitigate threats to available habitat; working with partners to coordinate Hoptree Borer recovery with Common Hoptree recovery planning; preventing the loss of shoreline habitat via erosion, and addressing vegetation succession and invasive alien plant species. It will be important to ensure vegetation management to achieve Common Hoptree recovery objectives does not threaten Hoptree Borer. The impacts of certain potential threats to the Hoptree Borer (e.g., changes in sand deposition, prescribed burns, interactions with native species) are not well understood; activities that can be undertaken to reduce their impacts are much less clear and require further study.

This federal population and distribution objective is consistent with the province of Ontario's Government Response Statement developed under the provincial *Endangered Species Act*, which outlines the provincial government's goal for the recovery of the species and summarizes the prioritized actions the government intends to take and support (see Part 3 for more information). The government's goal for the recovery of Hoptree Borer is to maintain the distribution of the species at existing locations in Ontario by filling knowledge gaps and managing threats to the species and to its host species.

## **5. Broad Strategies and General Approaches to Meet Objectives**

The government-led and government-supported actions tables from the *Hoptree Borer Government Response Statement* (Part 3) are adopted as the broad strategies and

general approaches to meet the population and distribution objective. ECCC is not adopting the approaches identified in section 2.3 of the *Recovery Strategy for the Hoptree Borer (Prays atomocella) in Ontario* (Part 2).

## 6. Critical Habitat

### 6.1 Identification of the Species' Critical Habitat

Section 41(1)(c) of SARA requires that recovery strategies include an identification of the species' critical habitat, to the extent possible, as well as examples of activities that are likely to result in its destruction. Under Section 2(1) of SARA, critical habitat is "the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species".

Identification of critical habitat is not a component of provincial recovery strategies under the Province of Ontario's ESA. Under the ESA, when a species becomes listed as endangered or threatened on the Species at Risk in Ontario List, it automatically receives general habitat protection. In some cases, a habitat regulation may be developed that replaces the general habitat protection. A habitat regulation is a legal instrument that prescribes an area that will be protected<sup>11</sup> as the habitat of the species by the Province of Ontario. A habitat regulation has not been developed for the Hoptree Borer. On non-federal lands, the Hoptree Borer and its general habitat are currently protected under the Ontario ESA<sup>12</sup>.

Critical habitat for the Hoptree Borer in Canada is identified as the extent of biophysical attributes (see Section 6.1.2) wherever they occur within areas described in Section 6.1.1, below. Areas containing critical habitat for the Hoptree Borer are presented in Figures 1 and 2. The UTM grid squares (Figures 1 and 2, Table 1) are part of a standardized grid system that indicates the general geographic areas containing critical habitat, which can be used for land use planning and/or environmental assessment purposes.

Critical habitat is identified in this federal recovery strategy for the Hoptree Borer in Canada and is considered sufficient to achieve the population and distribution objectives, therefore no schedule of studies has been developed. If new or additional information becomes available, refinements to current critical habitat, or additional critical habitat may be identified in an amendment to this recovery strategy. For more information on critical habitat identification, contact Environment and Climate Change

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<sup>11</sup> Under the federal Species at Risk Act (SARA), there are specific requirements and processes set out regarding the protection of critical habitat. Protection of critical habitat under SARA will be assessed following publication of the final federal recovery strategy.

<sup>12</sup> For more information on the ESA and species at risk recovery in the province of Ontario please visit the [Ministry of the Environment, Conservation and Parks webpage](#)

Canada – Canadian Wildlife Service at [RecoveryPlanning-Planificationduretablissement@ec.gc.ca](mailto:RecoveryPlanning-Planificationduretablissement@ec.gc.ca).

### 6.1.1 Areas Containing Critical Habitat

In Canada, the presence and persistence of the Hoptree Borer depends on an area greater than that occupied by individuals of the species. This species requires ecological and landscape features that promote and maintain biophysical attributes<sup>13</sup> which support its life processes (e.g., reproduction and dispersal).

The areas containing critical habitat for Hoptree Borer are:

- 1) The contiguous suitable habitat<sup>14</sup> where a known Hoptree Borer observation<sup>15</sup> occurs, AND
- 2) Where one or more Common Hoptree are found

### 6.1.2 Biophysical Attributes of Critical Habitat

The biophysical attributes of critical habitat are typically characterized as follows:

- vegetation cover varies from patchy and barren to more closed and treed
- graminoid<sup>16</sup> tallgrass, shrub, treed sand dune and thicket;
- sandy, well-drained, often xeric<sup>17</sup> soils;
- substrates such as thin soil over limestone.

As little is known regarding the feeding habits and specific needs of the Hoptree Borer beyond its dependence on Common Hoptree, the biophysical attributes are primarily based on the habitat required to support the persistence of Common Hoptree<sup>18</sup>.

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<sup>13</sup> Suitable biophysical attributes are those habitat features (e.g. soil and moisture conditions, light penetration, plant community composition and species interactions) that provide individuals of the species the necessary conditions to carry out essential life processes.

<sup>14</sup> Suitable habitat for the Common Hoptree which the Hoptree Borer is dependent on. This includes land classified by Ecological Land Classification at the community series: SDO (Open Shoreline), SDT (Open Sand Barren and Dune), and SBT (Treed Sand Barren and Dune) (Lee 2004).

<sup>15</sup> Based on data available to ECCC as of January 2019 acquired from the Natural Heritage Information Centre (NHIC). An observation includes a combination of larvae, adults, and evidence of Hoptree Borer larvae damage such as wilted/damaged shoots of the host plant the Common Hoptree, which are readily distinguished from other insect damage (COSEWIC 2015a). Evidence of larval damage assessed by the NHIC. <https://www.ontario.ca/page/natural-heritage-information-centre>

<sup>16</sup> Grass like plants such as grasses, sedges and rushes

<sup>17</sup> Very dry

<sup>18</sup> As described in the Recovery Strategy for the Common Hoptree (*Ptelea trifoliata*) in Canada (PCA 2012).

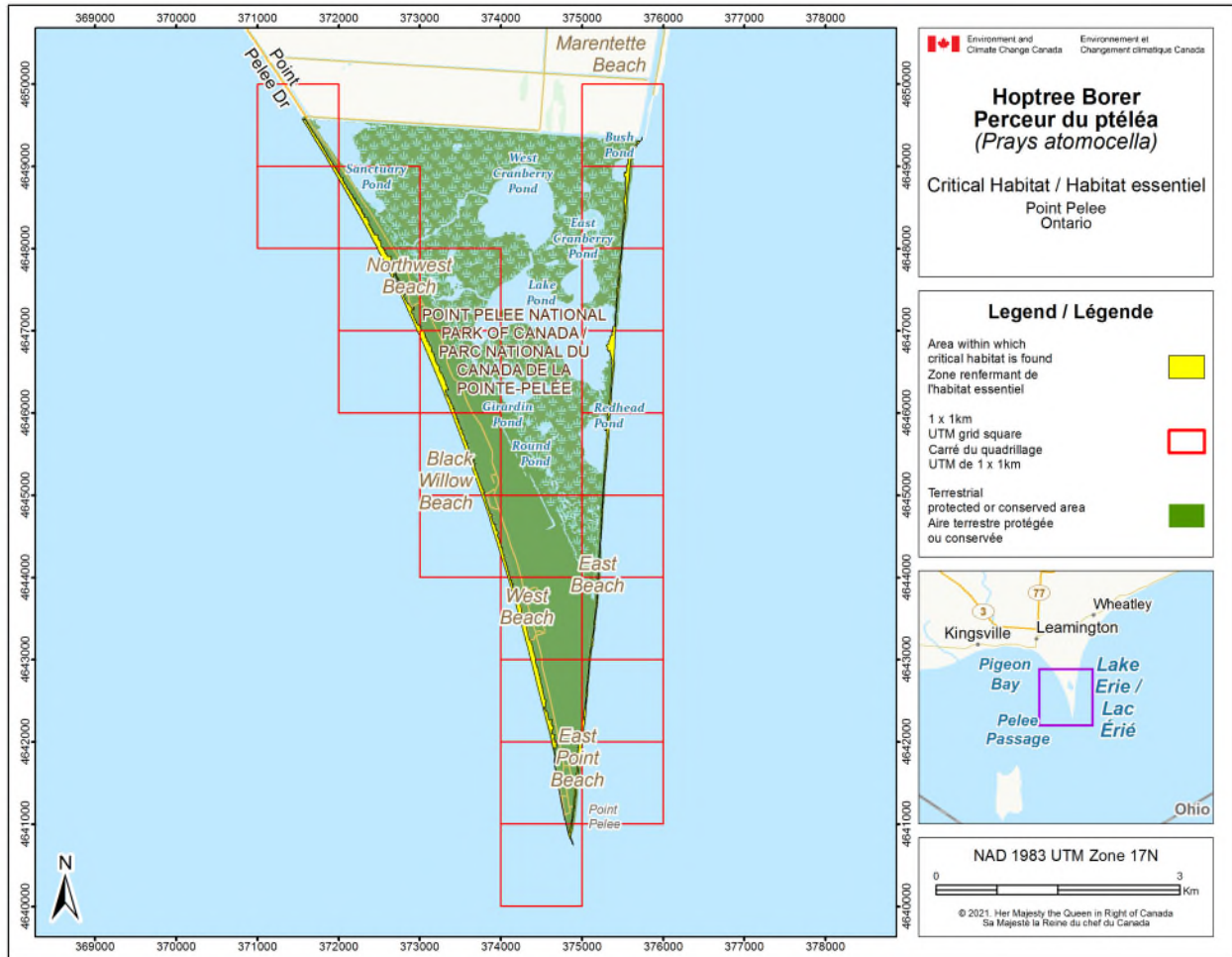


Figure 1. **Critical Habitat for Hoptree Borer in Canada – Point Pelee.** The area within which critical habitat is found for the Hoptree Borer in Canada, as described in section 6.1, is represented by the yellow shaded unit. Within this area, critical habitat only occurs where the biophysical attributes described in section 6.1.2 are found. The 1 km x 1 km UTM grid overlay (red outline) shown on this figure is a standardized national grid system used to indicate the general geographic area within which critical habitat is found.

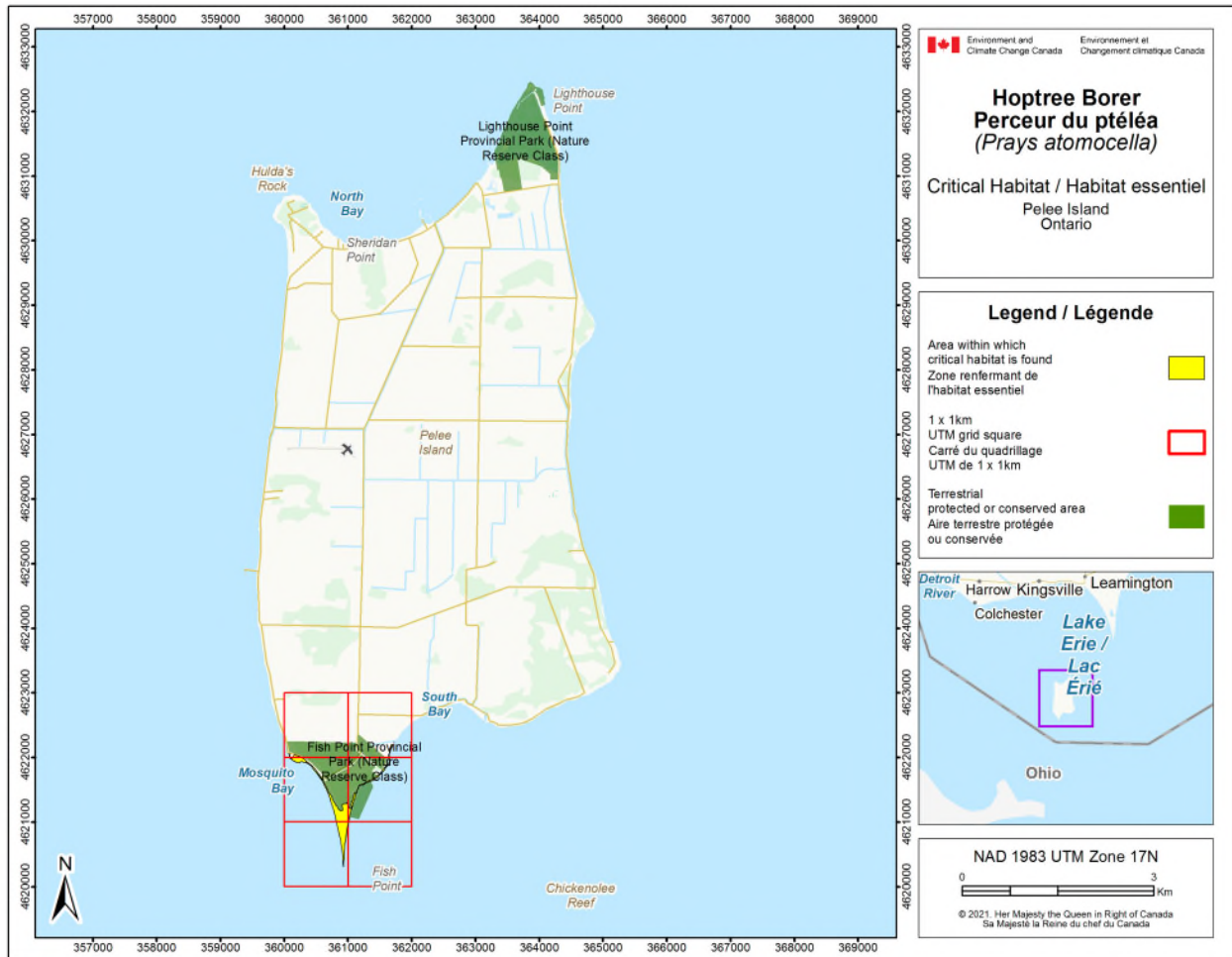


Figure 2. **Critical Habitat for Hoptree Borer in Canada – Pelee Island.** The area containing critical habitat for the Hoptree Borer in Canada, as described in section 6.1, is represented by the yellow shaded unit. Within this area, critical habitat only occurs where the biophysical attributes described in section 6.1.2 are found. The 1 km × 1 km UTM grid overlay (red outline) shown on this figure is a standardized national grid system used to indicate the general geographic area within which critical habitat is found.

## 6.2 Activities Likely to Result in the Destruction of Critical Habitat

Understanding what constitutes destruction of critical habitat is necessary for the protection and management of critical habitat. Destruction is determined on a case by case basis. Destruction would result if part of the critical habitat was degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a single activity or multiple activities at one point in time or from the cumulative effects of one or more activities over time.

There are unknowns regarding the feasibility of recovery of the Hoptree Borer because not a lot is known about the species in Canada. The primary, direct threats to the species are the loss of host plant species from natural ecosystem modifications. While possible that they can be managed to some extent, it is unknown whether the main human-caused threats to Hoptree Borer (habitat modification and loss, and non-native plant species) can be avoided or mitigated. Regardless, if these human-related activities continue, the likelihood of restoring host plant populations will be significantly reduced, as will the likelihood that Hoptree Borer can be recovered.

It should be noted that not all activities that occur in or near critical habitat are likely to cause its destruction. Some activities that result in a short-term disturbance to critical habitat without affecting individuals or residences may have the potential to contribute to the future quality of critical habitat, given proper management. Some disturbance to Hoptree Borer habitat may be beneficial to the species by maintaining an open canopy and managing invasive species or woody vegetation growth within a given site, improving habitat for the host species, Common Hoptree. Ecosystem management that promotes a mosaic of open and closed habitat is encouraged while ensuring the activities do not affect Hoptree Borers or their residence. Vegetation management will be planned around portions of the habitat and/or with considerations for timing of the activity to best avoid impact on Common Hoptree and Hoptree Borer, until more information becomes available.

Activities described in Table 3 are examples of those likely to cause destruction of critical habitat for the species; however, destructive activities are not necessarily limited to those listed.

**Table 3. Activities Likely to Result in the Destruction of Critical Habitat**

Description of Activity	Description of effect in relation to function loss	Details of effect
<p>Activities that remove or cause long-term or permanent destruction of vegetation or substrate, rendering the area inhospitable for the host plant, Common Hoptree and/or resulting in the long-term loss of germination sites within critical habitat. Examples include, but are not limited to, conversion of natural landscape for human developments (e.g., agriculture, buildings, or roads) or excessive canopy removal, and/or alteration of understory vegetation (e.g., beach grooming, cutting, mowing, burning and/or raking).</p>	<p>Activity would result in the direct loss of critical habitat by removing or disturbing vegetation or substrate within which Common Hoptree grows, and altering soil biophysical conditions (e.g., structure, moisture) required for germination, establishment and growth. This is consistent with the Recovery Strategy for the Common Hoptree in Canada (Parks Canada 2012).</p> <p>Habitat management activities may be beneficial to maintain the amount of available suitable habitat (e.g., prevent succession and indiscriminate fire, and promote early successional habitat) to support Hoptree Borer and its host Common Hoptree.</p>	<p>If this activity were to occur at any time of year within the bounds of critical habitat, it is likely to result in its destruction.</p> <p>Maintenance and habitat management activities that remove or damage suitable vegetation could result in the destruction of critical habitat if not managed in a way that considers the needs of Hoptree Borer and its host the Common Hoptree. Effects are both direct and cumulative.</p> <p>All threats</p>
<p>Alteration of the natural processes and/or disturbance regimes within or outside critical habitat which affect sand deposition or accretion and erosion rates (e.g., shoreline development, upgrades or modifications to existing infrastructure, such as docks, piers, walls, or other shoreline hardening structures that will impact delivery of sediment to critical habitat).</p>	<p>Changes to the natural deposition and erosion patterns of this dynamic shoreline habitat can result in the direct loss of critical habitat by reducing available suitable habitat or rendering shoreline habitat inhospitable for the larval host plant Common Hoptree.</p>	<p>If this activity were to occur at any time of year within, or adjacent to critical habitat, or outside of critical habitat in areas that affect sand deposition or accretion at Point Pelee National Park and Pelee Island, it is likely to result in the destruction of critical habitat. Thresholds for this activity are unknown at this time.</p> <p>IUCN-CMP Threat: 7.3 Other ecosystem modifications</p>

<p>Activities that facilitate the introduction of new invasive plant species or range expansion of already established invasive species (e.g. introduction of non-native plant seeds, shoreline development, or infrastructure modification that may use contaminated equipment, or disturb soil) in or near Hoptree Borer critical habitat. Potential threatening species may include: White Mulberry (<i>Morus alba</i>), Japanese Knotweed (<i>Polygonum cuspidatum</i>), White Poplar (<i>Populus alba</i>), Spotted Knapweed (<i>Centaurea maculosa</i>), English Ivy (<i>Hedera helix</i>), Garlic Mustard (<i>Alliaria petiolaris</i>), and Orange Daylily (<i>Hemerocallis fulva</i>).</p>	<p>If new invasive alien plant species are introduced, or ranges of existing invasive species are expanded, they could impair the establishment of new Common Hoptree seedlings or impact foraging habitat by outcompeting native plant species. Invasive plants are already present in nearly all Common Hoptree populations at Point Pelee National Park.</p>	<p>When this activity occurs within critical habitat at any time of year, the effects may be direct and/or cumulative. It is likely to result in the destruction of critical habitat.</p> <p>IUCN-CMP Threat 8.1 Invasive non-native/alien species</p>
<p>Applications of insecticides, herbicides, or fungicides that are not in accordance with latest Health Canada regulations (Pest Management Regulatory Act), within or near critical habitat, including areas where drift into critical habitat may occur.</p>	<p>Most insects are sensitive to insecticides and host plant Common Hoptree may be sensitive to herbicides, thus activities within or outside the areas of critical habitat can result in habitat toxicity or reduction in host plant success.</p>	<p>If this activity were to occur within the boundaries of critical habitat at any time of year, it is possible that the effects on critical habitat would be direct and cumulative.</p> <p>If this activity were to occur outside the boundaries of critical habitat, it could destroy critical habitat, as the chemicals could drift or leach into critical habitat. The effects of this activity apply year round because many pesticides are persistent; however, more serious effects could result when products (especially insecticides) are applied during the moth's larval stage between early April and early May.</p> <p>IUCN-CMP Threat 9.3 Agricultural &amp; Forestry Effluents</p>



## **7. Measuring Progress**

The performance indicators presented below provide a way to define and measure progress towards achieving the population and distribution objectives. Every five years, success of recovery strategy implementation will be measured against the following performance indicators:

- The current distribution (EOO 148 km<sup>2</sup> and IAO 28km<sup>2</sup>) of the Hoptree Borer in Canada have been maintained, including any expansions to the EOO or IAO due to new observations of the species.
- In the short-term, the amount of suitable habitat within the current distribution (Extent of Occurrence) is maintained. Data deficiencies are addressed, and threats to the Hoptree Borer and its host plant Common Hoptree where there is a Hoptree Borer observation are mitigated.

## **8. Statement on Action Plans**

One or more action plans will be completed and posted on the Species at Risk Public Registry for Hoptree Borer within five years of the publication of this recovery strategy.

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## Appendix A: Conservation Ranks of Hoptree Borer (*Prays atomocella*)

**Table A-1.** Conservation ranks of the Hoptree Borer (*Prays atomocella*)

<b>Hoptree Borer (<i>Prays atomocella</i>)</b>				
<b>Global (G) Rank</b>	<b>National (N) Rank (Canada)</b>	<b>Sub-national (S) Rank (Canada)</b>	<b>National (N) Rank (United States)</b>	<b>Sub-national (S) Rank (United States)</b>
GNR	NNR	Ontario (SNR)	NNR	Indiana (SNR)

Source: NatureServe 2019

**Table A-2.** Definitions Global (G), National (N) and Subnational (S) Conservation Status Ranks (Master et al. 2012).

<b>Rank</b>	<b>Definition</b>
GNR NNR SNR	Unranked- State/province conservation status not yet assessed

## Appendix B: Effects on the Environment and Other Species

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the [Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals](#)<sup>19</sup>. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or any of the [Federal Sustainable Development Strategy](#)'s<sup>20</sup> (FSDS) goals and targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the strategy itself, but are also summarized below in this

Most broad strategies and approaches to recover Hoptree Borer are expected to have either no significant adverse impacts or to have a positive effect on the environments in which it is found, as well as on other species occupying those areas. Hoptree Borer is restricted to areas where larval host plant, Common Hoptree, is also found. As such, recovery actions for the Hoptree Borer will primarily target the Common Hoptree. In Canada, Common Hoptree is generally restricted to Lake Erie coastal habitat which is composed of globally rare coastal dune ecosystems and their plant communities (Dougan and Associates et al. 2010). Species at risk found in this habitat include: Eastern Prickly Pear Cactus (*Opuntia humifusa*), Dwarf Hackberry (*Celtis tenuifolia*), Five-lined Skink (*Plestiodon fasciatus*), and Eastern Foxsnake (*Pantherophis gloydi*). Common Hoptree is also the preferred host plant and one of only two species native to Canada, on which the provincially rare Giant Swallowtail (*Papilio cresphontes*) butterfly larvae feed (Ambrose 2002). A twig boring bark beetle (*Phloeotribus scabricollis*) and the Hoptree Leaf-roller Moth (*Agonopterix pteleae*), also feed on Common Hoptree (Parks Canada Agency 2012). Additionally, Common Hoptree plays an important role in shoreline stabilization, and its recovery is expected to help prevent physical loss of shoreline areas. Inventory and monitoring, research, management and habitat protection, and public awareness are expected to benefit the suite of open habitat species typically found in association with Common Hoptree.

An ecosystem-based approach to implementation of broad strategies is recommended to achieve Hoptree Borer Recovery. Such an approach may consider the needs of the significant and common species and habitats found in proximity to Hoptree Borer and its host Common Hoptree. This is especially important for the implementation of habitat

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<sup>19</sup> [www.canada.ca/en/environmental-assessment-agency/programs/strategic-environmental-assessment/cabinet-directive-environmental-assessment-policy-plan-program-proposals.html](http://www.canada.ca/en/environmental-assessment-agency/programs/strategic-environmental-assessment/cabinet-directive-environmental-assessment-policy-plan-program-proposals.html)

<sup>20</sup> [www.fsds-sfdd.ca/index.html#/en/goals/](http://www.fsds-sfdd.ca/index.html#/en/goals/)

management approaches, which must be done in a way that maintains a mosaic of open and closed habitats to ensure the ongoing viability of all species in that environment. Restricting vegetation management activities to portions of the habitat and managing the timing of activities should reduce disturbance to all species by providing “refuge” areas.

Where necessary, the potential negative impacts associated with habitat modification, invasive species removal, shoreline alteration, and/or species management projects at Point Pelee National Park or as part of other federally funded projects will be addressed and corresponding mitigation measures will be developed in a project level environmental assessment under the *Canadian Environmental Assessment Act*. This is also completed for provincially owned sites under *A Class Environmental Assessment for Provincial Parks and Conservation Reserves*. Environmental assessments may require follow-up to determine the success of the techniques implemented, and the accuracy of the effects predicted. This will allow for adaptive management, the mitigation of potential environmental effects, and continual adjustment and improvement of recovery efforts. New iterations of these plans will continue to be reviewed using these environmental assessment processes

**Part 2 – *Recovery strategy for the Hoptree Borer*  
(*Prays atomocella*) in Ontario, prepared by Allan Harris for the  
Ontario Ministry of Environment, Conservation and Parks**



Photo: Jean-François Landry

## Hoptree Borer

(*Prays atomocella*) in Ontario

## Ontario Recovery Strategy Series

2018



# About the Ontario Recovery Strategy Series

This series presents the collection of recovery strategies that are prepared or adopted as advice to the Province of Ontario on the recommended approach to recover species at risk. The Province ensures the preparation of recovery strategies to meet its commitments to recover species at risk under the *Endangered Species Act 2007* (ESA) and the Accord for the Protection of Species at Risk in Canada.

## What is recovery?

Recovery of species at risk is the process by which the decline of an endangered, threatened, or extirpated species is arrested or reversed, and threats are removed or reduced to improve the likelihood of a species' persistence in the wild.

## What is a recovery strategy?

Under the ESA a recovery strategy provides the best available scientific knowledge on what is required to achieve recovery of a species. A recovery strategy outlines the habitat needs and the threats to the survival and recovery of the species. It also makes recommendations on the objectives for protection and recovery, the approaches to achieve those objectives, and the area that should be considered in the development of a habitat regulation. Sections 11 to 15 of the ESA outline the required content and timelines for developing recovery strategies published in this series.

Recovery strategies are required to be prepared for endangered and threatened species within one or two years respectively of the species being added to the Species at Risk in Ontario list. Recovery strategies are required to be prepared for extirpated species only if reintroduction is considered feasible.

## What's next?

Nine months after the completion of a recovery strategy a government response statement will be published which summarizes the actions that the Government of Ontario intends to take in response to the strategy. The implementation of recovery strategies depends on the continued cooperation and actions of government agencies, individuals, communities, land users, and conservationists.

## For more information

To learn more about species at risk recovery in Ontario, please visit the Ministry of the Environment, Conservation and Parks Species at Risk webpage at: [www.ontario.ca/speciesatrisk](http://www.ontario.ca/speciesatrisk)

## Recommended citation

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## Declaration

The recovery strategy for the Hoptree Borer was developed in accordance with the requirements of the *Endangered Species Act, 2007* (ESA). This recovery strategy has been prepared as advice to the Government of Ontario, other responsible jurisdictions and the many different constituencies that may be involved in recovering the species.

The recovery strategy does not necessarily represent the views of all of the individuals who provided advice or contributed to its preparation, or the official positions of the organizations with which the individuals are associated.

The recommended goals, objectives and recovery approaches identified in the strategy are based on the best available knowledge and are subject to revision as new information becomes available. Implementation of this strategy is subject to appropriations, priorities and budgetary constraints of the participating jurisdictions and organizations.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy.

## Responsible jurisdictions

Ministry of the Environment, Conservation and Parks  
Parks Canada Agency  
Environment and Climate Change Canada – Canadian Wildlife Service

## Executive summary

Hoptree Borer (*Prays atomocella*) is a small but distinctively patterned moth. Its known Ontario range is confined to Point Pelee National Park and Pelee Island, in association with its larval host plant, Common Hoptree (*Ptelea trifoliata*). Hoptree Borer is classified as endangered under Ontario's *Endangered Species Act, 2007*. Common Hoptree, the host species, is classified as special concern in Ontario and as threatened under Canada's Species at Risk Act.

Little is known of the life history of Hoptree Borer. Larvae bore into the twigs of Common Hoptree, creating a cavity in the woody stem. Larvae feed on leaves and other plant tissue until late summer or fall and probably overwinter in the cavity. The following spring, larvae resume feeding until they are ready to pupate when they leave the stem to pupate in a distinctive mesh-like cocoon. Adults emerge shortly thereafter and lay eggs on Common Hoptree shoots. It is unknown if the adults feed.

The most significant threats to Hoptree Borer are those that affect Common Hoptree including shoreline erosion, vegetation succession, invasive non-native plant species and problematic native species.

The recommended recovery goal for Hoptree Borer is to maintain the current distribution of all Ontario populations by (1) protecting, maintaining and restoring habitat, (2) filling knowledge gaps related to threats, species biology and population abundance and (3) mitigating threats.

Proposed recovery activities focus on filling knowledge gaps on Hoptree Borer distribution, abundance and life history and protecting Common Hoptree and its habitat.

Based on the Common Hoptree critical habitat in the federal recovery strategy (Parks Canada Agency 2012) it is recommended that areas for consideration for a habitat regulation for Hoptree Borer include all mapped polygons identified as critical habitat for Common Hoptree where Hoptree Borer are known to be present. For newly identified occurrences of Hoptree Borer (e.g., Burrell and Sutherland, pers. comm. 2018) where critical habitat for Common Hoptree has not been identified, a similar approach is recommended.

The locations and attributes of critical habitat were identified using the best available information on Common Hoptree distribution including observation data on the presence of a single tree or cluster of trees. Where specific point locations were unavailable, the vegetation communities (Ecological Land Classification vegetation types or ecosite polygons) surrounding the Common Hoptree occurrences were identified. Existing infrastructure (including roads, trails, parking lots, utility corridors and buildings), cultivated areas and unnatural vegetation types (e.g., baseball fields, grassed areas and septic beds) are excluded from these areas. Utility corridors and road rights-of-way are also excluded from critical habitat.

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## 1.0 Background information

### 1.1 Species assessment and classification

Table 1. Species assessment and classification of the Hoptree Borer (*Prays atomocella*). The glossary provides definitions for the abbreviations within, and for other technical terms in the document.

Assessment	Status
SARO List classification	Endangered
SARO List history	Endangered (2017)
COSEWIC assessment history	Endangered (2015)
SARA schedule 1	No schedule, no status
Conservation status rankings	GRANK: GNR NRANK: NNR SRANK: SNR

### 1.2 Species description and biology

#### Species description

The Hoptree Borer is a small, but distinctly patterned moth. The forewings and thorax are white with black dots and the hindwing and abdomen are pinkish or rust coloured. Both wings are fringed with hairs. No other Canadian moths have this distinctive combination of colours. The wingspan is 17 to 20 mm. The larvae are a nondescript pale-green or yellow but have the distinctive habit of boring in Common Hoptree shoots. Mature larvae are 20 mm long (COSEWIC 2015a).

A DNA barcode is publicly available for this species from a Canadian specimen (BOLD sequence ID: LPSOD1057-09.COI-5P) (Ratnasingham and Hebert 2007).

#### Species biology

Hoptree Borer is dependent on its host plant, Common Hoptree (*Ptelea trifoliata*), but its life cycle is poorly known. The duration of the egg, larval and adult stage are not precisely known, nor has the egg and egg-laying behaviour been described (COSEWIC

2015a). The following is largely inferred from observations of Hoptree Borer and other closely related species in the United States (US).

In the US, adults are active from mid- to late June, and lay their eggs on the leaves or shoots of Common Hoptree (COSEWIC 2015a). The eggs hatch shortly thereafter and the larvae bore into a young shoot, creating a cavity in the woody stem. Inside the cavity they construct a silk tube as a protection from predators and parasites. Larvae feed on leaves and other plant tissue until late summer or fall and probably overwinter in the cavity (COSEWIC 2015a). The following spring, larvae resume feeding until they are ready to pupate when they leave the stem to pupate in a distinctive mesh-like cocoon, often among the host plant flower clusters. There is one generation per year (COSEWIC 2015a).

Adult feeding has not been documented, but females of related species, Apple Ermine Moth (*Yponomeuta malinellus*) require nectar feeding for a week or more before they are sexually mature (Carter 1984).

Dispersal and migration in Hoptree Borer has not been documented but is probably limited by the sporadic distribution of Common Hoptree subpopulations in Ontario (Schmidt pers. comm. 2015).

### **1.3 Distribution, abundance and population trends**

The known Canadian range of Hoptree Borer consists of seven confirmed records of adults on the west side of Point Pelee National Park on Lake Erie and of larvae on Pelee Island, about 20 km south of Point Pelee (Figure 1, Table 2) (COSEWIC 2015a). Point Pelee National Park supports over 10,000 mature Common Hoptrees and Pelee Island has over 900 (COSEWIC 2015b). The recent records from Point Pelee are from the West Beach area, but precise locations of older collections are unknown (Table 2). On Pelee Island, Hoptree Borer larvae were found on a shoreline next to a road right-of-way on the west side of the island, on a road right-of-way near the north end of the island, and in Fish Point Nature Reserve on May 31 - June 3 2016 (COSEWIC 2015a, Burrell and Sutherland pers. comm. 2018). Several hundred twigs with feeding damage were observed in 2016 surveys and several larvae were collected. Undiscovered populations may also exist elsewhere in the Ontario range of Common Hoptree, particularly Middle Island in Lake Erie, which is part of Point Pelee National Park. Other scattered sites along the north shore of Lake Erie, and a few inland sites have fewer trees (<100 mature individuals) and are less likely to support the moth (COSEWIC 2015b). Most of the Common Hoptree sites northwest of Point Pelee and in Essex County contain fewer than 10 mature trees (COSEWIC 2015b), and are unlikely to support Hoptree Borer populations.

No abundance or population trend data are available for Hoptree Borer in Ontario. It is known from seven confirmed records at Point Pelee between 1927 and 2013. These include three between 1927 and 1931, and one each from 1981, 2008, 2010 and 2013 (COSEWIC 2015a). In 2010, probable evidence consisting of 84 damaged Common

Hoptree shoots was observed at Point Pelee (62) and at Pelee Island (22) (COSEWIC 2015a). More evidence of feeding damage was observed on Pelee Island in 2016 (Burrell and Sutherland pers. comm. 2018).

Although Hoptree Borer population trends are unknown, Common Hoptree populations in Ontario apparently increased between 2002 and 2014 (COSEWIC 2015b). However, it is also known that three small Common Hoptree sites outside Point Pelee National Park were extirpated during that period due to development.

In the US, the species is poorly known, but generally considered to be rare throughout its range (COSEWIC 2015a).

Table 2. Canadian Hoptree Borer (*Prays atomocella*) collections and evidence of Hoptree Borer presence (COSEWIC 2015a; Burrell and Sutherland pers. comm. 2018).

Date	Location	Life stage	Collector	Depository*
June 27 1927	Point Pelee, ON	Adult, male	F.P. Ide	CNC
June 29 1927	Point Pelee, ON	Adult, female	W.J. Brown	CNC
June 23 1931	Point Pelee, ON	Adult	D.H. Pengelly	DEBU
June 11 1981**	Point Pelee, ON	Adult	D.H. Pengelly	DEBU
June 8 2008	Point Pelee, ON	Adult, DNA barcode voucher #08MZPP-142	M. Zhang	BIO
June 6 2010	Point Pelee N.P. west shore. Multiple locations	Larval feeding damage	A. Harris and R. Foster	photograph
June 6 2010	Point Pelee N.P., West Beach, ON 41.934 N 82.517 W	Larva [dead], DNA barcode voucher # CNCLEP00076535	A. Harris and R. Foster	CNC
June 21 2013	Point Pelee N.P., West Beach trail	Adult	J. Cossey	photograph
June 5 2010	Pelee I. NW corner	Larval feeding damage	A. Harris and R. Foster	photograph
June 5 2010	Pelee I. Fish Point	Larval feeding damage	A. Harris and R. Foster	photograph
May – June 2016	Pelee Island, 22 m stretch of Harris-Garno Rd;	Larval feeding damage	M. Burrell and D. Sutherland	NHIC
May – June 2016	NCC property on north side of East West Road	Larval feeding damage	M. Burrell and D. Sutherland	NHIC

\* CNC = Canadian National Collection Ottawa; BIO = Biodiversity Institute of Ontario, Guelph; DEBU = Department of Environmental Biology, University of Guelph

\*\* label is unclear; could be 1961 (Marshall 2010 pers. comm.)



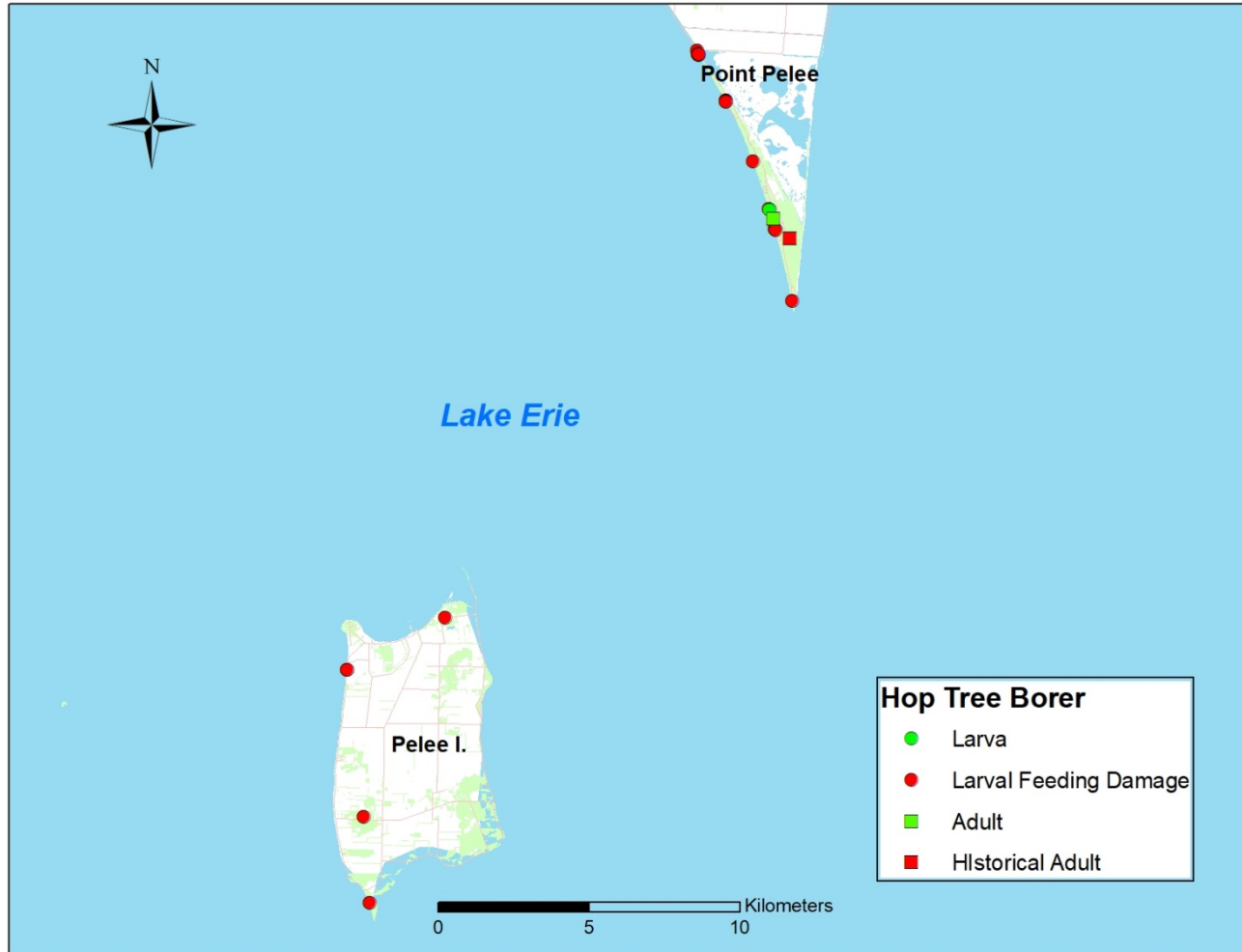


Figure 1. Historical and current distribution of the Hoptree Borer in Ontario (adapted from COSEWIC 2015a). Precise locations of historical collections at Point Pelee are unknown.

#### 1.4 Habitat needs

Hoptree Borer depends on Common Hoptree, which is intolerant of deep shade and most commonly occurs on the edge of sand beaches adjacent to the forest (COSEWIC 2015b). On Pelee Island, Hoptree Borer larvae occur on Common Hoptrees growing along roadsides as well as on beaches and along a track through a deciduous forest where there were scattered Common Hoptrees (Burrell and Sutherland pers. comm. 2018). Common Hoptree also grows on thin soil over limestone in alvars (COSEWIC 2015b), but Hoptree Borer has not yet been discovered in this habitat.

Common Hoptree habitat at Point Pelee, consists predominantly of three community types: Hoptree Shrub Sand Dune (SBS1-2), Red Cedar Treed Sand Dune (SBTD1-3) and Dry - Fresh Hackberry Deciduous Woodland (WODM4) (Lee et al. 1998; Dougan and Associates 2007). It occasionally occurs in a wide variety of other vegetation types

at Point Pelee. Elsewhere in its range, Hoptree Borer occurs on shoreline dunes of Lake Michigan, in cedar glades in Tennessee and Arkansas and along stream banks and shaded slopes in central Texas (Knudson pers. comm. 2009).

The Canadian range of Common Hoptree is largely confined to the Lake Erie shoreline where there is a long growing season and a moderate climate (Crins et al. 2009).

## **1.5 Limiting factors**

Hoptree Borer is dependent on a single host plant, which itself is at risk (special concern) in Ontario with a very limited geographical range and small number of occurrences.

## **1.6 Threats to survival and recovery**

Direct threats to Hoptree Borer are poorly understood given the lack of information on the species' life history, population size and trends. Threats were organized and evaluated using the IUCN-CMP (World Conservation Union-Conservation Measures Partnership) unified threats classification system (Master et al. 2009) in the COSEWIC status reports for Hoptree Borer and Common Hoptree (COSEWIC 2015a, 2015b). The most significant threats to Hoptree Borer are those that affect Common Hoptree including shoreline erosion, vegetation succession, invasive non-native plant species and problematic native species (COSEWIC 2015a, 2015b, Parks Canada Agency 2012).

### **Shoreline Erosion**

The primary threat to Common Hoptree is loss of beach and dune habitat caused by changes in sand deposition and erosion. Shoreline development on the Lake Erie shore both east and west of the park is trapping sand that formerly would be transported to replenish that lost by erosion. The mineral shoreline shrank by 30.8 ha between 1931 and 2015 and sand barren/dune habitat shrank by 40.4 ha during the same period (S1 Table in Markle et al. 2018). In the next 50 years, up to 126 ha of habitat could be lost from the west side of the park, and this is the area that should be naturally accreting new beach habitat (Parks Canada Agency 2012). Common 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 (COSEWIC 2015b).

### **Succession**

Common Hoptree requires periodic disturbance to maintain early successional habitats in sand dunes, savannas and roadsides. Without disturbance, trees and tall shrubs invade these habitats, which increases shading, suppresses flowering and limits recruitment (COSEWIC 2015b).

Suppression of fire in savanna and alvar habitats has allowed trees to invade some sites, but prescribed burns and other vegetation management at Point Pelee National Park and Stone Road Alvar on Pelee Island are maintaining dune and savanna habitats (COSEWIC 2015b). Vegetation clearing on road rights-of-way on Pelee Island has also maintained open conditions suitable for Common Hoptree.

Ice-scour (shoreline erosions caused by ice movements) along Lake Erie shores also maintains open conditions, but climate change may be reducing the amount of ice cover and resultant scour (Parks Canada Agency 2012).

## **Storms**

Shifts in the timing and severity of storms could have a significant impact on Hoptree Borer adults and larvae. Climate change leads to changes in the frequency, intensity, spatial extent, duration and timing of weather and climate extremes (Seneviratne et al. 2012). Recent severe storms have damaged Common Hoptrees and increased erosion of beach habitat at some sites (COSEWIC 2015a, Parks Canada Agency 2012).

## **Invasive Non-native Plant Species**

Competition with invasive non-native plants is a potential threat to Common Hoptree. Invasive plants are present in nearly all populations of Common Hoptree in Point Pelee National Park. They impair establishment of seedlings but do not kill mature trees (COSEWIC 2015b). The most invasive plants in Common Hoptree habitat at Point Pelee include White Mulberry (*Morus alba*), Japanese Knotweed (*Polygonum cuspidatum*), White Poplar (*Populus alba*), Spotted Knapweed (*Centaurea maculosa*), English Ivy (*Hedera helix*), Garlic Mustard (*Alliaria petiolaris*) and Orange Daylily (*Hemerocallis fulva*) (Dougan and Associates 2007).

## **Problematic Native Species**

Two native insect species are potential threats to Hoptree Borer through competition and by causing leaf and shoot dieback (death of twigs and branches). Hoptree Leaf-roller Moth (*Agonopterix pteleae*) outbreaks caused extensive defoliation of Common Hoptree at Point Pelee in 2005-2006 and 2009-2010 (Parks Canada Agency 2012). Extensive feeding damage was observed on Pelee Island in 2014, where smaller trees were frequently completely defoliated (COSEWIC 2015a). Hoptree Barkbeetle (*Phloeotribus scabricollis*) was observed on several of the Common Hoptree populations in 2000-2002 (COSEWIC 2002), causing dieback, reduced growth and loss of flowers.

While surveys for Hoptree Borer have not been conducted on Middle Island, habitat destruction caused by overabundant Double-crested Cormorants (*Phalacrocorax auritus*) on Middle Island is a potential threat to Common Hoptree (Boutin et al. 2011; Koh et al. 2012; Parks Canada Agency 2012). Cormorants increased from three nests

on Middle Island in 1987 to 3,809 in 2009 (Boutin et al. 2011). The accumulation of guano caused tree death, reduced plant species richness, altered soil chemistry and increased the proportion of non-native plants (Boutin et al. 2011, Hebert et al. 2014).

## **Pesticides**

The use of Btk (*Bacillus thuringiensis kurstaki*), a bacteria used to control Gypsy Moth (*Lymantria dispar*) is a potential threat to Hoptree Borer (COSEWIC 2015a). Btk kills many non-target butterfly and moth larvae and is typically applied in early April to early May, coinciding with the larval stage of Hoptree Borer. Btk is applied by aircraft or by hand-held sprayer on Gypsy Moth infected trees. It is also used on agricultural crops and on gardens (Surgeoner and Farkas 1990). Parks Canada currently does not control Gypsy Moth within Point Pelee National Park (COSEWIC 2015a), but its potential use at Pelee Island could negatively impact this species.

## **Other Threats**

Recreational activities and shoreline development are additional threats to Common Hoptree, but not known to be a factor in Hoptree Borer range (except in the reduction of sand deposition; see Shoreline Erosion). Prescribed burning to maintain alvar and savanna habitat is likely a minor threat to Hoptree Borer, as shoreline plant communities where Common Hoptree subpopulations are concentrated would only be marginally affected (COSEWIC 2015a). Prescribed burning has the potential to improve habitat for Hoptree Borer by maintaining early successional vegetation and better conditions for Common Hoptree (see Succession). Selective trimming of Common Hoptrees occurs along roadsides in Point Pelee National Park. This practice is unlikely to harm Hoptree Borer populations since all known occurrences of larvae are along beaches rather than roads. Trimming competing vegetation helps to maintain Common Hoptree habitat (COSEWIC 2015a).

## **1.7 Knowledge gaps**

Very little is known about the life cycle and basic biology of Hoptree Borer including adult feeding habits, predators, parasites and dispersal capability. The size and trend of Ontario's population are unknown. No surveys for Hoptree Borer have been completed at Middle Island where there are approximately 550 mature Common Hoptrees (COSEWIC 2015b).

## **1.8 Recovery actions completed or underway**

Since the release of the COSEWIC status report for Hoptree Borer in 2015, additional population surveys were conducted on Pelee Island in 2016 (Burrell and Sutherland pers. comm. 2018).

A federal recovery strategy for Common Hoptree was released in 2012 (Parks Canada Agency 2012). The Ontario recovery strategy (adoption of the federal strategy) was completed in 2013 (Ontario Ministry of Natural Resources 2013). Actions already completed include surveys to update Common Hoptree population size and distribution at Point Pelee National Park (and Middle Island and other sites where Hoptree Borer has not been discovered) and communication efforts with property owners and park staff and visitors (Parks Canada Agency 2012). 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 savanna and dune habitats to improve growing conditions for Common Hoptree (Parks Canada Agency 2012, 2016). Active management by Parks Canada is taking place to reduce the impacts of hyper-abundant nesting Double-crested Cormorants on Middle Island and over-browsing by White-tailed Deer (*Odocoileus virginianus*) at Point Pelee National Park (Parks Canada Agency 2012, 2016). Common Hoptree population enhancement efforts and ecosystem protection have also been implemented at the Walpole Island First Nation since 2007 (Parks Canada Agency 2012).

## 2. Recovery

### 2.1 Recommended recovery goal

The recommended recovery goal for Hoptree Borer is to maintain the current distribution of all Ontario populations by maintaining and protecting habitat, filling knowledge gaps and mitigating threats.

### 2.2 Recommended protection and recovery objectives

Table 3. Recommended protection and recovery objectives.

Number	Protection or recovery objective
1	Protect, maintain and where feasible restore habitat.
2	Fill knowledge gaps related to threats, species biology and population abundance.
3	Mitigate threats including pesticide use.

## 2.3 Recommended approaches to recovery

Table 4. Recommended approaches to recovery of the Hoptree Borer in Ontario.

Objective 1: Protect, maintain and where feasible restore habitat.

Relative priority	Relative timeframe	Recovery theme	Approach to recovery	Threats or knowledge gaps addressed
Critical	Short-term	Protection, Management	<p><b>1.0</b> Support Common Hoptree (host species) recovery objectives such as:</p> <ul style="list-style-type: none"> <li>• conduct Common Hoptree population and habitat surveys and monitoring;</li> <li>• research, assess and manage the impacts of nesting Double-crested Cormorants;</li> <li>• mitigate erosion threat;</li> <li>• develop and implement vegetation management activities;</li> <li>• research Common Hoptree basic biology and ecology;</li> <li>• research Common Hoptree genetics; and</li> <li>• promote and encourage activities that support regional mitigation or prevention of climate change.</li> </ul>	<p>Threats:</p> <ul style="list-style-type: none"> <li>• Shoreline erosion</li> <li>• Succession</li> <li>• Storms</li> <li>• Invasive non-native plant species</li> <li>• Problematic native species</li> </ul>
Critical	Short-term	Protection, Management	<p><b>1.1</b> Work with key partners to coordinate Hoptree Borer recovery with Common Hoptree recovery planning</p> <ul style="list-style-type: none"> <li>• Ensure vegetation management to achieve Common Hoptree recovery objectives does not threaten Hoptree Borer.</li> </ul>	<p>Threats:</p> <ul style="list-style-type: none"> <li>• All</li> </ul>
Beneficial	Short-term	Protection, Management	<p><b>1.2</b> Develop a habitat regulation to define the area protected as habitat for the Hoptree Borer in Ontario.</p>	<p>Threats:</p> <ul style="list-style-type: none"> <li>• All</li> </ul>

Recovery Strategy for the Hoptree Borer in Ontario

Objective 2: Fill knowledge gaps related to threats, species biology and population abundance.

Relative priority	Relative timeframe	Recovery theme	Approach to recovery	Threats or knowledge gaps addressed
Necessary	Ongoing	Inventory, Monitoring and Assessment	<p><b>2.1</b> Initiate a monitoring program to assess population size and trends</p> <ul style="list-style-type: none"> <li>• Establish a standardized monitoring protocol.</li> <li>• Implement monitoring at extant sites.</li> </ul>	<p>Knowledge gaps:</p> <ul style="list-style-type: none"> <li>• Population size and trends</li> </ul>
Necessary	Long-term	Inventory, Monitoring and Assessment	<p><b>2.2</b> Conduct surveys in suitable habitat to improve knowledge of Ontario range of Hoptree Borer</p> <ul style="list-style-type: none"> <li>• Conduct Hoptree Borer surveys at Middle Island and Port Burwell Provincial Park.</li> <li>• Conduct Hoptree Borer surveys in unsurveyed parts of Pelee Island.</li> </ul>	<p>Knowledge gaps:</p> <ul style="list-style-type: none"> <li>• Population size and trends</li> </ul>
Necessary	Long-term	Research	<p><b>2.3</b> Conduct research on known and potential threats:</p> <ul style="list-style-type: none"> <li>• Conduct research on the potential threats of Hoptree Leaf-roller Moth and Hoptree Barkbeetle including distribution, population size and trends and extent of feeding damage to Common Hoptree.</li> <li>• Investigate impacts of pesticide use in and near Hoptree Borer habitat.</li> </ul>	<p>Knowledge gaps:</p> <ul style="list-style-type: none"> <li>• Identification of threats</li> </ul>



Recovery Strategy for the Hoptree Borer in Ontario

Relative priority	Relative timeframe	Recovery theme	Approach to recovery	Threats or knowledge gaps addressed
Necessary	Long-term	Research	<p><b>2.4</b> Conduct research on life history and basic biology:</p> <ul style="list-style-type: none"> <li>• Determine Hoptree Borer adult feeding habits.</li> <li>• Describe eggs and egg laying behaviour</li> <li>• Identify important predators and parasites of Hoptree Borer.</li> <li>• Investigate competition and interactions with other species.</li> <li>• Investigate Hoptree Borer dispersal capabilities.</li> </ul>	<p>Knowledge gaps:</p> <ul style="list-style-type: none"> <li>• Species biology, life history.</li> <li>• Interspecific interactions.</li> </ul>

Objective 3: Mitigate threats including pesticide use. .

Relative priority	Relative timeframe	Recovery theme	Approach to recovery	Threats or knowledge gaps addressed
Necessary	Short-term	Protection, Management	<b>3.1</b> Restrict use of Btk and other insecticides in and near Hoptree Borer habitat.	<p>Threats:</p> <ul style="list-style-type: none"> <li>• Pesticide use.</li> </ul>
Beneficial	Long-term	Protection, Management	<b>3.2</b> Promote practices that encourage growth and survival of Common Hoptree on road rights-of-way and transmission lines.	<p>Threats:</p> <ul style="list-style-type: none"> <li>• Pesticide use</li> </ul>

## 2.4 Area for consideration in developing a habitat regulation

Under the ESA, a recovery strategy must include a recommendation to the Minister of the Environment, Conservation and Parks on the area that should be considered in developing a habitat regulation. A habitat regulation is a legal instrument that prescribes an area that will be protected as the habitat of the species. The recommendation provided below by the author will be one of many sources considered by the Minister when developing the habitat regulation for this species.

Hoptree Borer is a habitat specialist dependent on Common Hoptree. Although the biology of Hoptree Borer is poorly understood, Common Hoptree distribution and habitat requirements are well known in Ontario. Ontario adopted the Common Hoptree federal recovery strategy in 2013 and the approach used to identify critical habitat is to be considered when developing a habitat regulation under the ESA.

Based on the Common Hoptree critical habitat in the federal recovery strategy (Parks Canada Agency 2012), it is recommended that areas for consideration for a habitat regulation for Hoptree Borer include all mapped polygons identified as critical habitat for Common Hoptree where Hoptree Borer are known to be present. For newly identified occurrences of Hoptree Borer (e.g., Burrell and Sutherland, pers. comm. 2018) where critical habitat for Common Hoptree has not been identified, a similar approach is recommended.

The biophysical attributes of Common Hoptree critical habitat include open to moderately vegetated areas, often with a relatively high level of natural disturbance or harsh environmental conditions. These attributes occur in the following locations and situations (Parks Canada Agency 2012):

- Open shoreline; graminoid (grass like plant) tallgrass prairie; graminoid, shrub and treed sand dune and thicket Ecological Land Classification (ELC) vegetation types and ecosites (where vegetation types have not been identified); as well as the open forest edges that occur in sandy, well-drained, often xeric soils along the highly disturbed beaches and sand dunes of Lake Erie.
- Other droughty substrates such as thin soil over limestone (i.e., the open, shrub and treed alvar and thicket vegetation types and ecosites [where vegetation types have not been identified] of Pelee Island).
- Forest and thicket edge interfacing with the bedrock/open beach/bar shoreline of Middle Island and Pelee Island.
- Lake-bottom clays and clay-loams of Pelee Island drainage ditches.
- A circle with a radius of 9 m surrounding the trunk of each known, live, individual, naturally occurring Common Hoptree at identified locations (i.e., where data points currently exist), based on a critical root zone definition, used as a zone of protection for trees, of up to 36 times the diameter at breast height (dbh) of a tree (Johnson 1997).

Critical habitat for Common Hoptree is currently identified and mapped in the federal recovery strategy (Parks Canada Agency 2012). The locations and attributes of critical habitat were identified using the best available information on Common Hoptree distribution including observation data on the presence of a single tree or cluster of trees. Where specific point locations were unavailable, the vegetation communities (ELC vegetation types or ecosite polygons) surrounding the Common Hoptree occurrences were identified. Existing infrastructure (including roads, trails, parking lots, utility corridors and buildings), cultivated areas and unnatural vegetation types (e.g., baseball fields, grassed areas and septic beds) are excluded from these areas. Utility corridors and road rights-of-way are also excluded from critical habitat.

Approach based on ELC Vegetation Type and Ecosite:

Where data were available to identify Common Hoptree within one or more ELC units (vegetation type or ecosite, where vegetation types were not available), critical habitat was identified as the boundaries of the occupied ELC unit(s), provided that they were considered suitable for survival and recovery of the species. The areas recommended for a habitat regulation for Hoptree Borer include:

- NCC Richard and Beryl Ivey property on the north side of East West Road, across from the winery, Pelee Island (+/- 25 m of 41° 45' 24.8" N, 82° 40' 37.5" W).
- Point Pelee National Park, Leamington, Essex County: the occupied Sea Rocket Sand Open Shoreline (SHOM1-2<sup>i</sup>), Beach Grass – Wormwood Open Graminoid Sand Dune (SBOD1-3), Little Bluestem – Switchgrass– Beachgrass Open Graminoid Sand Dune (SBOD1-1), Hoptree Shrub Sand Dune (SBSD1-2), Red Cedar Treed Sand Dune (SBTD1-3), Dry – Fresh Drummond's Dogwood Deciduous Shrub Thicket and Fresh – Moist Cottonwood Deciduous Forest (FODM8-3) Vegetation Types adjacent to the shores of Lake Erie (Lee 2004, Dougan and Associates 2007, Jalava et al. 2008).
- The north portion of Fish Point Provincial Nature Reserve, Pelee Island: all occupied ELC vegetation types and ecosites (where no vegetation types are defined).

Approach based on the observation of trees:

Where no vegetation community mapping is available and if the area cannot be mapped, an occupancy approach, based on the observation of trees, is recommended. Critical habitat was based on UTM (Universal Transverse Mercator coordinate system) locations of individual trees or clusters of trees, obtained using a GPS (geographic positioning system) unit. Coordinates obtained using this technology are expected to be accurate to at least 10 m.

In these situations, the area within which critical habitat (based on biophysical attributes) is found is identified as a rectangle that stretches 150 m perpendicular to the water's edge to encompass the tree(s) and extends along and parallel to the shoreline 150 m on either side of the Common Hoptree(s). The 150 m value was chosen as

surveyors in the Niagara Region indicated that most populations seemed to be a maximum of 150 m long (Brant pers. comm. 2009).

As some data points represent multiple trees and it is unclear where within the tree cluster the coordinates were taken, the 150 m distance has been applied in either direction parallel to the shoreline to ensure critical habitat protection along a 300 m stretch of shoreline. The area recommended for considering a habitat regulation for Hoptree Borer includes:

- The vicinity of West Shore Pump Station on the west shore of Pelee Island: bordered by the following coordinates: 41° 47' 41" N, 82° 41' 8" W; 41° 47' 40" N, 82° 41' 2" W; 41° 46' 50" N, 82° 41' 15" W; 41° 46' 49" N, 82° 41' 9" W.

Critical habitat is not mapped for Common Hoptree at the following location where Hoptree Borer is known to be present (Burrell and Sutherland, pers comm. 2018). A similar approach (identified above) to identify habitat is recommended.

- Harris-Garno Road at quarry, Pelee Island (+/- 100 m in either direction of 41° 48' 59.6" N, 82° 38' 46.3" W).

## Glossary

Committee on the Status of Endangered Wildlife in Canada (COSEWIC): The committee established under section 14 of the Species at Risk Act that is responsible for assessing and classifying species at risk in Canada.

Committee on the Status of Species at Risk in Ontario (COSSARO): The committee established under section 3 of the *Endangered Species Act, 2007* that is responsible for assessing and classifying species at risk in Ontario.

Conservation status rank: A rank assigned to a species or ecological community that primarily conveys the degree of rarity of the species or community at the global (G), national (N) or subnational (S) level. These ranks, termed G-rank, N-rank and S-rank, are not legal designations. Ranks are determined by NatureServe and, in the case of Ontario's S-rank, by Ontario's Natural Heritage Information Centre. The conservation status of a species or ecosystem is designated by a number from 1 to 5, preceded by the letter G, N or S reflecting the appropriate geographic scale of the assessment. The numbers mean the following:

- 1 = critically imperilled
- 2 = imperilled
- 3 = vulnerable
- 4 = apparently secure
- 5 = secure
- NR = not yet ranked

*Endangered Species Act, 2007* (ESA): The provincial legislation that provides protection to species at risk in Ontario.

*Species at Risk Act* (SARA): The federal legislation that provides protection to species at risk in Canada. This act establishes Schedule 1 as the legal list of wildlife species at risk. Schedules 2 and 3 contain lists of species that at the time the Act came into force needed to be reassessed. After species on Schedule 2 and 3 are reassessed and found to be at risk, they undergo the SARA listing process to be included in Schedule 1.

Species at Risk in Ontario (SARO) List: The regulation made under section 7 of the *Endangered Species Act, 2007* that provides the official status classification of species at risk in Ontario. This list was first published in 2004 as a policy and became a regulation in 2008.

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## List of abbreviations

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

COSSARO: Committee on the Status of Species at Risk in Ontario

CWS: Canadian Wildlife Service

ELC: Ecological Land Classification

ESA: *Endangered Species Act, 2007*

ISBN: International Standard Book Number

NCC: Nature Conservancy of Canada

SARA: *Canada's Species at Risk Act*

SARO: Species at Risk in Ontario

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<sup>i</sup> ELC Code based on ELC Provincial Catalogue 8 (Lee 2004).



**Part 3 – *Hoptree Borer Ontario Government Response Statement*, prepared by the Ontario Ministry of Environment, Conservation and Parks**

# Hoptree Borer

## Ontario Government Response Statement



Photo: Jean-Francois Landry

### Protecting and Recovering Species at Risk in Ontario

Species at risk recovery is a key part of protecting Ontario's biodiversity. The *Endangered Species Act, 2007* (ESA) is the Government of Ontario's legislative commitment to protecting and recovering species at risk and their habitats.

Under the ESA, the Government of Ontario must ensure that a recovery strategy is prepared for each species that is listed as endangered or threatened. A recovery strategy provides science-based advice to government on what is required to achieve recovery of a species.

Within nine months after a recovery strategy is prepared, the ESA requires the government to publish a statement summarizing the government's intended actions and priorities in response to the recovery strategy. The response statement is the government's policy response to the scientific advice provided in the recovery strategy. In addition to the strategy, the government response statement considered (where available) input from Indigenous communities and organizations, stakeholders, other jurisdictions, and members of the public. It reflects the best available local and scientific knowledge, including Traditional Ecological Knowledge where it has been shared by communities and Knowledge Holders, as appropriate and may be adapted if new information becomes available. In implementing the actions in the response statement, the ESA allows the government to determine what is feasible, taking into account social, cultural and economic factors.

The Recovery Strategy for the Hoptree Borer (*Prays atomocella*) in Ontario was completed on December 7, 2018.

Hoptree Borer is a small moth with forewings that are pure white with black spots and a wingspan of 17 to 20 mm. Hoptree Borer is dependent on its host plant the Common Hoptree (*Ptelea trifoliata*), which is listed as special concern on the Species at Risk in Ontario (SARO) List.

## Protecting and Recovering Hoptree Borer

Hoptree Borer is listed as an endangered species under the ESA, which protects both the insect and its habitat. The ESA prohibits harm or harassment of the species and damage or destruction of its habitat without authorization. Such authorization would require that conditions established by the Ontario government be met.

Globally, the distribution of Hoptree Borer is not well known, but the species generally occurs from the southern Great Lakes region through the midwestern United States to south-central Texas, coinciding with the distribution of its larval host species, the Common Hoptree. Hoptree Borer is considered to be rare throughout its range and is not found in all locations where Common Hoptree occurs.

In Canada, Hoptree Borer are only found in Ontario and population levels and trends are generally unknown. There are seven confirmed records of the species in the province consisting of adults on the west side of Point Pelee National Park on the north shore of Lake Erie, and larval feeding damage on Common Hoptrees on Pelee Island.

Hoptree Borer is a small, highly specialized moth dependent on its only host species, the Common Hoptree, which is primarily restricted to sandy shorelines. Hoptree Borer likely deposits eggs during mid to late June, and larvae then bore into the twigs of Common Hoptree, creating a cavity in the stem. Larvae feed on leaves and other plant tissue until late summer or fall and likely overwinter in the cavity. The following spring, larvae resume feeding on young shoots of Common Hoptree until they are ready to pupate. Adults emerge shortly thereafter and lay eggs on Common Hoptree shoots. Dispersal and migration have not been documented and are likely limited by the discontinuous distribution of Common Hoptree in Ontario.

Common Hoptrees are found in seven core areas along the north shore of Lake Erie and Lake Erie islands (Middle Island, Pelee Island, the Essex County shoreline including mainland Point Pelee National Park, Walpole Island First Nation, Rondeau Provincial Park, Port Burwell Provincial Park, Regional Municipality of Niagara). Within these core areas, Hoptree Borer has only been documented on the Essex County shoreline (Point Pelee National Park) and Pelee Island. Hoptree Borer has only been found at sites where Common Hoptree grows abundantly (1,000 to 10,000 mature Common Hoptrees) on sandy shorelines and has not been found in smaller isolated Common Hoptree populations.

In 2017, Hoptree Borer's host plant, Common Hoptree, was down-listed provincially from threatened to special concern based on the Committee on the Status of Species at Risk in Ontario's (COSSARO) assessment. Focussed survey efforts resulted in a significant increase to the number of known individuals since the species was first listed in Ontario.

Undiscovered populations of Hoptree Borer may exist elsewhere in Ontario within the range of Common Hoptree as little survey effort has been dedicated to smaller moths (e.g., Hoptree Borer) in most jurisdictions. Given the population size of Common Hoptrees and proximity of other Hoptree Borer observations, further searches are warranted on Middle Island, Essex County west of Point Pelee and Pelee Island. Hoptree Borers are unlikely to be found within the remaining Common Hoptree core areas due to smaller Common Hoptree population levels, geographic isolation, unfavourable climate conditions, or a combination of these factors. Targeted surveys for Hoptree Borer in Rondeau Provincial Park and the Niagara region occurred in 2014 and indicate the species is absent in these areas. Port Burwell Provincial Park may also warrant searches due to large numbers of Common Hoptrees; however, as it is located between the Niagara and Rondeau search areas where the species was found to be absent it is thought there is a reduced likelihood that Hoptree Borer is present.

Knowledge gaps exist regarding the distribution and population levels of Hoptree Borer and the life cycle of Hoptree Borer in Canada. Current information on the biology of Hoptree Borer is largely inferred from Hoptree Borer in the United States or other closely related species. The species' dispersal capabilities, migration and adult feeding behaviour are also unknown.

The main threats identified for Hoptree Borer are habitat related and are those identified for its host species, Common Hoptree – the loss of suitable habitat from the alteration of natural dune processes from shoreline hardening, vegetation succession, and competition from invasive species such as Japanese Knotweed (*Polygonum cuspidatum*), White Poplar (*Populus alba*), Spotted Knapweed (*Centaurea maculosa*), English Ivy (*Hedera helix*), Garlic Mustard (*Alliaria petiolaris*) and Orange Daylily (*Hemerocallis fulva*). Hoptree Borer's host, Common Hoptree, may be impacted in some areas by Double-crested Cormorants (*Phalacrocorax auritus*) from deposition of guano (feces). Double-crested Cormorants are found in high numbers on Middle Island (where Common Hoptrees are found) and lands are managed federally by Parks Canada as it occurs within Point Pelee National Park. Middle Island has not yet been surveyed for Hoptree Borer.

Potential threats to Hoptree Borer include control measures for Gypsy Moth (*Lymantria dispar dispar*) from ground and aerial spraying of the pesticide BtK (*Bacillus thuringiensis var. kurstaki*) and competition for resources from other insects. Several insect species are dependent on Common Hoptree and feed on the twigs, leaves and nectar, and the direct impacts of the interspecific competition for resources to Hoptree Borer and its host are unknown. Hoptree Borer may also be impacted by higher predation pressure from migratory birds on Point Pelee.

Given that Hoptree Borer is a specialist species that relies on its only host, Common Hoptree, recovery efforts for Hoptree Borer will focus on maintaining and protecting habitat including its host species, the Common Hoptree, in areas where Hoptree Borer is found while filling knowledge gaps related to the species' biology, ecology and population level/trends. Further surveys in suitable habitat will improve knowledge of the distribution of Hoptree Borer and inform priority areas for recovery implementation. Ecosystem-focussed recovery efforts (including research) are encouraged for Hoptree Borer and its host to ensure threats are mitigated effectively and in consideration of complex ecological relationships.

### **Government's Recovery Goal**

**The government's goal for the recovery of Hoptree Borer is to maintain the distribution of the species at existing locations in Ontario by filling knowledge gaps and managing threats to the species and to its host species.**

### **Actions**

Protecting and recovering species at risk is a shared responsibility. No single agency or organization has the knowledge, authority or financial resources to protect and recover all of Ontario's species at risk. Successful recovery requires inter-governmental cooperation and the involvement of many individuals, organizations and communities. In developing the government response statement, the government considered what actions are feasible for the government to lead directly and what actions are feasible for the government to support its conservation partners to undertake.

## Government-led Actions

To help protect and recover Hoptree Borer, the government will directly undertake the following actions:

- Continue to monitor and manage provincially protected areas with Hoptree Borer and Common Hoptree in a manner consistent with park management plans (e.g., Fish Point Provincial Park).
- Explore taking appropriate management actions in accordance with provincial policy direction on cormorants to support protection and recovery for Hoptree Borer and its host, Common Hoptree.
- Work with partners and stakeholders to support pollinator health in Ontario through actions such as integrated pest management and education.
- Collaborate with federal partners, such as Parks Canada, Environment and Climate Change Canada and Canadian Wildlife Service to implement protection and recovery actions for Hoptree Borer and its host species on federal lands.
- For populations that occur on Pelee Island, explore opportunities to work collaboratively with the Township of Pelee, including the Pelee Island Environmental Advisory Committee, the federal government and local partners to integrate approaches to stewardship, implement recovery actions and explore integrated approaches to managing species at risk.
- Continue to implement the *Ontario Invasive Species Strategic Plan* (2012) to address the invasive species (e.g., Garlic Mustard) that threaten Hoptree Borer.
- Educate other agencies and authorities involved in planning and environmental assessment processes on the protection requirements under the ESA.
- Encourage the submission of Hoptree Borer data to the Ontario's central repository through the citizen science project that they receive data from (i.e., iNaturalist.ca) and directly through the Natural Heritage Information Centre.
- Undertake communications and outreach to increase public awareness of species at risk in Ontario.
- Continue to protect Hoptree Borer and its habitat through the ESA.
- Support conservation, agency, municipal and industry partners, and Indigenous communities and organizations to undertake activities to protect and recover Hoptree Borer. Support will be provided where appropriate through funding, agreements, permits (including conditions) and/or advisory services.
- Encourage collaboration, and establish and communicate annual priority actions for government support in order to reduce duplication of efforts.
- Conduct a review of progress toward the protection and recovery of Hoptree Borer within five years of the publication of this document.

## Government-supported Actions

The government endorses the following actions as being necessary for the protection and recovery of Hoptree Borer. Actions identified as “high” may be given priority consideration for funding under the Species at Risk Stewardship Program. Where reasonable, the government will also consider the priority assigned to these actions when reviewing and issuing authorizations under the ESA. Other organizations are encouraged to consider these priorities when developing projects or mitigation plans related to species at risk.

### Focus Area: Inventory and Monitoring

**Objective:** Increase knowledge of the distribution, abundance and habitat conditions of Hoptree Borer and its host species.

The population size and trends for Hoptree Borer are generally unknown and very few individuals have been found. To improve knowledge of Hoptree Borer distribution, surveys and inventory are required in suitable areas where Common Hoptree are found in larger stands on sandy shorelines, particularly Middle Island, Essex County west of Point Pelee, unsurveyed areas of Pelee Island and at Port Burwell Provincial Park. Implementation of a standardized monitoring program for Hoptree Borer and its host will improve knowledge of population sizes and trends over time. Surveys and monitoring should be appropriately timed for Hoptree Borer. In addition, identifying and documenting threats affecting Hoptree Borer and its host, Common Hoptree, will improve our understanding of the extent and severity of threats and enable management approaches to be adjusted accordingly.

#### Actions:

1. **(High)** Conduct surveys in suitable habitat to identify any new populations of Hoptree Borer in priority areas (e.g., Middle Island, Essex County west of Point Pelee, Pelee Island, and Port Burwell Provincial Park).
2. **(High)** Develop and implement a standardized monitoring program at locations where Hoptree Borer and its host species are known to occur. The monitoring program will document and assess:
  - presence and absence of Hoptree Borer;
  - health of Common Hoptree (including presence of pests and disease);
  - the distribution, population size and trends and extent of feeding damage of other insect species specializing on Common Hoptree;
  - type, quality, and extent of suitable habitat; and,
  - presence and significance of threats to both Hoptree Borer and Common Hoptree.

**Focus Area: Research**

**Objective:** Improve knowledge of Hoptree Borer and its host species, threats, and interactions with other Common Hoptree specialists.

Knowledge gaps exist in the life cycle of Hoptree Borer related to the duration of the egg, larval and adult stage, egg laying behaviour, and adult feeding habits. Knowledge gaps continue to exist regarding factors that may affect Common Hoptree recruitment at sites where Hoptree Borer are found. Addressing these knowledge gaps will support the recovery of the larval host plant and in turn support the persistence of Hoptree Borer in Ontario. In addition, several insect species such as the Hoptree Leaf-roller Moth (*Agonopterix pteleae*) and Hoptree Barkbeetle (*Phloeotribus scabricollis*) are specialist herbivores on Common Hoptree. Sudden increases in their population sizes could potentially threaten Hoptree Borer indirectly by completely defoliating the host species and directly by competing with Hoptree Borer. Filling knowledge gaps related to the interaction of Hoptree Borer and other specialist insect species relying on Common Hoptree will support effective, ecosystem-focussed recovery efforts.

**Actions:**

3. **(High)** Investigate the biology of Hoptree Borer including:
  - the life cycle of the species (e.g., adult feeding habits, egg laying behaviour); and,
  - Hoptree Borer dispersal and migration capabilities.
4. Conduct research to improve knowledge on Hoptree Borer ecology, habitat and threats such as:
  - identifying important predators and parasites;
  - the interaction of Hoptree Borer and other specialist insect species that rely on Common Hoptree (e.g., Hoptree Leaf-roller Moth and Hoptree Barkbeetle); and,
  - underlying factors that influence the severity, frequency, and extent of feeding damage of other specialist insect species on Common Hoptrees (e.g., climatic conditions) where Hoptree Borer is present.
5. Investigate impacts of pesticide use in locations where Hoptree Borer is present.
6. Research factors that influence recruitment of the larval host (Common Hoptree) to help improve natural regeneration at sites where Hoptree Borer are found or likely to occur. Some factors include:
  - sex ratios;
  - seed production and dispersal;
  - habitat suitability;
  - survivorship and longevity; and,
  - germination.



**Focus Area: Management and Habitat Protection**

**Objective:** Maintain or improve the quality of habitat available for Hoptree Borer and its host species, and reduce threats to the species and its host.

Hoptree Borer is known to occur on private land, protected areas and on publicly accessed land. As a result, a collaborative approach to habitat management and protection will support coordinated implementation of actions, improve efficiency and prevent duplication of efforts. Major threats to Hoptree Borer and its host includes altered coastal processes, habitat succession and invasive species resulting in the loss of suitable habitat. Landowners and land managers are encouraged to work collaboratively to mitigate threats of altered coastal processes and manage native and non-native vegetation while minimizing impacts to Hoptree Borer, and its host, Common Hoptree. Minimizing further shoreline hardening will allow the natural movement of sediment into the water and encourage the transport of sediment to beaches where the host species grows.

**Actions:**

7. **(High)** Work collaboratively with municipalities, conservation partners, land owners and land managers to mitigate threats and develop, implement and evaluate management plans to maintain or improve the quality of Hoptree Borer habitat and that of its host species. Actions may include:
  - managing vegetation to improve habitat quality (e.g., controlling invasive species posing a direct threat)
  - minimizing the use of pesticides and minimizing the use of herbicides on the host species and nectar sources at locations where Hoptree Borer is present; and,
  - where feasible, minimizing further shoreline hardening and barriers that block the natural movement of sediment where Hoptree Borer and its host are present.
8. As opportunities arise, work with local land owners and community partners to support the securement of habitat of Hoptree Borer through existing land securement and stewardship programs.

**Focus Area: Awareness**

**Objective:** Increase public awareness of Hoptree Borer to protect and recover the species and its host.

Collaborative efforts are needed to support the persistence of both Hoptree Borer and its host, Common Hoptree. As Hoptree Borer is found on public lands, protected areas and private lands, awareness is a key factor in supporting recovery of the species. By increasing local awareness, individuals can become active stewards and learn how modifying activities can help to protect the species and its host.

**Actions:**

9. Collaborate with organizations, landowners, land managers, and Indigenous communities and organizations to promote awareness of Hoptree Borer and its host by sharing information on:
  - how to identify the species;
  - the species' habitat requirements;
  - protection afforded to the species and its habitat under the ESA; and,
  - actions that can be taken to avoid or minimize impacts to the species and its host including reducing use of pesticides.

**Implementing Actions**

Financial support for the implementation of actions may be available through the Species at Risk Stewardship Program. Conservation partners are encouraged to discuss project proposals related to the actions in this response statement with the program staff. The Ontario government can also advise if any authorizations under the ESA or other legislation may be required to undertake the project.

Implementation of the actions may be subject to changing priorities across the multitude of species at risk, available resources and the capacity of partners to undertake recovery activities. Where appropriate, the implementation of actions for multiple species will be coordinated across government response statements.

**Reviewing Progress**

The ESA requires the Ontario government to conduct a review of progress towards protecting and recovering a species no later than the time specified in the species' government response statement, or not later than five years after the government response statement is published if no time is specified. The review will help identify if adjustments are needed to achieve the protection and recovery of Hoptree Borer.

**Acknowledgement**

We would like to thank all those who participated in the development of the Recovery Strategy for the Hoptree Borer (*Prays atomocella*) in Ontario for their dedication to protecting and recovering species at risk.

**For additional information:**

Visit the species at risk website at [ontario.ca/speciesatrisk](http://ontario.ca/speciesatrisk)

Contact the Ministry of the Environment, Conservation and Parks

1-800-565-4923

TTY 1-855-515-2759

[www.ontario.ca/environment](http://www.ontario.ca/environment)