

Recovery Strategy for the American Columbo (*Frasera caroliniensis*) in Canada

American Columbo



2019



Government
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Gouvernement
du Canada

Canada

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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](http://sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1)¹.

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¹ <http://sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1>

RECOVERY STRATEGY FOR THE AMERICAN CUMBO (*FRASERA CAROLINIENSIS*) IN CANADA

2019

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 the American Columbo (Frasera caroliniensis) in Ontario* (Part 2) and the *American Columbo – Ontario Government Response Statement*²(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 American Columbo in Canada consists of three parts:

Part 1 – Federal Addition to the *Recovery Strategy for the American Columbo (Frasera caroliniensis) in Ontario*, prepared by Environment and Climate Change Canada.

Part 2 – *Recovery Strategy for the American Columbo (Frasera caroliniensis) in Ontario*, prepared by H.J. Bickerton for the Ontario Ministry of Natural Resources³.

Part 3 – *American Columbo – Ontario Government Response Statement*, prepared by the Ontario Ministry of Natural Resources.

² The Government Response Statement is the Ontario Government's policy response to the recovery strategy and summarizes the prioritized actions that the Ontario Government intends to take and support.

³ On June 26, 2014, the Ontario Ministry of Natural Resources became the Ontario Ministry of Natural Resources and Forestry.

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Part 2 – *Recovery Strategy for the American Columbo (Frasera caroliniensis) in Ontario*, prepared by H.J. Bickerton for the Ontario Ministry of Natural Resources.

Part 3 – *American Columbo – Ontario Government Response Statement*, prepared by the Ontario Ministry of Natural Resources

Part 1 – Federal Addition to the *Recovery Strategy for the American Columbo (Fraseria caroliniensis) 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 \(1996\)](#)⁴ 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 is the competent minister under SARA for the American Columbo and has prepared the federal component of this recovery strategy (Part 1), as per section 37 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 Natural Resources (now the Ontario Ministry of Natural Resources and Forestry) led the development of the attached recovery strategy for the American Columbo (Part 2) in cooperation with Environment and Climate Change Canada. The Province of Ontario also led the development of the attached Government response (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.

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, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the American Columbo 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 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.

⁴ <http://registrelep-sararegistry.gc.ca/default.asp?lang=en&n=6B319869-1#2>

In the case of critical habitat identified for terrestrial species including migratory birds SARA requires that critical habitat identified in a federally protected area⁵ 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.

⁵ 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

The initial draft of the federal addition was prepared by Holly Bickerton (Consulting Ecologist, Ottawa). Nigel Finney (Conservation Halton), Natalie Iwanycki, (formerly of the Royal Botanical Gardens), Graham Buck (Ontario Ministry of Natural Resources and Forestry), and Clint Jacobs (Walpole Island Heritage Centre) provided information and advice useful in the preparation of this document. Additional preparation and review of the document was completed by Rachel deCatanzaro, John Brett, Allison Foran and Angela Darwin (Environment and Climate Change Canada, Canadian Wildlife Service – Ontario). This federal addition benefited from input, review, and suggestions from the following individuals and organizations: Krista Holmes, Ken Tuininga, and Lesley Dunn (Environment and Climate Change Canada, Canadian Wildlife Service – Ontario) and Vivian Brownell, Eric Snyder, and Aileen Wheeldon (Ontario Ministry of Natural Resources and Forestry).

Acknowledgement and thanks is given to all other parties that provided advice and input used to help inform the development of this recovery strategy including various Aboriginal organizations and individuals, landowners, citizens and stakeholders who provided input and/or participated in consultation meetings.

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 *Recovery Strategy for the American Columbo (Frasera caroliniensis) in Ontario* (Part 2 of this document, referred to henceforth as “the provincial recovery strategy”) and/or to provide updates or additional information.

Environment and Climate Change Canada is adopting the Ontario recovery strategy (Part 2) with the exception of section 2, Recovery. In place of section 2, Environment and Climate Change Canada has established a population and distribution objective and performance indicators, and is adopting the government-led and government-supported actions of the *American Columbo 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 protection of critical habitat. Therefore, statements in the provincial recovery strategy referring to protection of the species; habitat may not directly correspond to federal requirements with respect to critical habitat. 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.

1. Species Status Information

The American Columbo occurs in North America, ranging from Ontario, Michigan and New York in the north, to Alabama and Mississippi in the south. The species has a global conservation rank of Secure⁶ (G5; NatureServe 2014). In the United States the species has not been ranked nationally, but it occurs in 18 states where the subnational conservation ranks range from Critically Imperiled⁷ (S1) to Secure (S5; Appendix A).

In Canada, the American Columbo is ranked Imperiled⁸ both nationally (N2) and subnationally (S2) in Ontario, the only province where it occurs. It is listed as Endangered⁹ on Schedule 1 of SARA, and is also listed as Endangered¹⁰ under Ontario’s *Endangered Species Act, 2007* (ESA). Less than 10% of the species’ global range occurs in Canada.

⁶ Secure: Common; widespread and abundant.

⁷ Critically Imperiled: At a very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats or other factors.

⁸ Imperiled: At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats or other factors.

⁹ A wildlife species facing imminent extirpation or extinction in Canada.

¹⁰ A species that lives in the wild in Ontario but is facing imminent extinction or extirpation.

2. Recovery Feasibility Summary

Based on the following four criteria that Environment and Climate Change Canada uses to establish recovery feasibility, there are unknowns regarding the feasibility of recovery of the American Columbo. 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.

Yes. Over 7000 mature individuals have been recently observed (2008-2012) at eight extant populations¹¹ in southwestern Ontario (see Table 1 and Figure 1). Reproductive capabilities have been repeatedly observed in at least one population -- the Halton and Hamilton Area population. Flowering and fruiting were observed in many individuals in 2005, 2009 and 2012, with evidence of seedling recruitment at many sites within this population (Finney 2013).

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

Yes. American Columbo occurs across a relatively broad area of southwestern Ontario (the extent of occurrence¹² is approximately 2000 km²; COSEWIC 2006). Although habitat loss may have contributed to past extirpation of American Columbo at some sites, open deciduous forests with suitable attributes exist throughout the range and populations of American Columbo have been newly discovered within those habitats in recent surveys.

American Columbo can also persist in a wide variety of habitats, including disturbed and successional habitats, which are found throughout Ontario. This suggests that additional suitable habitat might be made available to support the species through habitat management or restoration of historic sites, although it is unknown if the presence of individuals in disturbed or successional habitats represents the persistence of individuals in unfavourable conditions rather than a preference or tolerance for those habitats (Threadgill et al. 1979, COSEWIC 2006). Management of the species' habitat in Brant County, including brush removal and prescribed burning, resulted in increased seedling recruitment. Monitoring of existing populations to assess habitat characteristics and population numbers,

¹¹ The provincial recovery strategy (Bickerton 2013) estimates there to be 12 known extant populations. The difference in the number presented here represents a re-grouping of the populations based on NatureServe's (2002) methods for describing populations (and sub-populations) of vascular plants rather than a decrease in the number of American Columbo occurrences. This is described further in section 3.

¹² The area included in a polygon without concave angles that encompasses the geographic distribution of all known populations of a wildlife species (COSEWIC 2004).

demographics, and health is proposed in the *American Columbo Ontario Government Response Statement* (Part 3).

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

Unknown. The primary threats to American Columbo in southwestern Ontario include habitat loss and fragmentation due to urban and agricultural development, and the establishment of invasive plants including Garlic Mustard (*Alliaria petiolata*), Dog-strangling Vine (*Cynanchum spp.*), and Common Buckthorn (*Rhamnus cathartica*) (COSEWIC 2006, Bickerton 2013). Continued habitat loss can be mitigated to some extent through habitat protection, management, and stewardship. However, in many areas, existing habitat is already irreversibly fragmented by intensive urban development. It is not known whether certain types of maintenance of hydro corridors threatens (e.g., trampling, crushing by heavy equipment, use of chemicals) or provides benefits (e.g., opening canopy cover through selective canopy thinning) for the American Columbo (Finney 2013). If necessary, best management practices will be identified to guide land owners and land managers in undertaking habitat management for the American Columbo, including practices relevant to the maintenance of hydro-electric corridors. Control methods for the most common and widespread invasive species are available, including several of the species that threaten American Columbo (OFAH and OMNR 2014) but successful control requires significant, long-term effort. Control methods may include prescribed burns in tallgrass prairie and oak savanna habitat. Some secondary threats such as habitat degradation (e.g., creation of trails, garbage piles and compost heaps) are also very difficult to control on private land.

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

Yes. There are several techniques available that are believed to be sufficient to maintain or increase the abundance of American Columbo at existing locations in Canada. Land management and stewardship could be used to reduce threats on private and public lands, and American Columbo is considered a conservation target in two regional conservation action plans (Jalava et al. 2010a, b). Techniques such as brush cutting and prescribed burning have increased seedling recruitment at one Ontario location, where the species occurs in savanna and tallgrass prairie habitat (Buck pers. comm. 2012). Further experimentation with these management techniques is recommended in the recent provincial recovery strategy (Bickerton 2013). Additionally, as noted in (3) above, control of invasive plant species is possible through existing methods.

Techniques for propagation¹³ and transplantation to encourage re-establishment are not well understood, and the best practices for propagating the plant remain

¹³ Propagation refers to the creation of new plants by natural or artificial means (e.g., spreading seeds).

unknown (Bickerton 2013). The restoration of the species at sites it historically occupied may be dependent on the plants' dispersal ability and the longevity of seeds in the seed bank, both of which are poorly understood (COSEWIC 2006). Propagation and transplantation is not currently being recommended; rather, recovery will focus on natural expansion/re-establishment of populations through habitat management. Propagation and transplantation techniques may be considered as new information becomes available.

In Canada, the American Columbo is only found in southern Ontario and is at the northern edge of the species' range. Due to the species' small population size it will likely always be vulnerable to human-caused stressors and natural, chance events. The species is widespread in North America but it is not abundant anywhere in its range (COSEWIC 2006), and will likely continue to be rare in Canada despite applying available recovery techniques and maintaining existing populations.

3. Species Information

3.1 Species Population and Distribution

The *Recovery Strategy for the American Columbo (Frasera caroliniensis) in Ontario* identifies 12 extant Element Occurrences¹⁴ or populations in Canada (Bickerton 2013), and is consistent with the 2006 COSEWIC Assessment and Update Status Report. Since the publication of these documents, new locations have been discovered. These new locations have not been formally assessed by the Natural Heritage Information Centre (NHIC, also known as the Ontario Conservation Data Centre). American Columbo populations in this federal recovery strategy are identified using NatureServe (2002) methods for describing populations¹⁵ (and sub-populations) of vascular plants, which resulted in a re-grouping of populations (see Figure 1 and Table 1). In particular, new sub-populations have recently been discovered within the Halton and Hamilton Area population. In the future, this enumeration may better align with the provincial record for American Columbo.

¹⁴ Element occurrence: an area of land and/or water in which a species or natural community is, or was present. Throughout this document, the term "population" is considered to be synonymous with the term "element occurrence" as used by the Natural Heritage Information Centre and NatureServe (i.e., populations that are more than 1 km apart) following standard guidelines developed by NatureServe for vascular plants.

¹⁵ Populations are considered to be independent if separated by one kilometre or more of inappropriate habitat, and groupings of plants separated by less than one kilometre are considered sub-populations (Natural Heritage Information Centre 2001).

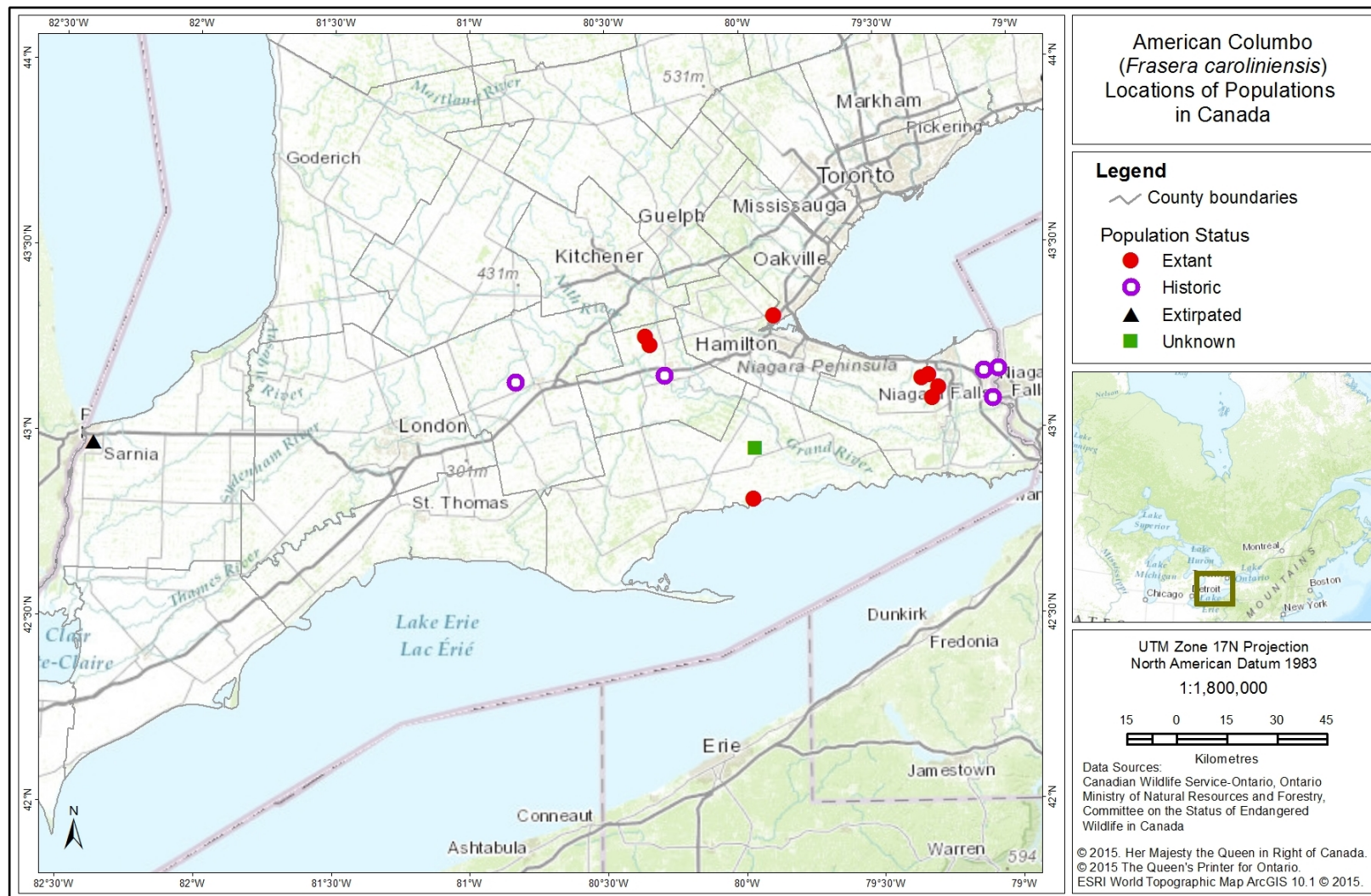


Figure 1. Distribution of the American Columbo in Canada.

Currently, there are eight known extant¹⁶ populations of American Columbo in Canada, all in Southern Ontario (see Table 1 and Figure 1). Six other populations are likely extirpated from locations in Lambton County (one population), Oxford County (one population), Brant County (one population), the City of Hamilton (one population), and the Regional Municipality of Niagara (two populations) (COSEWIC 2006). The status of one population in Haldimand County and one sub-population within the Halton and Hamilton Area population (Borer's Creek Conservation Area) are presumed to be historical; plants have not been documented at either site since 1989 despite recent search efforts.

Table 1. Extant populations of the American Columbo in Canada (COSEWIC 2006; Finney 2013).

Population (COSEWIC population ID ¹⁷)	Sub-population (COSEWIC population ID)	Most recent known status	County or Region
Blue Lake (3)		2010: 1000 plants	Brant County
Glen Morris (2)		2004: 862 plants	
Selkirk Provincial Park (6)		2006: 106 plants	Haldimand County
Halton and Hamilton Area (8-12, 21)	Cartwright Nature Sanctuary (21)	2009: 220 plants	City of Hamilton
	Pleasant View Tributary (n/a)	2011: 6 plants	
	Highway 6 (n/a)	2014: no count	
	Long Pond (n/a)	2010: no count	
	Bridgeview Valley (8)	2010/2012: 1082 plants	Regional Municipality of Halton
	Hendrie Valley (9 A&B)	2011: 446 plants	
	Clappison Escarpment Woods (8)	2010/2012: 1701 plants	
	Snake Road (8)	2011/2012: 189 plants	
	Hidden Valley – Grindstone Creek West Tributary (n/a)	2010: 112 plants	
	Sassafras Woods (10)	2010: 435 plants	
	King Road East (11)	2004: 204 plants	
	King Road West (12)	2005: 3 plants	
	Hidden Valley Park (n/a)	2013: 7 plants	
Short Hills Provincial Park (16)		2005: 1000 plants	Regional Municipality of Niagara
Sixteen Mile Creek (14)		2004: 67 plants	
Twelve Mile Creek (17)	Twelve Mile Creek (vicinity of) (17)	2009: no count	
Fifteen Mile Creek (15)		2009: no count	

¹⁶ Population which is considered to be still in existence, i.e., not destroyed or lost (extirpated).

¹⁷ COSEWIC population ID numbers have been included for comparison of combined or renamed populations. At the time of the COSEWIC 2006 report, twelve populations were considered extant (2, 3, 6, 8, 9, 10, 11, 12, 14, 16, 21, 22), nine were considered extirpated (1, 4, 5, 7, 13, 17, 18, 19, 20), and the status of one population (15) was unknown. This recovery strategy considers thirteen COSEWIC populations extant (2, 3, 6, 8, 9, 10, 11, 12, 14, 15, 16, 17, 21), but they have been re-grouped into eight populations including four new sub-populations (see Table 1). Seven COSEWIC populations are considered historic or extirpated (1, 4, 5, 13, 18, 19, 20), and the status of two populations is unknown (7, 22).

4. Threats

In addition to the known and potential threats outlined in Part 2 - *Recovery Strategy for the American Columbo (Frasera Caroliniensis) in Ontario*, another potential threat to the American Columbo is a decline in pollinator populations. American Columbo is primarily pollinated by members of the Apidae family including the European Honeybee (*Apis mellifera*) and several bumblebee species (*Bombus spp.*) (Threadgill et al. 1981).

A number of factors are suspected to be contributing to the decline in insect pollinator populations globally and in Canada, including loss of habitat and food sources, diseases, viruses, pests, and pesticide exposure (Health Canada 2014). Notably, there is growing evidence to suggest that pesticides, including neonicotinoids, may be having negative effects on pollinator populations due to their toxic properties and persistence in soil and water (van der Sluijs et al. 2013, Cutler et al. 2014). Currently, the extent to which the decline in pollinator populations may impact the American Columbo is not known.

5. Population and Distribution Objectives

Under SARA, a population and distribution objective for the species must be established. Environment and Climate Change Canada's population and distribution objective for the American Columbo is to:

- Maintain or, where biologically and technically feasible, increase the species' current abundance and distribution at extant populations in Canada.

This 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 (see Part 3 for more information). The *Government Response Statement* for the Province of Ontario lists the following goal for the recovery of the American Columbo in Ontario:

The government's goal for the recovery of American Columbo is to maintain the current population levels at existing locations in Ontario, and enable natural increases.

Though American Columbo was probably always rare, occurring at the northern edge of its range, it was previously more widespread as six documented populations are now considered extirpated or historical in Canada. Current estimated abundance is based on the most recent available data in Finney (2013), which provides a total count for the Canadian populations of about 7633 stems. The area of habitat occupied by American Columbo is less than 1 km² (approximately 12 ha; COSEWIC 2006).

Due to the rarity of this species within Canada, maintaining all extant populations is considered important to ensure that the Canadian distribution is not further reduced. Ontario Government-supported protection activities in Part 3 - Ontario Government

Response Statement include the implementation of management strategies to improve habitat conditions and support natural increases in the distribution and abundance of the species at extant locations (see Part 3). Natural increases in the abundance and distribution will be encouraged at extant locations through threat mitigation, and through maintenance of habitat where the species occurs and in suitable adjacent areas to allow for dispersal and population expansion.

6. Broad Strategies and General Approaches to Meet Objectives

The government-led and government-supported actions tables from the *American Columbo Ontario Government Response Statement* (Part 3) are adopted as the broad strategies and general approaches to meet the population and distribution objective. Environment and Climate Change Canada is not adopting the approaches identified in section 2 of the *Recovery Strategy for the American Columbo (Frasera caroliniensis) in Ontario* (Part 2).

7. Critical Habitat

7.1 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 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 the provincial recovery strategy 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. The American Columbo currently receives general habitat protection under the ESA; however, a description of the general habitat has not yet been developed. 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 protected¹⁸ as the habitat of the species by the Province of Ontario. A habitat regulation has not been developed for the American Columbo under the ESA; however, the provincial recovery strategy (Part 2) contains a recommendation on the area for consideration in developing a habitat regulation. This federal recovery strategy identifies critical habitat for the American Columbo in Canada, to the extent possible based on this recommendation and on the best available information as of March 2015.

¹⁸ Under the federal 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.

Critical habitat is identified for the eight extant populations of American Columbo in Ontario and is sufficient to meet the population and distribution objective; therefore a schedule of studies is not required. Additional critical habitat may be added in the future if new or additional information supports the inclusion of areas beyond those currently identified (e.g., new sites become colonized or existing sites expand into adjacent areas).

Critical habitat identification for the American Columbo is based on two criteria: habitat occupancy and habitat suitability.

7.1.1 Habitat Occupancy

This criterion refers to areas of suitable habitat where there is a reasonable degree of certainty of current use by the species.

Habitat is considered occupied when:

- One or more American Columbo individuals have been observed in any single year since 1995.

Occupancy is based on occurrence reports for all known populations from the NHIC, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Finney (2013) and allows for the inclusion of all eight populations known to be extant. Individual American Columbo plants are long-lived, with an estimated lifespan of 7-15+ years (COSEWIC 2006), although Threadgill et al. (1979) found that plants can persist for over 30 years. If new observations become available, they will be considered for the identification of additional critical habitat. The timeframe is also consistent with NatureServe's (2002) and conservation data centres (e.g., Ontario's NHIC) threshold for considering populations to be extant versus historical (i.e., 20 years).

Plants that are considered horticultural specimens, and those clearly planted in landscaped settings such as urban gardens, are not considered to be occupying habitat for the purposes of identifying critical habitat.

7.1.2. Habitat Suitability

Habitat suitability relates to areas possessing a specific set of biophysical attributes that can support individuals of the species carrying out essential aspects of their life cycle.

At extant locations in Canada, American Columbo is typically found in deciduous woodlands or forests, most often dominated by Red Oak (*Quercus rubra*) or White Oak (*Q. alba*), or less commonly by Sugar Maple (*Acer saccharum*), in areas where the canopy is relatively open. The species may also occur in oak savanna and tallgrass prairie or in shrub thickets (Bickerton 2013, Finney 2013).

Suitable habitat for the American Columbo is currently defined as the extent of the biophysical attributes at known populations. These biophysical attributes, which capture the characteristics required by the species to carry out its life processes, include:

- Deciduous woodlands, forests, thickets, oak savanna or tallgrass prairie habitat
- Relatively open canopy (may include forest edges) or canopy gaps
- Dry mesic to mesic clay, clay loam or mesic silty clay soils

When the species occurs within a non-linear habitat, such as tallgrass prairie, savanna, thicket, woodland or forest, suitable habitat for the American Columbo is currently defined as the extent of the biophysical attributes where American Columbo exists in Ontario. In addition, a critical function zone of 50 m (radial distance) is applied when the biophysical attributes around a plant extend for less than 50 m.

When the species occurs within a linear habitat, such as a utility corridor (i.e., where there is no limit to the immediate extent of suitable habitat), suitable habitat is currently defined as the extent of the biophysical attributes, up to a maximum distance of 100 m from an American Columbo individual in both directions parallel to the linear feature. The width of the suitable habitat (i.e., perpendicular to the linear feature) is defined as the extent of the biophysical attributes, as it is in non-linear habitats. In addition, a critical function zone of 50 m (radial distance) is applied when the biophysical attributes around a plant extend for less than 50 m.

In Ontario, suitable habitat for the American Columbo is described using the Ecological Land Classification (ELC) framework for Southern Ontario (Lee et al. 1998). The ELC framework provides a standardized approach to the interpretation and delineation of dynamic ecosystem boundaries. The ELC approach classifies habitats not only by vegetation community but also considers soil moisture conditions and topography, and as such provides a basis for describing the biophysical attributes of the habitat for the American Columbo. In Ontario, ELC terminology and methods are familiar to many land managers and conservation practitioners who have adopted this tool as the standard approach in Ontario.

Within the ELC system in Ontario, the ecosite¹⁹ boundary best captures the extent of biophysical attributes required by the species to meet the population and distribution objective. The ecosite will include the areas occupied by American Columbo and the surrounding areas that provide suitable habitat conditions (e.g., open canopy) to carry out essential life processes for the species and should allow for natural processes related to population dynamics and reproduction (e.g., dispersal and pollination) to occur. This larger area around the plant may also promote ecosystem resilience to invasive species while protecting what are typically rare plant communities in Ontario. Although seed dispersal patterns and distances is not known, seed dispersal in American Columbo is

¹⁹ Ecosite: "A mappable landscape unit integrating a consistent set of environmental factors and vegetation characteristics." (Lee et al. 1998).

facilitated mainly by gravity, which suggests that it is less likely to disperse across large areas of unsuitable habitat (COSEWIC 2006). Therefore, the occupied ELC ecosite is appropriate to provide opportunity for dispersal and expansion of populations. Use of the ELC ecosite is considered appropriate at this time, as there is insufficient information on habitat requirements of the American Columbo to determine whether the more refined boundaries of ELC vegetation type would provide sufficient habitat to meet its needs.

Ecosites containing American Columbo in Ontario have included: Dry-Fresh Oak Deciduous Forest, Dry-Fresh Oak Maple Hickory Deciduous Forest, Dry-Fresh Sugar Maple Deciduous Forest, Dry-Fresh White Oak Woodland, and Deciduous Shrub Thicket. In linear habitats, the suitable ELC ecosite will typically be a cultural (i.e., human modified) habitat type.

Additional habitat assessments are required to delineate and map the specific ELC ecosites currently occupied by the American Columbo.

The 50 m radial distance used in both the linear and non-linear habitat is considered a minimum critical function zone, or the threshold habitat fragment size required for maintaining constituent microhabitat properties for a species (e.g., critical light, temperature, litter moisture, humidity levels necessary for survival). At present, it is not clear at what exact distances physical and/or biological processes begin to negatively affect the American Columbo, and this distance is likely to depend on local habitat characteristics. The 50 m radius identified in Bickerton (2013) has been adopted to ensure that microhabitat properties are maintained as part of the identification of critical habitat. The area within the critical function zone may include both suitable and unsuitable habitat as the American Columbo may be found near the transition zone between suitable and unsuitable habitat (e.g., within forest openings or edges). As new information on species' habitat requirements and site-specific characteristics becomes available, these distances may be refined.

Studies on micro-environmental gradients at habitat edges, i.e., light, temperature, litter moisture (Matlack 1993), and of edge effects on plants in mixed hardwood forests, as evidenced by changes in plant community structure and composition (Fraver 1994), have shown that edge effects could be detected up to 50 m into habitat fragments, although other studies show that the magnitude and distance of edge effects will vary depending on the structure and composition of adjacent habitat types (Harper et al. 2005).

Paved areas or built-up features such as buildings do not possess the biophysical attributes of suitable habitat or assist in the maintenance of natural processes.

7.1.3 Application of the Criteria to Identify Critical Habitat for American Columbo

Critical habitat for the American Columbo is identified as the extent of suitable habitat (section 7.1.2) where the occupancy criterion (section 7.1.1) is met. In cases where the suitable habitat extends for less than 50 m around an American Columbo plant, a critical

function zone capturing an area within a radial distance of 50 m is also included as critical habitat.

In Ontario, as noted above, suitable habitat for American Columbo is most appropriately identified as the ELC ecosite. At the present time, the ecosite descriptions and boundaries are not available to support the identification of critical habitat for all populations in Ontario. In the interim, where ELC ecosite boundaries are not available, ELC community series level is identified as the area within which critical habitat is found. In Ontario, critical habitat is located within community series boundaries where the biophysical attributes described in section 7.1.2 are found and where the occupancy criterion is met (section 7.1.1). When ecosite boundaries become available, the identification of critical habitat will be updated.

Application of the critical habitat criteria to the best available information identifies critical habitat for the eight extant populations of the American Columbo in Canada (Figure 2; see also Table 2), totalling up to 217 ha²⁰.

Critical habitat for the American Columbo is presented using 1 x 1 km UTM grid squares (Table 2). The UTM grid squares presented in Figure 2 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. In addition to providing these benefits, the 1 x 1 km UTM grid respects provincial data-sharing agreements in Ontario. Critical habitat within each grid square occurs where the description of habitat occupancy (section 7.1.1) and habitat suitability (section 7.1.2) are met. More detailed information on critical habitat to support protection of the species and its habitat may be requested on a need-to-know basis by contacting Environment and Climate Change Canada – Canadian Wildlife Service at ec.planificationduretablissement-recoveryplanning.ec@canada.ca.

²⁰ This is the maximum extent of critical habitat based on habitat boundaries that can be delineated from high resolution aerial photography (comparable to ELC, Community Series) for linear or non-linear habitats and/or a 50m radial distance around the American Columbo. Actual critical habitat occurs only in those areas described in section 7.1 and therefore the actual area could be less than this and would require field verification to determine the precise amount.

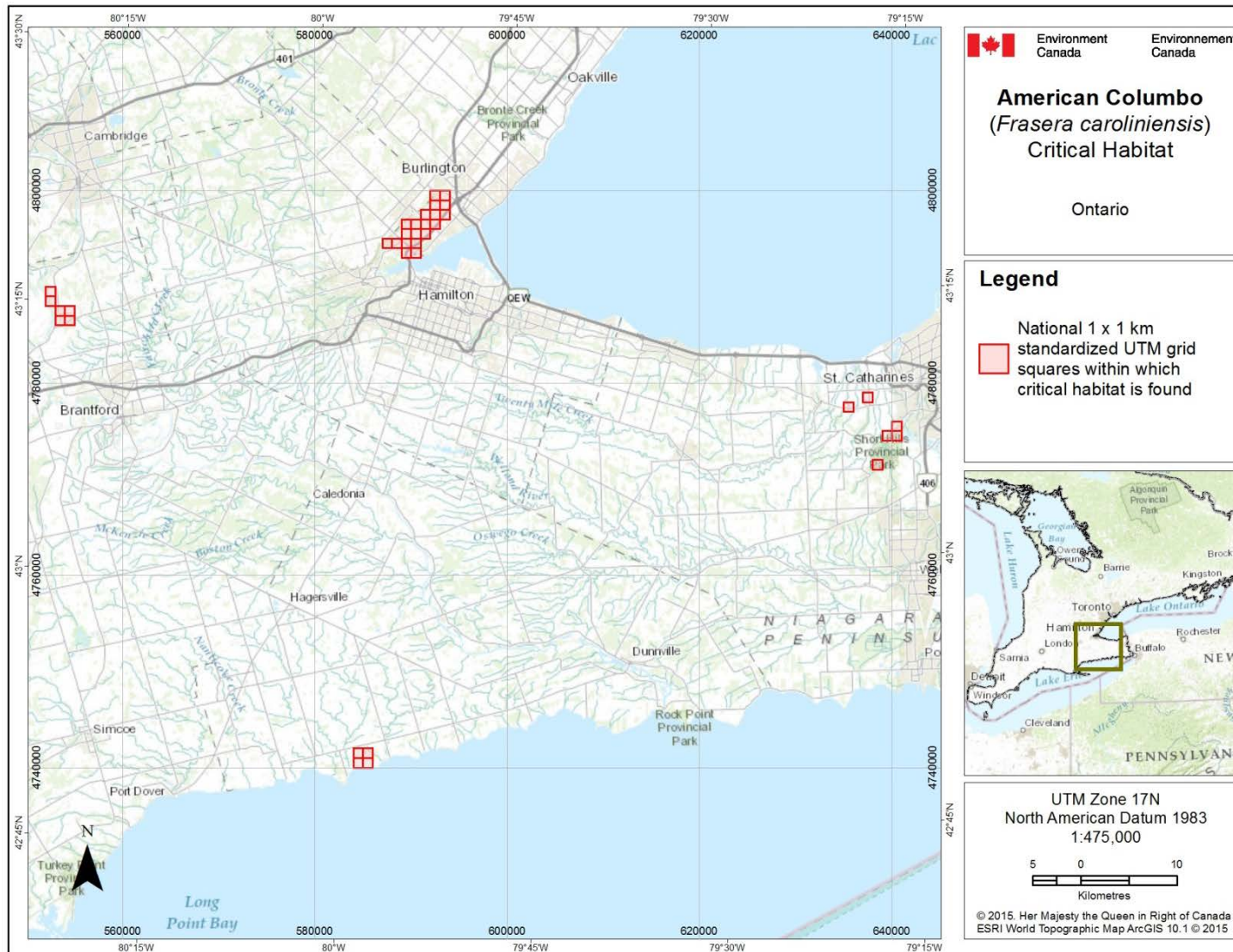


Figure 2. Grid squares that contain critical habitat for the American Columbo in Canada. Critical habitat for the American Columbo occurs within these 1 x 1 km UTM grid squares (red shaded squares), where the description of habitat occupancy (section 7.1.1) and habitat suitability (section 7.1.2) are met.

Table 2. Grid squares that contain critical habitat for the American Columbo in Canada.

Critical habitat for the American Columbo occurs within these 1 x 1 km UTM grid squares where the description of habitat occupancy (section 7.1.1) and habitat suitability (section 7.1.2) are met.

Population	Sub-population	1 x 1 km standardized UTM grid square ID ¹	Province/ Territory	UTM Grid Square Coordinates ²		Land Tenure
				Easting	Northing	
Blue Lake		17TNH5837	Ontario	553000	4787000	Non-federal Land
		17TNH5847		554000	4787000	
		17TNH5836		553000	4786000	
		17TNH5846		554000	4786000	
Glen Morris		17TNH5829	Ontario	552000	4789000	Non-federal Land
		17TNH5828		552000	4788000	
Selkirk Provincial Park		17TNH8441	Ontario	584000	4741000	Non-federal Land
		17TNH8451		585000	4741000	
		17TNH8440		584000	4740000	
		17TNH8450		585000	4740000	
Halton and Hamilton Area	Cartwright Nature Sanctuary	17TNH8974	Ontario	587000	4794000	Non-federal Land
	Pleasant View Tributary	17TNH8984	Ontario	588000	4794000	Non-federal Land
	Bridgeview Valley; Highway 6; Pleasant View Tributary	17TNH8994	Ontario	589000	4794000	Non-federal Land
	Bridgeview Valley	17TNH8995	Ontario	589000	4795000	Non-federal Land
	Bridgeview Valley; Hendrie Valley	17TNH9904	Ontario	590000	4794000	Non-federal Land
	Highway 6; Pleasant View Tributary; Long Pond	17TNH8993	Ontario	589000	4793000	Non-federal Land
	Hendrie Valley	17TNH9903	Ontario	590000	4793000	Non-federal Land
	Clappison Escarpment Woods & Hydro Corridor; Snake Road	17TNH8996	Ontario	589000	4796000	Non-federal Land
	Hidden Valley - Grindstone Creek West Tributary	17TNH9906	Ontario	590000	4796000	Non-federal Land

	Hidden Valley Park; Hidden Valley - Grindstone Creek West Tributary	17TNH9905	Ontario	590000	4795000	Non-federal Land
	Hidden Valley Park	17TNH9915	Ontario	591000	4795000	Non-federal Land
	Sassafras Woods	17TNH9916	Ontario	591000	4796000	Non-federal Land
		17TNH9926		592000	4796000	
		17TNH9917		591000	4797000	
	King Road West; Sassafras Woods	17TNH9927	Ontario	592000	4797000	Non-federal Land
	King Road West	17TNH9937	Ontario	593000	4797000	Non-federal Land
	King Road East	17TNH9929	Ontario	592000	4799000	Non-federal Land
		17TNH9939	Ontario	593000	4799000	Non-federal Land
		17TNH9928	Ontario	592000	4798000	Non-federal Land
		17TNH9938	Ontario	593000	4798000	Non-federal Land
Short Hills Provincial Park		17TPH4705	Ontario	640000	4775000	Non-federal Land
		17TPH3794	Ontario	639000	4774000	Non-federal Land
		17TPH4704	Ontario	640000	4774000	Non-federal Land
Sixteen Mile Creek		17TPH3757	Ontario	635000	4777000	Non-federal Land
Twelve Mile Creek		17TPH3781	Ontario	638000	4771000	Non-federal Land
Fifteen Mile Creek		17TPH3778	Ontario	637000	4778000	Non-federal Land

¹ Based on the standard UTM Military Grid Reference System (see <http://www.nrcan.gc.ca/earth-sciences/geography/topographic-information/maps/9789>), where the first 2 digits and letter represent the UTM Zone, the following 2 letters indicate the 100 x 100 km standardized UTM grid followed by 2 digits to represent the 10 x 10 km standardized UTM grid. The last 2 digits represent the 1 x 1 km standardized UTM grid containing all or a portion of the critical habitat unit. This unique alphanumeric code is based on the methodology produced from the Breeding Bird Atlases of Canada (See www.bsc-eoc.org/ for more information on breeding bird atlases).

² The listed coordinates are a cartographic representation of where critical habitat can be found, presented as the southwest corner of the 1 x 1 km standardized UTM grid square containing all or a portion of the critical habitat unit. The coordinates may not fall within critical habitat and are provided as a general location only.

7.2 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. It should be noted that not all activities that occur in or near critical habitat are likely to cause its

destruction. Detailed descriptions of activities that threaten the survival and recovery of the American Columbo can be found in the *Recovery Strategy for the American Columbo (Frasera caroliniensis) in Ontario*. 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.

Recognizing that American Columbo is able to establish following disturbance, activities that result in a temporary removal of critical habitat (e.g., brush cutting and prescribed burns) have the potential to contribute to the future supply of critical habitat, given proper management. Some disturbance to American Columbo habitat may be beneficial to the species by opening up the canopy cover and suitable bare ground within a given site.

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

Description of activity	Descriptions of effect in relation to function loss	Details of effect
Development and conversion of lands that results in the clearing of natural vegetation communities (e.g., residential or industrial development, road construction)	Construction converts habitat and results in the direct loss of critical habitat upon which the species relies for basic survival, successful seed germination and seedling establishment. Direct removal of soil/substrate would render the habitat unsuitable for American Columbo by removing the biophysical attributes required by the species.	When this activity occurs within the bounds of critical habitat, at any time of year, the effects will be direct, and is certain to result in the permanent destruction of critical habitat. There are no possible thresholds for this activity. Use restricted to the surface of existing roadways/access roads and recreational trails would not result in the destruction of critical habitat.
Incompatible habitat management activities including clear-cut, some small-scale forest harvesting, inappropriate hydro corridor maintenance activities, etc.	<p>Clear cutting and small-scale forest harvesting may result in direct removal and loss of tree canopy and light conditions, indirectly changing soil moisture regimes of critical habitat.</p> <p>Use of forestry and maintenance equipment may result in an increase in the probability of propagules of invasive species being introduced, and potentially in habitat no longer being suitable for the species.</p> <p>Hydro corridor maintenance activities (e.g., chemical use, cutting, trampling, and crushing by heavy equipment) that physically alter habitat and results in degraded habitat that is no longer suitable for the species.</p>	<p>When this activity occurs within or adjacent to (i.e., within 50m) critical habitat at any time of year, the effects are likely to be direct. The information available at this time is insufficient to develop a threshold for this activity.</p> <p>However, the species benefits from open canopies or canopy gaps, therefore some selective canopy thinning and/or brush clearing and mowing as part of small-scale forest harvesting or hydro corridor maintenance activities may be beneficial provided careful precautions are taken to avoid other threats (e.g., no heavy equipment, clean equipment to avoid spread of propagules, removal of all brush and wood from habitat).</p>

Description of activity	Descriptions of effect in relation to function loss	Details of effect
Introduction of invasive plant species (e.g., through introduction of non-native plant seeds, individual plants, foreign soil or gravel, composting or dumping of garden waste, ATV use, operation of heavy equipment)	Invasive plant species may result in increased competition with the American Columbo, and/or cause physical and chemical changes to habitat (e.g., altered shade or soil moisture) such that it is no longer suitable for the American Columbo.	Introduction of an invasive species in or adjacent to critical habitat can lead to gradual destruction of critical habitat over time. Thresholds are not applicable to this activity, as introduction of even a single individual could lead to further spread of the species.

8. Measuring Progress

The performance indicator presented below provides a way to define and measure progress toward achieving the population and distribution objective. Every five years, success of recovery strategy implementation will be measured against the following performance indicator:

- The abundance and distribution of extant populations of American Columbo in Canada have been maintained, or increased where biologically and technically feasible

9. Statement on Action Plans

One or more action plans will be completed for the American Columbo and posted on the Species at Risk Public Registry by December 31, 2024.

10. 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](#)²¹. 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](#)'s²² (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

²¹ www.ceaa.gc.ca/default.asp?lang=E&n=B3186435-1

²² www.ec.gc.ca/dd-sd/default.asp?lang=En&n=F93CD795-1

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 statement.

In general, protecting the habitat of American Columbo and the habitats within which it is found will benefit many other species and ecosystem functions within the Carolinian Zone in southern Ontario. The species shares the range and preferred habitat characteristics of other rare and at-risk plants in the Carolinian Zone. A population in the Halton Region occurs together with Eastern Flowering Dogwood (*Cornus florida*, Endangered [SARA], S2? ²³) (Finney 2013). Other provincially rare species that occur in or near American Columbo habitat include Perfoliate Bellwort (*Uvularia perfoliata*, S1), Downy False Foxglove (*Aureolaria virginica*, S1), Bristly Buttercup (*Ranunculus hispidus* var. *hispidus*, S3), Rue Anemone (*Anemonella thalictroides*, S3) and Pignut Hickory (*Carya glabra*, S3) (Crins and Sharp 1993, COSEWIC 2006, Finney 2013). The Mottled Duskywing, (*Erynnis martialis*, G3S2), a globally rare butterfly, has also been documented at or near sites where American Columbo is found (Finney 2013).

The potential for this recovery strategy to inadvertently lead to adverse effects on other species was considered. In general, most proposed recovery activities, including habitat protection, securement, and invasive species control will benefit native plant and animal species. Certain management activities, such as prescribed burning and thinning of the forest canopy, have the potential to harm some species in the short term. The open forest conditions typically preferred by American Columbo may not be preferred by some co-occurring rare species. The ecological risks of management activities will be considered before they are undertaken, in order to avoid or mitigate any negative effects. The SEA concluded that this strategy will benefit the environment and will not entail any significant adverse effects that cannot be avoided or mitigated.

²³ See Appendix A for subnational conservation rank definitions.

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Appendix A: Subnational Conservation Ranks of American Columbo (*Frasera caroliniensis*) in Canada and the United States

American Columbo (<i>Frasera caroliniensis</i>)	
S-rank	State/Province
S1 (Critically Imperiled)	Oklahoma, Pennsylvania
S2 (Imperiled)	Alabama, New York, Ontario, South Carolina
S2S3 (Imperiled-Vulnerable)	Mississippi, North Carolina
S3 (Vulnerable)	Georgia
S5 (Secure)	Kentucky
SH (Possibly Extirpated)	Louisiana
SNR (Unranked)	Arkansas, Illinois, Indiana, Michigan, Missouri, Ohio, Tennessee, Wisconsin

Rank Definitions (NatureServe 2014)

S1: Critically Imperiled - At very high risk of extirpation in the jurisdiction (i.e., N - nation, or S - state/province) due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.

S2: Imperiled - At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

S3: Vulnerable - At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats or other factors.

S4: Apparently Secure – At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences but with possible cause for some concern as a result of local recent declines, threats or other factors.

S5: Secure - At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

SH: Possibly Extirpated (Historical) - Species or community occurred historically in the state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.

SNR/NNR: Unranked – National or subnational conservation status not yet assessed.

S#?: Inexact Numeric Rank – Denotes inexact numeric rank (e.g. S2?).

**Part 2 – *Recovery Strategy for the American Columbo*
(*Frasera caroliniensis*) in Ontario, prepared by H.J. Bickerton
for the Ontario Ministry of Natural Resources**

American Columbo (*Frasera caroliniensis*) in Ontario

Ontario Recovery Strategy Series

Recovery strategy prepared under the Endangered Species Act, 2007

2013

Natural. Valued. Protected.

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 (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. There is a transition period of five years (until June 30, 2013) to develop recovery strategies for those species listed as endangered or threatened in the schedules of the ESA. 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 Natural Resources Species at Risk webpage at: www.ontario.ca/speciesatrisk

RECOMMENDED CITATION

Bickerton, H.J. 2013. Recovery Strategy for the American Columbo (*Frasera caroliniensis*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 23 pp.

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DECLARATION

The recovery strategy for the American Columbo 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 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

Ontario Ministry of Natural Resources
Environment Canada – Canadian Wildlife Service, Ontario

EXECUTIVE SUMMARY

American Columbo (*Frasera caroliniensis*) is a distinctive perennial herb in the Gentian family (Gentianaceae). The species ranges across central and eastern North America, and although it is considered secure (G5) in North America, it is uncommon throughout its range. In Canada, American Columbo occurs only in southwestern Ontario, and it is listed as endangered under Ontario's *Endangered Species Act, 2007*. There are approximately 12 known extant populations, concentrated in areas of Hamilton, Halton, Brant and Niagara. The total population is estimated at 7,633 plants, representing an approximate 80 percent increase since the 2006 COSEWIC status report. However, the apparent increase is likely due to significant search efforts since 2005. A small proportion of the total population of American Columbo occurs within protected areas such as provincial parks and conservation areas. The majority of plants in Canada are found on private land and along utility and transportation corridors.

The life history of American Columbo is unusual. Plants of this species may spend many years as a non-reproductive rosette before flowering, setting seed and dying in the same season. Many plants in a population or region may flower and die in the same year. Flowering is erratic and factors that stimulate it are not known. This reproductive strategy may limit the species' population and distribution to some degree.

In Ontario, American Columbo grows in upland deciduous habitats, including forests, woodlands and savannas, and also in shrub thickets. It appears to prefer wooded areas with open canopies or canopy gaps but otherwise is tolerant to a wide range of physical and chemical soil conditions. Seeds are probably dispersed mainly by gravity and, to a lesser degree, by water and wind. The main threats to American Columbo in Ontario are habitat loss and fragmentation, invasive plants, utility and transportation corridor management, succession and canopy closure, habitat degradation and erosion.

The recovery goal for American Columbo is to protect all extant populations, to maintain its abundance at each site, and to ensure its long-term persistence within its current Ontario range. Protection and recovery objectives are to:

1. protect and manage extant populations and their habitats;
2. identify and, where necessary, manage threats to populations and habitats;
3. determine population trends and changes to habitat conditions through regular monitoring;
4. where feasible and necessary, facilitate recruitment, augment existing populations and consider re-establishing populations at historical sites in suitable habitat; and
5. address knowledge gaps related to population status, management, life history, and severity of threats.

It is recommended that the area prescribed as habitat in a regulation for American Columbo include the contiguous Ecological Land Classification (ELC) vegetation type polygon(s) (Lee et al. 1998) within which the species is found. If plants are close to the edge of a vegetation community, a minimum distance of 50 metres from the outer limit

of the population is recommended for regulation. American Columbo occurs in some vegetation communities that are anthropogenic in origin (e.g., shrub thickets), and these may be included in a habitat regulation. Where populations occur in uniform, anthropogenically-maintained habitat along linear utility and transportation corridors, a distance of 50 metres from the outside population limit is recommended for regulation. Mapping of regulated habitat would be beneficial for this species.

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1.0 BACKGROUND INFORMATION

1.1 Species Assessment and Classification

COMMON NAME: American Columbo

SCIENTIFIC NAME: *Frasera caroliniensis*

SARO List Classification: Endangered

SARO List History: Endangered (2008), Special Concern (2004)

COSEWIC Assessment History: Endangered (2006), Special Concern (1993)

SARA Schedule 1: Endangered (2007)

CONSERVATION STATUS RANKINGS:

GRANK: G5

NRANK: N2

SRANK: S2

The glossary provides definitions for technical terms, including the abbreviations above.

1.2 Species Description and Biology

Species Description

American Columbo (*Frasera caroliniensis*) is a distinctive member of the Gentian family (Gentianaceae). Each season, plants produce a basal rosette of 3 to 25 oblong, light green leaves that can be up to 40 cm long (COSEWIC 2006). Plants spend most of their lives in this rosette form, persisting for many years before producing a single flowering stem. Flowering stems may grow up to two to three metres in height, with progressively shorter stem leaves growing in whorls, usually of four to five leaves. Flowers are arranged in a large pyramidal inflorescence, with flowering stems emerging from the axils of the upper leaves. Each flower is comprised of four greenish-yellow petals with purplish dots. Petals are fused at the base to form a saucer-shaped flower between two and three centimetres wide (Threadgill et al. 1981a). Seed capsules 1.5 to 2 cm in length typically contain 4 to 14 dark brown, crescent-shaped, winged seeds.

American Columbo is a very striking and robust plant in the Carolinian forest. In flower and fruit, there are no similar species in Canada with which it might easily be confused. Detailed species descriptions and taxonomic keys can be found in Gleason and Cronquist (1991) and Voss and Reznicek (2012). Technical illustrations are shown in Holmgren (1998).

Species Biology

The life history of American Columbo is unusual: it is a monocarpic perennial, meaning that plants persist for several years in a non-reproductive form and then die in the

season they flower and set seed. Rosettes also wither each season, although the robust flowering stalks may persist for more than a year (COSEWIC 2006).

Following germination and development into a two-leaved seedling, plants form a small rosette in the subsequent season. During this time of pre-reproductive growth, the number of leaves in the rosette increases, and overall size of the plant expands so that the largest plants in a population may have a rosette of up to a metre in diameter (Threadgill et al. 1981a; 1981b). Each July or August, following annual growth, rosettes become dormant. Leaf tissue may wither and decompose by August or September, although flowering stalks may persist. Late-season population estimates for this species are therefore not considered as accurate as those conducted earlier in the season in May and June (Crins and Sharp 1993).

Flowering in Ontario populations usually occurs in June. Factors which stimulate flowering of American Columbo remain poorly understood. The size of the rosette is believed to play a role, although after many years of study, Threadgill et al. (1981a) concluded that size alone is not the determining factor. Flowering in American Columbo is “synchronous”, with many rosettes in a population producing a flowering stalk simultaneously (Threadgill et al. 1981a). Synchronous flowering has been observed during recent fieldwork at several Ontario sites (N. Finney, pers. comm. 2012, N. Iwanycki, pers. comm. 2012).

Flowering is also unpredictable: many plants may flower at a site in one year, followed by very few in a subsequent year (Threadgill et al. 1981b). In Ontario, it appears that many, but not all populations will flower in the same year (N. Finney, pers. comm. 2012, N. Iwanycki, pers. comm. 2012). McCoy (1949) suggested that the period of vegetative growth lasts for six to seven years, although this may not be consistent and has not been tested. Threadgill et al. (1979) found that plants can persist for over 30 years in this non-reproductive rosette form.

Horn (1997) observed that flowering plants were more likely to be found in forest openings and along forest margins, and suggested that increased light penetration through the canopy may stimulate flowering. Following flowering and seed set, the plant dies. Unlike long-lived perennials and plants that may reproduce vegetatively, the long-term persistence of American Columbo at a site depends on successful flowering, seed production and seedling establishment. This is due to its monocarpic nature: populations must continually renew themselves through sexual reproduction.

Pollinators are drawn to the many flowers by a large nectar-producing gland situated on each petal. Members of the family Apidae (Order Hymenoptera), including generalist pollinator species such as the European Honeybee (*Apis mellifera*) and several bumblebee species (*Bombus* spp.), are the most effective pollinators (Threadgill et al. 1981a). American Columbo is capable of self-pollination, although cross-pollination leads to a higher reproductive output (Threadgill et al. 1981b).

Little is known about seed dispersal. The seeds of American Columbo are presumably dispersed mainly by gravity, and to a lesser extent, water and wind, and are unlikely to spread across large areas of unsuitable habitat (COSEWIC 2006). Dispersal at many sites on steep slopes is most likely to be downslope, into richer areas with less suitable habitat. Most seeds are shed in the late autumn and winter, although viable seeds may remain undispersed on the dead fruiting stalks for more than a year (Baskin and Baskin 1986). Seeds that remain on plants until winter do not germinate the following season, but require an additional season before germinating (Threadgill et al. 1981c, Baskin and Baskin 1986).

Little has been documented about herbivory on American Columbo. Gastropods have been observed feeding on foliage on Ontario populations, but it is not known whether this threatens plant survival (COSEWIC 2006). Threadgill et al. (1981a) found that approximately a quarter of one season's seed crop at one site was lost to invertebrate predators. Synchronous flowering and seed set in American Columbo may help to reduce seed predation (Threadgill et al. 1981a).

1.3 Distribution, Abundance and Population Trends

Distribution

American Columbo is found throughout a broad area of the central-eastern United States, ranging from Michigan and New York, southward to South Carolina and northern Georgia, and westward to eastern Oklahoma and Louisiana. Although widespread, it is not common anywhere in its range, and is considered of conservation concern (S1-S3, SH) in 9 of 18 American states where it occurs.

Within Canada, American Columbo is extant only in an area at the western end of Lake Ontario and the eastern end of Lake Erie (Brant County, Regional Municipality of Haldimand-Norfolk, City of Hamilton, Regional Municipality of Halton and Niagara Region; Figure 1). A single disjunct population was documented near Sarnia, Ontario in 1896, and is presumed extirpated.

Abundance and Population Trends

At the time of the 2006 COSEWIC status report, 22 documented populations (Element Occurrences or EOs) had been reported in Ontario. Of these, 12 were believed to be extant, 9 were considered extirpated populations, and the status of one population was uncertain. The total Canadian (i.e., Ontario) population was estimated at 4,200 plants. Of these, all but a few were in the vegetative state during fieldwork in the seasons of 2004 and 2005 (COSEWIC 2006).

Since that time, fieldwork has been undertaken by staff at Conservation Halton, the Grand River Conservation Authority and the Royal Botanical Gardens. The total Ontario population has recently been estimated at 7,633 (Finney 2012). This apparent 80 percent increase likely reflects a significant and targeted search effort rather than a population increase. Survey effort has been concentrated in Hamilton and Halton

regions, where most populations have shown a stable to increasing population (Rothfels 2005, COSEWIC 2006, Finney 2012).

At least three additional populations have been documented; two of these probably represent new Element Occurrences (N. Finney, pers. comm. 2012, N. Iwanycki pers. comm. 2012). Importantly, a significant proportion of plants observed in several Hamilton and Halton populations flowered in 2005, 2009 and again in 2012 (Finney 2012). There have been few recent surveys in the Niagara Region.

Additional populations may also exist but have not been verified. In the Carolinian Woodlands Recovery Strategy (Jalava et al. 2009), American Columbo was identified as a species present at the Aamjinwnang First Nation near Sarnia, Ontario. This report could not be verified. A 2009 observation on private land in the vicinity of Short Hills Provincial Park from the Guelph District Species at Risk database may also represent a new EO; the Short Hills Conservation Action Plan also reports that new populations are being found in this area (Jalava et al. 2010a). No further information is available on these references.

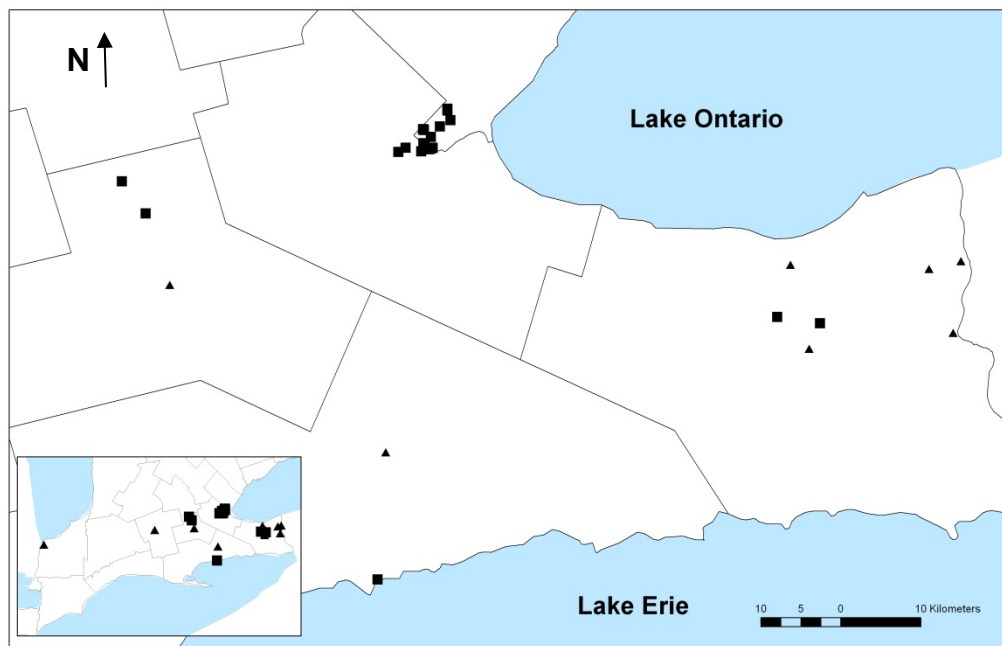


Figure 1. Historical and current distribution of American Columbo in Ontario. Squares represent populations verified since 1993; triangles represent historical populations not observed since 1993. Map courtesy of N. Finney, Conservation Halton.

1.4 Habitat Needs

Across its range, American Columbo is usually associated with open deciduous forest, although it has been reported from pine and cedar forest in some areas of the United States (Threadgill et al. 1979). Typically, this species occupies stable habitats, but it

has been documented from successional shrub thickets as well as recently disturbed habitats. Threadgill et al. (1979) also note that it is most common in dry upland forests, but it has been documented in swampy areas.

In Ontario, most sites are found in deciduous woodlands or forests. These are often dominated by Red Oak (*Quercus rubra*) or White Oak (*Quercus alba*), sometimes in association with Hickory (*Carya* spp.), or less commonly, in Sugar Maple (*Acer saccharum*) forests, sometimes in association with White Ash (*Fraxinus americana*) or American Beech (*Fagus grandifolia*). The canopy is often quite open, or canopy gaps may be present. In Brant County, the species also occurs in oak savanna and tallgrass prairie. These are habitats that are maintained through regular disturbance, which in Ontario, was historically by fire. Some Ontario populations occur, at least in part, under dense shrub thickets dominated by Gray Dogwood (*Cornus racemosa*), Hawthorns (*Crataegus* spp.), Buckthorn (*Rhamnus* spp.), or Staghorn Sumac (*Rhus typhina*) (Geomatics International 1992). None of the Ontario sites where habitat information has been reported have been located in wetland plant communities.

American Columbo tolerates a range of soil textures and conditions. It has been collected from rocky hillsides, sandy soils, sandy loam and clay; it has been found on calcareous soils and among granite boulders (Threadgill et al. 1979). In Ontario, populations have been reported from dry mesic to mesic clay and clay-loam as well as mesic silty clay.

In Hamilton and Halton, American Columbo has been found in the following Ecological Land Classification (ELC) vegetation types (Lee et al. 1998, Finney 2012):

- Dry-Fresh White Oak Deciduous Forest (FOD1-2)
- Dry-Fresh Oak-Hickory Deciduous Forest (FOD2-2)
- Dry-Fresh Oak-Hardwood Deciduous Forest (FOD2-4)
- Dry-Fresh Sugar Maple-Oak Deciduous Forest (FOD5-3)
- Dry-Fresh Sugar Maple-White Ash Deciduous Forest (FOD 5-8)
- Dry-Fresh White Oak Woodland (WODM3-3)
- Gray Dogwood - Deciduous Shrub Thicket (CUT1-4)

This does not represent a comprehensive list of ELC vegetation communities in which American Columbo is found. No documentation could be found to describe ELC vegetation communities for sites in other areas of Ontario. For example, in Brant County, American Columbo also occurs on private land in oak savanna and tallgrass prairie, although these have not been mapped using ELC methods. In addition, habitat in some areas has been described using methods that preceded the ELC (e.g., Halton Natural Areas Inventory, Varga and Jalava 1992), and some sites still require survey.

1.5 Limiting Factors

American Columbo's reproductive strategy as a monocarpic perennial in a mature forest setting may limit its population to some degree. Individual plants spend many years in a vegetative state. In most years, very few plants flower, and it is quite common to observe no reproductive individuals at a site in a given year (N. Finney, pers. comm. 2012, M. Gartshore, pers. comm. 2012). The fact that American Columbo is not common anywhere in its range suggests that this reproductive strategy, combined with its limited dispersal ability, may limit its population.

1.6 Threats to Survival and Recovery

Threats are generally presented in order of importance, although the severity of some threats is unclear.

Habitat Loss and Fragmentation

Habitat loss has historically been a significant threat to this species, with at least 9 of the 22 documented populations presumed extirpated. At least three populations are expected to be affected by development in the future; two of these may be imminently at risk due to planned industrial expansion (COSEWIC 2006, N. Finney, pers. comm. 2012). In Halton and Hamilton, only 17% of Ontario's American Columbo plants are within publicly owned protected areas (Finney 2012). American Columbo is also restricted to a relatively small and highly developed area of Ontario, where habitat fragmentation is high. Presuming that seeds are dispersed mainly by gravity, the opportunity for wider dispersal of this plant is limited. Habitat fragmentation, and the population isolation that may result, are considered to be threats.

Invasive Plants

Fieldwork in advance of the COSEWIC status report (2006) identified that non-native, invasive plants pose a significant threat to this species at its remaining extant sites. This remains the case at many sites (N. Finney, pers. comm., 2012, N. Iwanycki, pers. comm. 2012, L. Campbell, pers. comm. 2012). Non-native, invasive plant species have the potential to outcompete native species for resources and alter habitat such that it becomes unsuitable. Species considered most aggressive at Ontario sites include Dog-strangling Vine (*Cynanchum* spp.), Garlic Mustard (*Alliaria petiolata*), Common Buckthorn (*Rhamnus cathartica*), Japanese Barberry (*Berberis thunbergii*), Multiflora Rose (*Rosa multiflora*), Tartarian Honeysuckle (*Lonicera tatarica*), Sweet White Clover (*Melilotus alba*) and Dame's Rocket (*Hesperis matronalis*) (COSEWIC 2006, N. Finney, pers. comm. 2012). The effects of invasive species on germination, reproduction and survival of American Columbo are uncertain. For example, American Columbo continues to persist at sites where Dog-strangling Vine has become dominant in recent years, and the extent to which this affects population viability is not known.

Utility and Transportation Corridor Management

Over 40% of American Columbo plants in Halton and Hamilton occur on lands owned or managed as a utility (hydro) or transportation corridor (Finney 2012). Without careful planning, utility and transportation corridor management has the potential to threaten American Columbo populations through physical impact (cutting, trampling, crushing by heavy equipment), habitat alteration, chemical use, and the possible introduction of invasive species. It is not known whether these impacts are occurring because these activities are currently unmonitored. However, two populations have persisted for at least three decades in thickets along maintained hydro corridors; one of these is among the largest populations in Canada. Herbicides are no longer used by Hydro One; however, in the past, tree species have been removed to encourage dense shrub cover and minimize maintenance requirements (Geomatix International 1991). The effects of these activities on American Columbo are unknown without assessment and monitoring.

Succession and Canopy Closure

American Columbo is a species of dry forests, woodlands and savannas. There is evidence that this species benefits from open canopies or canopy gaps. Given that natural fire is suppressed in southern Ontario, it is possible that the limited recruitment observed in some populations is a result of canopy closure that results from natural succession. Horn (1997) suggested that American Columbo shows increased flowering at forest margins and in canopy gaps. Recent brush cutting and prescribed burning in American Columbo's oak savanna habitat in Brant County has resulted in increased recruitment (G. Buck, pers. comm. 2012). Due to a lack of study, it is not clear if canopy closure presents a threat to this species in Ontario (Finney 2012).

Logging

Logging has also been observed as a threat to this species (COSEWIC 2006). The number of populations threatened by logging is not known, but is probably low. Some methods of commercial timber harvest (e.g., clearcutting) would probably threaten American Columbo by causing direct harm to plants, introducing invasive species, or completely altering habitat so that it becomes unsuitable. However, the impact of other types of forestry, such as selective cutting and canopy thinning, may benefit American Columbo populations by creating canopy gaps that stimulate flowering. Such impacts are not known, because no studies have been undertaken to date.

Habitat Degradation

Many American Columbo sites are within or near urban areas, and are subject to disturbances that may reduce habitat quality. Dumping of refuse and garden waste has been reported at three sites (COSEWIC 2006), and this could encourage the establishment and spread of invasive plants. Formal and informal trails may result in trampling and/or soil compaction. The suppression of naturally-occurring fire in urban areas, as described above, can also be considered a form of habitat degradation. Thus, although these sites, often on steep slopes, may not be entirely lost, habitat degradation may represent a significant threat.

Erosion

Several Ontario populations of American Columbo occur on steep hillsides, and soil erosion is considered a threat to some sites (COSEWIC 2006, L. Campbell, pers. comm. 2012). However, it is not clear if populations on steeper and more active slopes are necessarily more at risk. Additional study would be beneficial.

1.7 Knowledge Gaps

Population and Habitat Status

Due to recent inventory and monitoring work, there is a wealth of new population information on this species, as well as detailed spatial population mapping. However, the current number of Element Occurrences is not clear, and this species would benefit from a reassessment of the current number and geographic extent of populations and their status. Undocumented reports of this species also exist and require confirmation. Habitat information, threats, and land ownership have been documented at most sites in Halton and Hamilton, but gaps exist for some sites, especially in the Niagara area. Recent census information is lacking for populations in the Niagara Region. The completion of Ecological Land Classification (ELC) to the level of “vegetation type” would inform a habitat regulation for this species.

Management Techniques

There is little published information describing the effects of management techniques on American Columbo. Studies examining the effects of vegetation clearing (e.g., brush cutting, forest thinning) and prescribed burning on population persistence and reproduction would provide useful information in managing this population in Ontario. The feasibility of population enhancement and augmentation through propagation and transplanting is not well understood.

Life History, Ecological and Demographic Research

The unusual life history of American Columbo raises many questions regarding the long-term future for this rare species in Ontario. The viability, particularly of small populations, is not known. The factor(s) which trigger synchronous flowering have not been identified to date. Understanding vegetative and reproductive patterns in this species would determine whether seed production and recruitment are sufficient to maintain populations over the long term. Seed dispersal patterns and distances are not known. Information on seed viability in soil and seedling recruitment will also help meet conservation and recovery goals.

Threat Clarification

The effects on populations of some proposed threats, particularly of invasive species and soil erosion, are not known. Long-term, experimental invasive species control would help determine the effects of invasive species (and their control) on the long-term viability of American Columbo. Slope stability studies could indicate whether stabilization efforts, where possible, are advisable. A study of seed predation would be useful in determining the reproductive potential of populations (N. Finney, pers. comm.).

2012); it is not currently understood whether this constitutes a threat to the species in Ontario (COSEWIC 2006). The extent and effects of soil compaction resulting from formal and informal trail networks is unclear.

1.8 Recovery Actions Completed or Underway

Since 2008, staff at Conservation Halton have conducted inventory work within the City of Hamilton and Halton Region. Information has been collected on total population, reproductive status, and habitat, including ELC communities (Finney 2012). In partnership with the Hamilton Field Naturalists, a long-term monitoring project for the Cartwright Nature Sanctuary population has been initiated. Garlic Mustard control has also been undertaken in the Cartwright Nature Sanctuary (N. Finney, pers. comm. 2012). Sites within the Royal Botanical Gardens (RBG) are monitored frequently, although not on a systematic basis. Staff at the Grand River Conservation Authority (GRCA) have surveyed the Glen Morris population several times between 2007 and 2011 (L. Campbell, pers. comm. 2012).

A population at a privately-owned site in Brant County occurs in open oak savanna and woodland, with many prairie species present. With a goal of maintaining oak savanna, brush cutting and three prescribed burns have been conducted between 2007 and 2009. American Columbo has responded positively, with a flush of seedling recruitment in the first years following burning (G. Buck, pers. comm. 2012).

In 1991, a monitoring program was developed for American Columbo populations along two Ontario Hydro rights-of-way (Geomatics International 1991). The program aimed to monitor the species' status and response to management practices along the rights-of-way. Permanent plots were then established in 1992. Recommendations for future monitoring were given in a subsequent report (Geomatics International 1992). Although this work was discontinued, these two reports provide a useful starting point for further monitoring and research on the effects of management practices on American Columbo abundance, reproductive success, and germination.

Over the past decade, broader scale conservation planning has been underway within this species' range. A National Recovery Strategy for Carolinian Woodlands and Associated Species at Risk (Jalava et al. 2009) identified recovery approaches for threatened habitats and species, including American Columbo, within the Carolinian life zone. Conservation Action Plans have also been developed for the Short Hills (Jalava et al. 2010a) and Hamilton-Burlington areas (Jalava et al. 2010b). These Conservation Action Plans have been developed collaboratively by a number of community stakeholders to identify and prioritize actions to help recover ecosystems and species-at-risk populations in their target area. Implementation is currently underway (J. Jalava, pers. comm. 2012). A similar, broad-scale, multi-agency approach to land management is being undertaken by the Cootes to Escarpment Park System Project, which incorporates all the American Columbo populations and habitat within Hamilton-Halton (Royal Botanical Gardens 2013, N. Finney, pers. comm. 2012).

2.0 RECOVERY

2.1 Recovery Goal

The recovery goal for American Columbo is to protect all extant populations, to maintain its abundance at each site, and to ensure its long-term persistence within its current Ontario range.

2.2 Protection and Recovery Objectives

Recovery for this species places greatest emphasis on ensuring the protection of extant populations.

Table 1. Protection and recovery objectives for American Columbo

No.	Protection or Recovery Objective
1	Protect and manage extant populations and their habitats.
2	Identify and, where necessary, manage threats to populations and habitats.
3	Determine population trends and changes to habitat conditions through regular monitoring.
4	Where feasible and necessary, facilitate recruitment, augment existing populations and consider re-establishing populations at historical sites in suitable habitat.
5	Address knowledge gaps related to population status, management, life history, and severity of threats.

2.3 Approaches to Recovery

Table 2. Approaches to recovery of the American Columbo in Ontario

Relative Priority	Relative Timeframe	Recovery Theme	Approach to Recovery	Threats or Knowledge Gaps Addressed
1.0 Protect and manage extant populations and their habitats				
Critical	Short-term	Inventory and Protection	1.1 Map the extent of each extant population and its habitat, and identify current landowners and/or land managers.	<ul style="list-style-type: none"> • All threats
Necessary	Short-term	Inventory	1.2 Investigate references to undocumented and new populations and undertake surveys if necessary to determine if populations are extant.	<ul style="list-style-type: none"> • Habitat loss
Necessary	Short-term	Protection and Communication	1.3 Contact private landowners and, by working with them, identify opportunities for long-term protection and stewardship (e.g., conservation easements, stewardship agreements, and financial incentives such as Conservation Land Tax Incentive Program or acquisition).	<ul style="list-style-type: none"> • Habitat loss • Habitat degradation
Necessary	Short-term	Protection and Communication	1.4 Identify American Columbo habitat under the ESA and work collaboratively with stakeholders, municipalities, conservation authorities, and OMNR to protect habitat.	<ul style="list-style-type: none"> • Habitat loss • Habitat degradation
2.0 Identify and, where necessary, manage threats to populations and habitats				
Critical	Short-term	Management and Stewardship	2.1 Prioritize and implement invasive species control at all sites as required. <ul style="list-style-type: none"> – With landowners or land managers, assess threat of invasive species at each site and prioritize action. – Conduct control efforts in priority order. – Monitor results and follow-up where necessary. 	<ul style="list-style-type: none"> • Invasive plants
Necessary	Short-term	Management, Communication	2.2 Manage sites to protect populations. <ul style="list-style-type: none"> – Work with landowners and land managers to identify 	<ul style="list-style-type: none"> • Utility and transportation

Recovery Strategy for the American Columbo in Ontario

Relative Priority	Relative Timeframe	Recovery Theme	Approach to Recovery	Threats or Knowledge Gaps Addressed
		and Stewardship	<p>site management practices that may affect American Columbo populations (e.g., along Hydro rights-of-way, in privately managed forests).</p> <ul style="list-style-type: none"> – Develop and implement site management plan(s) as required, based upon the best available information. – Monitor population response to management, and adapt if necessary. – Document and share results. 	<p>corridor management</p> <ul style="list-style-type: none"> • Habitat degradation • Management techniques
Beneficial	Short-term	Stewardship and Outreach	2.3 Develop outreach materials for landowners and land managers (e.g., Ontario Hydro, municipalities) to explain the significance and threats to American Columbo, and identify Best Management Practices.	<ul style="list-style-type: none"> • All threats
3.0 Determine population trends and changes to habitat conditions through regular monitoring				
Critical	Short-term	Inventory and Monitoring	3.1 Comprehensively review all survey and monitoring data to identify and clarify the number of current element occurrences.	<ul style="list-style-type: none"> • Population status
Critical	Short-term	Inventory	3.2 Compile all population data into a single, current, standard (i.e., Natural Heritage Information Centre) database to ensure that current population information is available to municipalities, conservation authorities, and consultants.	<ul style="list-style-type: none"> • Population status
Necessary	Short-term	Inventory and Monitoring	3.3 Develop and implement a survey and monitoring protocol for American Columbo.	<ul style="list-style-type: none"> • Population status
Necessary	Long-term	Inventory and Monitoring	3.4 Conduct population surveys and threat assessments on a regular basis, using a standard protocol. Prioritize surveys of populations in the Niagara region and any others that have not been recently visited. Identify and survey additional sites with apparently suitable habitat within the range of American Columbo.	<ul style="list-style-type: none"> • Population status • All threats

Recovery Strategy for the American Columbo in Ontario

Relative Priority	Relative Timeframe	Recovery Theme	Approach to Recovery	Threats or Knowledge Gaps Addressed
Necessary	Long-term	Inventory, Monitoring and Research	3.5 Develop and implement a standard population monitoring protocol based upon current methods and expertise, to ensure that populations are regularly monitored (every 3–5 years), and results are comparable between years and populations.	<ul style="list-style-type: none"> Population status Life History
4.0 Where feasible and necessary, facilitate recruitment, augment existing populations and consider re-establishing populations at historical sites in suitable habitat				
Beneficial	Long-term	Management and Restoration	4.1 Increase the size and (presumably) the viability of extant American Columbo populations by assisting in the spread of seed produced in flowering years, or by other means of augmentation.	<ul style="list-style-type: none"> Population status
Beneficial	Short-term and Long-term	Management	4.2 Working with MNR, collect local seed to ensure that local seeds are available for restoration plantings in the short-term. If possible, deposit seed in a reputable seed bank to safeguard the genetics of this species in Ontario.	<ul style="list-style-type: none"> Population status
Beneficial	Long-term	Restoration	4.3 Consider habitat restoration and/or re-establishment at historical sites where suitable habitat remains or could be restored. If deemed feasible, develop and implement restoration plans.	<ul style="list-style-type: none"> Habitat loss and fragmentation
Beneficial	Long-term	Stewardship	4.4 Integrate management and restoration planning with property management plans (where they exist), as well as larger landscape conservation initiatives (e.g., Conservation Action Plans, the Cootes to Escarpment initiative and other programs of partner agencies)	<ul style="list-style-type: none"> Habitat loss and fragmentation
5.0 Address knowledge gaps related to population status, management, life history, and severity of threats				
Necessary	Long-term	Research	5.1 Conduct detailed demographic studies and population viability analysis, including analysis of seed germination and seedling recruitment rates.	<ul style="list-style-type: none"> Population status

Recovery Strategy for the American Columbo in Ontario

Relative Priority	Relative Timeframe	Recovery Theme	Approach to Recovery	Threats or Knowledge Gaps Addressed
Necessary	Long-term	Research and Management	5.2 Conduct research to improve site management. <ul style="list-style-type: none"> – Determine the effects of site management (e.g., brush clearing, forest thinning, selective logging, prescribed burning) on population abundance and viability – Determine the success of germination, propagation, translocation, and population augmentation. – Document and share results. 	<ul style="list-style-type: none"> • Succession and canopy closure • Logging • Management techniques
Necessary	Long-term	Research	5.3 Identify aspects of the life history and ecology of American Columbo that will inform recovery; e.g.: <ul style="list-style-type: none"> – length of reproductive cycle; – stimulus to flowering; – ideal conditions for germination and persistence until reproduction; and – extent and effects of seed predation. 	<ul style="list-style-type: none"> • Life history and ecology • Management techniques
Necessary	Long-term	Research	5.4 Clarify threats to American Columbo. <ul style="list-style-type: none"> – Determine the effect(s) of utility corridor management methods on Ontario populations of American Columbo. – Investigate the effects of invasive species on survivorship, growth and germination. – Examine the extent of erosion at sites, whether it poses a threat to this species, and if so, suggest possible mitigation. – Determine the extent and effects of trail development and use on nearby populations. 	<ul style="list-style-type: none"> • Invasive plants • Erosion

Narrative to Support Approaches to Recovery

The approaches in Table 2 focus on maintaining extant populations, through protection, management, and monitoring. Restoration of habitat and/or populations are lower priority approaches for American Columbo at this time.

Population Viability Analysis is recommended in order to better quantify population goals for recovery. It is currently assumed, although not known, that several larger populations are viable over the long-term. Population Viability Analysis involves detailed demographic analyses of populations (e.g., survivorship, growth and recruitment) over several years in order to estimate the probability of extinction (Menges 1990). Such studies would clarify the extent to which population augmentation and/or re-establishment is required to ensure the long-term persistence of this species in Ontario.

Stewardship and communication strategies are also prioritized. Several landowners have been contacted by Conservation Halton during survey work and are sympathetic to American Columbo conservation; it is recommended that these landowners be identified and contacted to explore stewardship options. Other landowners, including industrial and even municipal landowners, may be unaware of the presence of American Columbo on their properties. Communication and the availability of stewardship incentives (e.g., tax incentives and/or funding for habitat management) will be key to the success of protection of this species on private lands. The co-ordination of stewardship and recovery efforts should be undertaken in the context of regional conservation efforts such as the Carolinian Woodland Recovery Strategy (Jalava et al. 2009), Conservation Action Plans for areas within the range of American Columbo (e.g., Jalava et al. 2010a, Jalava et al. 2010b), and the Cootes to Escarpment Park System landscape planning project (Royal Botanical Gardens 2013).

The availability of current occurrence and survey data to municipalities and consultants through the commonly accepted and standard portal (i.e., Natural Heritage Information Centre database) is critical to the protection of all populations, especially to those recently discovered. Although much survey and monitoring has been completed, the documentation and implementation of standard monitoring methods (especially describing survey timing and the collection of demographic information) would be very valuable.

Based on the available information, the control of invasive species is the most urgent management priority at American Columbo sites. However, careful planning is also required at other populations where habitat is actively managed (e.g., Hydro rights-of-way, managed forests) in order to ensure that American Columbo populations are not harmed.

Re-establishment and re-introduction are considered lower priority recovery approaches at this time, until certain knowledge gaps are filled. Further information about population viability, site maintenance, and the likely success of management techniques will inform the need for such measures in the future.

Many other rare and at-risk Carolinian species occur in American Columbo habitat, including Eastern Flowering Dogwood (*Cornus florida*, endangered), and several rare Carolinian plants and invertebrates (Finney 2012). Habitat management actions should also consider habitat requirements of other rare and at-risk species within the area.

2.4 Performance Measures

Table 3. Performance measures for the recovery of American Columbo

Objective	Performance Measures
1. Protect and manage extant populations and their habitats.	<ul style="list-style-type: none"> Stable to increasing trend observed in the number of extant sites (including sub-populations) and total population Population and habitat extent identified and mapped for all populations Increase observed in the number of sites protected through stewardship and acquisition Habitat identified under the ESA
2. Identify and, where necessary, manage threats to populations and habitats.	<ul style="list-style-type: none"> Habitat quality improved through control of invasive species Increase observed in the number of land managers aware of and engaged in habitat management for American Columbo Reduction in threats observed at each site
3. Monitor all populations regularly, using standard methods, to determine trends and changes to habitat conditions.	<ul style="list-style-type: none"> Standard monitoring techniques developed and all sites regularly monitored Current information on population extent compiled and made widely available to stakeholders
4. Where feasible and necessary, facilitate recruitment, augment existing populations and consider re-establishing populations at historical sites in suitable habitat.	<ul style="list-style-type: none"> Augmentation of populations attempted and results monitored Recovery potential of historical sites evaluated
5. Address knowledge gaps related to population status, management, life history, and severity of threats.	<ul style="list-style-type: none"> Population Viability Analysis completed and minimum viable population identified for American Columbo Understanding of key life history traits, management needs, and threats significantly improved

2.5 Area for Consideration in Developing a Habitat Regulation

Under the ESA, a recovery strategy must include a recommendation to the Minister of Natural Resources 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.

The minimum area that should be prescribed as habitat in a habitat regulation for American Columbo should include the area occupied by all extant populations, and the surrounding extent of the vegetation community in which it occurs. The vegetation community should be described as the vegetation type, based on the ELC methods for southern Ontario (Lee et al. 1998). If plants are close to the edge of a vegetation community, a minimum distance of 50 metres from the outer limit of the population is recommended for regulation. Regulating habitat based on the vegetation community will help to preserve ecological functions required for the recovery of American Columbo, including seed dispersal and recruitment in suitable habitat. Protecting a minimum radius of 50 metres around the extent of each population represents a precautionary approach to ensure the necessary habitat conditions are maintained and that plants are protected from harm.

Recent scientific literature also supports this minimum distance for protection. Effects on both micro-environmental gradients (e.g., light, temperature, litter moisture, etc.) and changes in plant community structure and composition could be detected to 50 metres into habitat fragments (Matlack 1993, Fraver 1994). Roadside effects resulting from construction and traffic typically have the greatest impact within 30 to 50 metres (Forman and Alexander 1998, Forman et al. 2003). Studies that have used mosses or lichens to identify edge effects in forests have also shown effects up to a distance of 50 metres into remnant habitat fragments (Esseen and Renhorn 1998, Baldwin and Bradfield 2005). All of these studies support a minimum 50-metre distance for habitat regulation surrounding each population.

Some of the vegetation types occupied by American Columbo (e.g., Cultural Thicket) may be maintained by human activities (i.e., anthropogenic). These may also be included in a habitat regulation. Clearly unsuitable areas (e.g., paved or manicured areas, and structures) should be exempt from a habitat regulation.

A minority of American Columbo populations (but a large percentage of plants) occurs along linear corridors maintained as hydro rights-of-way or road allowances. In the case of linear corridors where habitat is actively managed, the vegetation type in which American Columbo is found may be contiguous (and maintained as such) over large areas. In these cases, a maximum distance of 50 metres from the outer limit of the population is recommended for protection through regulation. This is to ensure that the necessary habitat conditions are maintained and that plants are protected from harm (see above), as well as to allow natural dispersal of propagules and population expansion.

New information on the species' habitat management needs should also be considered. There is a significant amount of apparently suitable but unoccupied habitat within the species' Ontario range, especially considering the extent of its former range. It is therefore recommended that habitat regulation be flexible enough to accommodate newly discovered sites, and those where restoration and/or re-introduction is planned.

American Columbo is not known to be cultivated in Canada, but seeds and rootstocks are commercially available from nurseries in the United States. It is recommended that horticultural populations and those known to have originated from sources outside Canada be excluded from a habitat regulation.

GLOSSARY

Axil: The upper angle where a small stem joins a larger one, or where a leaf stalk joins the stem.

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. 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

Cyme: An arrangement of flowers in a plant inflorescence in which each axis ends in a flower.

ELC: Ecological Land Classification. This refers to a standard method of vegetation community classification for southern Ontario. For more information, please see Lee et al. (1998).

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

Extant: Existing

Extirpated: Locally extinct in a specific region

Monocarpic: A plant that flowers, sets seeds and then dies.

Population Viability Analysis: A method of risk analysis used by conservation biologists to determine the probability that a species will go extinct within a given number of years. The goal is to assess whether the species is self-sustaining over the long term.

Rosette: A plant with leaves spread in a horizontal plane from a short axis (i.e., stem) at ground level.

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.

Synchronous flowering: Refers to the phenomenon of coincident, simultaneous flowering of a population of a given species, often over a large region. It may involve many plants, but not necessarily all plants of that species.

Whorl: An arrangement in which leaves or petals all arise at the same point on an axis (e.g., stem, branch), encircling it.

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**Part 3 – *American Columbo* – Ontario Government Response
Statement, prepared by the Ontario Ministry of Natural Resources**

American Columbo

Ontario Government Response Statement



Photo: Nigel Finney

PROTECTING AND RECOVERING SPECIES AT RISK IN ONTARIO

Species at risk recovery is a key part of protecting Ontario's biodiversity. Biodiversity – the variety of living organisms on Earth – provides us with clean air and water, food, fibre, medicine and other resources that we need to survive.

The *Endangered Species Act, 2007* (ESA) is the Government of Ontario's legislative commitment to protecting and recovering species at risk and their habitats. As soon as a species is listed as extirpated, endangered or threatened under the ESA, it is automatically protected from harm or harassment. Also, immediately upon listing, the habitats of endangered and threatened species are protected from damage or destruction.

Under the ESA, the Ministry of Natural Resources and Forestry (the Ministry) 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.

GOVERNMENT RESPONSE STATEMENTS

Within nine months after a recovery strategy is prepared, the ESA requires the Ministry to publish a statement summarizing the government's intended actions and priorities in response to the recovery strategy. The recovery strategy for the American Columbo (*Frasera caroliniensis*) in Ontario was completed on November 22, 2013 (http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_rs_amr_clmb_en.pdf).

The response statement is the government's policy response to the scientific advice provided in the recovery strategy. All recommendations provided in the recovery strategy were considered and this response statement identifies those that are considered to be appropriate and necessary for the protection and recovery of the species. In addition to the strategy, the response statement is based on input from stakeholders, other jurisdictions, Aboriginal communities and members of the public. It reflects the best available traditional, local and scientific knowledge at this time and may be adapted if new information becomes available. In implementing the actions in the response statement, the ESA allows the Ministry to determine what is feasible, taking into account social and economic factors.

American Columbo is a perennial herb with a single stem that may grow up to two to three metres in height. Stem leaves grow in groups of usually four to five leaves and flowers are composed of four greenish-yellow petals with purplish spots. In Canada, the species is restricted to southern Ontario.

MOVING FORWARD TO PROTECT AND RECOVER AMERICAN COLUMBO

The American Columbo is listed as an endangered species under the ESA, which protects both the plant 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 Ministry be met.

The American Columbo ranges across central and eastern North America. In Canada, American Columbo is restricted to southern Ontario. Approximately 14 populations of American Columbo continue to exist in the areas of Hamilton, Halton, Brant and Niagara. Nine populations are considered to no longer exist, including one population documented in 1896 near Sarnia. One additional population has been documented; however, it is unknown whether this population continues to exist today. Significant survey effort has been concentrated in the areas of Hamilton and Halton, where approximately half of existing populations occur. Most populations in the areas of Hamilton and Halton have shown a stable to increasing population, due in part to increased search effort and the discovery of new subpopulations. The total Ontario population has been estimated at 7,633 individuals, the majority of which are found on private land and along utility and transportation corridors.

American Columbo is a perennial herb that grows in upland deciduous forests, woodlands and savannas, and shrub thickets. It can tolerate a range of soil conditions, but prefers wooded areas with openings or patchy tree cover. American Columbo will flower only once and then die. It may spend many years in a non-reproductive state until it flowers and produces seed. Dispersal is facilitated mainly by gravity, and may also be facilitated by water and wind. Seed dispersal patterns and distances are not known. Information about the species life history, such as the timing of flowering, seed production, and seedling establishment, is poorly understood. Major threats to the species are habitat loss and fragmentation, which have historically caused population losses. Other important threats to the species recovery are invasive plants, succession and canopy closure, habitat degradation and erosion, and impacts from management of utility and transportation corridors, which may include trampling and crushing by heavy equipment, and chemical use.

The recovery approach for American Columbo is focused on managing the species' habitat using best practices to date, and filling key knowledge gaps about its populations, reproduction, and life history to inform ongoing recovery efforts. Results from recent habitat management and survey work indicate that continued support for these actions is likely to contribute to the recovery of American Columbo. Management of the species' habitat in Brant County, including brush cutting and prescribed burning, resulted in increased seedling recruitment; while survey efforts undertaken since 2006 have discovered new populations accounting, in part, for an 80 percent increase to the known population count. Additional survey efforts in suitable habitat may again discover more populations of American Columbo.

The government's goal for the recovery of American Columbo is to maintain the current population levels at existing locations in Ontario, and enable natural increases.

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 co-operation and the involvement of many individuals, organizations and communities.

In developing the government response statement, the Ministry 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 the American Columbo, the government will directly undertake the following actions:

- Continue to implement the Ontario Invasive Species Strategic Plan to address the invasive species (e.g., Dog-strangling Vine (*Cynanchum rossicum*)) that threaten American Columbo.
- Educate other agencies and authorities involved in planning and environmental assessment processes on the protection requirements under the ESA.
- Encourage the submission of American Columbo data to the Ministry's central repository at the Natural Heritage Information Centre.
- Undertake communications and outreach to increase public awareness of species at risk in Ontario.
- Protect the American Columbo and its habitat through the ESA.
- Support conservation, agency, municipal and industry partners, and Aboriginal communities and organizations to undertake activities to protect and recover the American Columbo. Support will be provided where appropriate through funding, agreements, permits with appropriate conditions, and/or advisory services.
- Encourage collaboration, and establish and communicate annual priority actions for government support in order to reduce duplication of efforts.

GOVERNMENT-SUPPORTED ACTIONS

The government endorses the following actions as being necessary for the protection and recovery of American Columbo. Actions identified as “high” will be given priority consideration for funding under the ESA. Where reasonable, the government will also consider the priority assigned to these actions when reviewing and issuing authorizations under the Endangered Species Act. Other organizations are encouraged to consider these priorities when developing projects or mitigation plans related to species at risk. The government will focus its support on these high-priority actions over the next five years.

Focus Area:	Protection and Management
Objective:	Improve American Columbo habitat and increase knowledge about the species and its habitat.
	Actions: <ol style="list-style-type: none"> 1. (HIGH) Implement management practices to reduce threats to American Columbo and maintain suitable habitat conditions at the sites where it currently occurs, with consideration to other rare species. Monitor the effectiveness of actions taken and revise as appropriate based on the best available information. Actions may include: <ul style="list-style-type: none"> ■ maintaining moderately open canopy conditions; ■ removing invasive species; and, ■ increasing habitat connectivity.
Focus Area:	Monitoring and Research
Objective:	Increase knowledge about American Columbo distribution, abundance, and reproduction in Ontario.
	Actions: <ol style="list-style-type: none"> 2. (HIGH) Develop and implement a standardized monitoring protocol for all existing populations, to be conducted on a regular basis, to assess: <ul style="list-style-type: none"> ■ population numbers, demographics, and health; ■ reproductive success; ■ habitat characteristics such as vegetation type; and, ■ habitat conditions and presence of threats. 3. Identify areas of suitable habitat and conduct standardized surveys to try to detect new populations within the species’ range. 4. Research life history characteristics that will inform the species recovery, which may include: <ul style="list-style-type: none"> ■ length of reproductive cycle; ■ factors that stimulate flowering; ■ demographics and persistence until reproduction; ■ seed dispersal, germination, recruitment, and predation; and, ■ response to threats.
Focus Area:	Awareness
Objective:	Promote awareness about American Columbo and ways to minimize threats to the species and its habitat.
	Actions: <ol style="list-style-type: none"> 5. Develop and distribute outreach materials to landowners and land managers that highlight the threats to American Columbo and actions that landowners and land managers can undertake, such as preventing chemical contamination, soil erosion, and trampling, to support recovery.

IMPLEMENTING ACTIONS

Financial support for the implementation of actions may be available through the Species at Risk Stewardship Fund, Species at Risk Research Fund for Ontario, or the Species at Risk Farm Incentive Program. Conservation partners are encouraged to discuss project proposals related to the actions in this response statement with the Ministry. The Ministry 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 co-ordinated across government response statements.

REVIEWING PROGRESS

The ESA requires the Ministry to conduct a review of progress towards protecting and recovering a species not later than five years from the publication of this response statement. The review will help identify if adjustments are needed to achieve the protection and recovery of American Columbo.

ACKNOWLEDGEMENT

We would like to thank all those who participated in the development of the Recovery Strategy for the American Columbo (*Frasera caroliniensis*) 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
Contact your MNRF district office
Contact the Natural Resources Information Centre
1-800-667-1940
TTY 1-866-686-6072
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