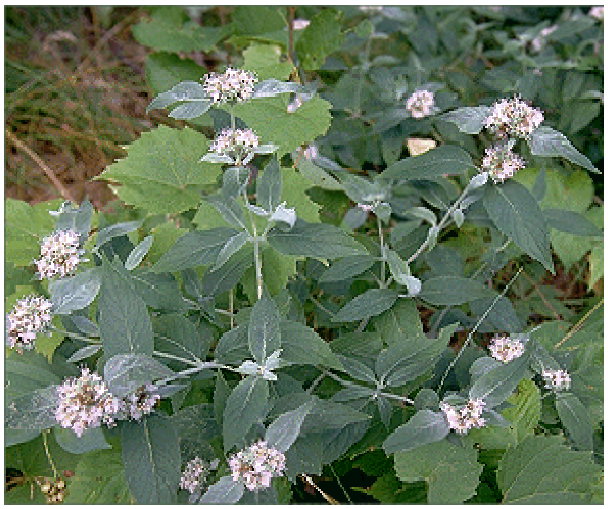
Recovery Strategy for Hoary Mountain-mint (*Pycnanthemum incanum* (L.) Michx.) in Canada 2006-2011



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Prepared by

Hoary Mountain-mint Recovery Team

May 2006

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 Hoary Mountain-mint (*Pycnanthemum incanum* (L.) Michx.) in Canada under Section 44 of the *Species at Risk Act* (SARA). Details are provided in the addenda of this document.

Following this 60-day comment period starting in February 2007, and until the federal Minister of Environment determines otherwise or the Ontario Ministry of Natural Resources formally amends this document, this recovery strategy will be the recovery strategy of the Minister of the Environment of Canada for this species.

Recommended Citation

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Responsible Jurisdictions

Hoary Mountain Mint occurs in the province of Ontario, and the recovery strategy was developed by the province. The Canadian Wildlife Service - Ontario Region, on behalf of the competent minister (the Minister of the Environment), cooperated in the development of the recovery strategy.

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Preface

The Hoary Mountain-mint is under the management jurisdiction of the Government of Ontario. It is currently listed in regulation under the provincial Endangered Species Act.

The Hoary Mountain-mint was listed as Endangered under the *Species at Risk Act* (SARA) in January 2003. SARA (Section 37) requires the competent minister to prepare a recovery strategy for all listed extirpated, endangered or threatened species. Section 44 of the Act allows the Minister to adopt all or part of an existing plan for the species if it meets the requirements under SARA for content (Section 41(1,2)).

The Ontario Ministry of Natural Resources led the development of this recovery strategy in cooperation with the Canadian Wildlife Service – Ontario Region, Environment Canada. All responsible jurisdictions reviewed and acknowledged receipt of the strategy.

Acknowledgements

Members of the Recovery Team wish to acknowledge Paul O'Hara and the employees of Royal Botanical Gardens for providing population census data. In addition, the Recovery Team would like to thank the many individuals who provided technical expertise to assist the development of the recovery strategy for this species.

Executive Summary

This Recovery Strategy outlines the goals and objectives necessary for the protection and recovery of Canadian populations of Hoary Mountain-mint (*Pycnanthemum incanum* (L.) Michx.). It is effective for the years 2006-2011. The strategy is based on a comprehensive review of current and historical population census data and consultations with knowledgeable individuals.

Recovery objectives identified in this report include the protection and enhancement of extant populations, potential habitat augmentation and potential restoration of historical populations. Steps to accomplishing these objectives include the protection of core habitats and identification and elimination of threats to populations through continued monitoring and management.

Many of the recovery objectives identified in this recovery strategy are contingent on the outcome of future research initiatives, as basic knowledge of the species' habitat requirements, population biology, and propagation requirements is lacking. The strategy outlines and prioritizes research necessary to support the implementation of the identified recovery objectives.

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I. RECOVERY

1. Recovery Goal

The long-term recovery goal for this species is to ensure that the extant populations are protected with no further losses of habitat or populations. In addition, it is imperative to implement proper management practices to portions of the recovery habitat of this species in order to allow for the potential reintroduction of self-sustaining populations to historical locations.

2. Recovery Objectives (2006-2011)

Objective 1: Ensure protection of the habitat of extant populations through implementation of appropriate management techniques

Strategy 1 Annual monitoring of existing populations & habitat
Strategy 2 Promotion of stewardship and awareness among landowners and the public
Strategy 3 Habitat mapping with Ecological Land Classification (ELC) standards and Conservation Land Tax Incentive Program (CLTIP) guidelines
Strategy 4 Invasive species removal at existing sites & monitoring

Objective 2: Increase population size of existing populations to self-sustainable levels

Strategy 1 Determination of species requirements
Strategy 2 Seed collection and propagation of plant material
Strategy 3 Planting (augmentation) or site maintenance to increase population size at selected areas, if required

Objective 3: Investigate feasibility of restoring recovery habitat and reintroducing individuals to historic sites

Strategy 1 Investigation of the effects of prescribed burning
Strategy 2 Investigation of possibilities for species reintroduction

The recovery objectives for this species place great emphasis on ensuring protection of extant populations. The success of these efforts can be measured through ongoing monitoring of populations and threats, assessment of habitat conditions, and evaluation of the effectiveness of management, stewardship and education programs.

3. Approaches for Meeting Recovery Objectives

A wide range of strategies and approaches are recommended for achieving the short-term and long-term recovery goals for Hoary Mountain-mint in Canada. . A summary of recommended activities for species recovery is provided in Table 1. Each type of activity is categorized according to its priority, actions, and anticipated effects.

Table 1. Strategies and Approaches for Recovery

Priority	Objective	Strategy	Broad Approach	Threats Addressed	Specific Steps	Anticipated Effect
Critical	1	1	yearly monitoring		Monitor population annually and maintain database of the data collected	Ongoing assessment of population status
Necessary		1	yearly monitoring	Slumping	Monitor effects of slumping on populations	Determine if there is a need for bank stabilization
Critical		2	habitat protection	Accidental destruction, Dumping, Succession and Fire suppression	Educate landowners and municipalities about species presence, threats and management options	Enhanced protection for areas that are recognized as endangered species habitat
Critical		3	habitat mapping		Map current and potential habitat with ELC standards	Improved understanding of habitat and its characteristics; provision of information for habitat protection, and identification of potential habitats for introduction
Critical		4	invasive removal	Invasive species	Remove invasive species at existing sites	Prevention of the loss of populations through encroachment
Beneficial	2	1	population studies		Determine species requirements	Identification of life history attributes, germination requirements, ecological niche, studies of genetic variation should be initiated
Beneficial		2	propagation		Collect seed and propagate plant material	Provision of plants that can be used as a basis for further studies
Necessary		3	reintroduction	Small population size	Increase population size at selected areas through planting (reintroduction) or site maintenance	Provision of plants to augment numbers and ensure genetic variability in natural populations
Necessary	3	1	habitat restoration	Succession and Fire suppression	Investigate effects of prescribed burning on Hoary Mountain-mint	Burning may increase habitat quality and suitable habitat available for species reintroduction
Beneficial		2	propagation	Small population size	Investigate possibilities for species reintroduction	Determination of the suitability of reintroduction in historic habitats

4. Potential Impacts of Recovery Strategy on Other Species/Ecological Processes

Hoary Mountain-mint tends to occur with many prairie/savanna affiliates including:

Andropogon gerardii	Big Bluestem	S4
Anemone cylindrica	Thimbleweed	S4
Asclepias tuberosa	Butterfly-weed	S4
Aster laevis	Smooth Aster	S5
Aster oolentangiensis	Sky-Blue Aster	S4
Elymus canadensis	Canada Wild-rye	S4S5
Helianthus divaricatus	Woodland Sunflower	S5
Lespedeza capitata	Round-headed Bush-clover	S4
Monarda fistulosa	Wild Bergamot	S5
Panicum virgatum	Switchgrass	S4
Quercus velutina	Black Oak	S4
Schizachyrium scoparium	Little Bluestem	S4

Most of these species have a rank of S4 in Ontario. Further inventory of the habitat at these sites may reveal more species that are considered rare in Ontario (S3 or above). For example, Few-flowered Club-rush is an Endangered species, which occupies similar habitat. Coordination with the Few-flowered Club-rush recovery team and strategy should be investigated because these species share some similar threats and habitat requirements. Additionally, both species may benefit from the same recovery actions.

Much of the habitat in this area appears to be former oak savanna, which is a rare community type in Ontario. Oak savanna is comprised of open-grown oak trees scattered across the landscape with a ground layer of tallgrass prairie species (Rodger, 1998). It is possible that Hoary Mountain Mint occurs at these sites due to its affinity for dry open habitats. It is not considered a prairie species, although other *Pycnanthemum* species (*P. verticillatum var. pilosum, P. virginianum, P. tenuifolium)* are considered prairie affiliates and are listed under the Tallgrass Communities Recovery Plan (Rodger, 1998). Although this habitat may fall under the Tallgrass Communities Recovery plan, the extreme degradation of the habitat, including the lack of sufficient "rare" affiliates may make this area an unsuitable candidate for recovery under the auspices of the Tallgrass Community Recovery plan. However, this option should be explored in further detail through discussion with members of the Tallgrass Recovery Team. The small amount of area that represents the current habitat for this species can be easily managed as its own entity, and distinct management practices relating specifically to the habitat requirements of Hoary Mountain Mint should be considered.

Any management practices put in place for Hoary Mountain-mint would be expected to have a positive effect on all of the species listed above and on the existing habitat. Much of the habitat is being overrun with invasive species and management processes/activities that focus on the removal of invasive species will be especially important.

5. Actions Already Completed or Underway

This species is currently regulated under the Ontario *Endangered Species Act*. This affords protection to the species and its habitat. The current landowners have been informed of the presence of this species on their land through the regulation process (1986). All landowners and adjacent landowners must be re-contacted in order to establish a communications network and to identify landowner concerns and opinions.

Some recovery actions have already been attempted informally over the last four years (2001-2005). Small-scale manual removal of invasive species from the area surrounding one population has been ongoing. No assessment of the effectiveness of these actions has taken place. There have been no recovery actions implemented at the other two sites, apart from the removal of a few shrubs at the "hanging prairie" site.

Seed and plant material were collected by the Royal Botanical Gardens (RBG) in 1999/2000 and preliminary propagation and seedbank studies have been completed. In addition, plants propagated in 2000 were planted at a demonstration site at the Cootes Paradise Fishway where they will be used for further research and seed collection.

Census surveys were conducted in 2000/2001 in areas where there were extant and historic records of Hoary Mountain-mint. Nearby areas with similar habitat characteristics were also investigated for the presence of previously overlooked plants. All populations were located within 1m with a Global Positioning System. In addition, representative herbarium specimens were prepared to document each population. These vouchers are stored at the RBG herbarium (HAM).

Ecological Land Classification (ELC) surveys were completed for polygons containing Hoary Mountain-mint, noting also the extent of the Occupied Habitat, Endangered Plant Community, and Habitat Protection Zone within or in the vicinity of that polygon, as required for the Conservation Land Tax Incentive Program (CLTIP) (MNR, 1998). Mapping was based on available airphotos, and is stored at the RBG in GIS files. ELC data included floral inventory, soil and topographic description, and management/disturbance scoring. Summaries of adjacent land-use were also provided. Special note was made of any factors that may present a threat to the Hoary Mountain-mint populations. The results of the census and ELC surveys will be used to develop appropriate action plans for Hoary Mountain-mint populations in Ontario.

Some habitat restoration has begun at one site. The landowners are attempting to remove invasive species and restore the area to oak savanna and open woodland (O'Hara, 2002).

Planning for a prescribed burn at one site was initiated in the fall of 2005. This effort is being led by Aurora and Guelph District MNR in cooperation with Halton-Peel Woodlands and Wildlife Stewardship. Site preparation began in fall 2005 with removal of woody invasives and application of herbicide on stumps. A successful prescribed burn was undertaken in April 2006 resulting in the clearing of woody debris and invasive species such as periwinkle. Monitoring will continue through 2006 with a possible follow up prescribed burn in the spring of 2007.

6. Statement of When One or More Action Plans in Relation to the Recovery Strategy will be Completed

An Action Plan will be prepared by the Recovery Team, and if necessary with the assistance of a Recovery Implementation Group (RIG) by 2009. It will address research needs, monitoring, site management and restoration.

7. Evaluation

Performance measures for evaluation of the success of the approaches to recovery set out in this strategy will include the extent to which goals and objectives have been met, specifically:

Objective 1

1) All populations have been monitored in a consistent manner for at least 3 consecutive years; monitoring results indicate stable or increasing populations
2) Landowners and the public are aware of the presence of the species and its importance and are participating in recovery
3) All habitat has been mapped using ELC and CLTIP mapping guidelines
4) Invasive species have been removed for at least 1 site and effects have been assessed

Objective 2

1) Species requirements for germination and survival have been determined
2) Seeds have been collected and stored in a gene bank
3) Propagation experiments have been completed
4) Population sizes for at least 2 small sites have been increased to more than 10 plants through planting or habitat improvement

Objective 3

1) Effects of prescribed burning have been assessed for this species through research and experimentation
2) Historic sites have been assessed for suitability of reintroduction by seed or plantings

II. BACKGROUND

8. Species Information

Date of Assessment:	May 2000
Common Name:	Hoary Mountain-mint
Scientific Name:	*Pycnanthemum incanum* (L.) Michx.
COSEWIC Status:	Endangered (April 1986)
Reason for Designation:	Two very small nearby populations with drastic decline in plant numbers and increased threat from exotic plants.
Canadian Occurrence:	ON
COSEWIC Status History:	Designated Endangered in April 1986. Status re-examined and confirmed Endangered in April 1998 and in May 2000. Last assessment based on an existing status report.

8.1 Species Description

Hoary Mountain-mint is one of several species of Mountain-mint (*Pycnanthemum*) found in Ontario. It is a perennial, herbaceous plant that grows to a height of 1 m. In Ontario, the plants are reproducing largely vegetatively from rhizomes (underground horizontal stems), even though the plants are producing viable seeds. The stems have many fine white hairs especially on the upper parts. In this particular species, the number of stems per plant is an indicator of the age and hardiness of the plant (Obee, 1994). The leaves are opposite. The main leaves are 5-10 cm long and 1.5-3.5 cm wide. They are densely hairy on the lower leaf surface and on the upper surface of the leaves in the upper part of the plant. They have few teeth and a fragrant minty scent. The genus is appropriately named *Pycnanthemum*, which means "densely flowered". The small, white, purple-spotted flowers are found in dense clusters at the end of stems and in the leaf axils. The flowers clusters are 1.5 to 3.5 cm in diameter and bloom in mid to late summer.

9. Distribution

9.1 Global Range

Hoary Mountain-mint occurs solely in eastern North America. As illustrated in Figure 1, it ranges from New Hampshire south-west to Missouri and east through Tennessee and Georgia. However, other sources also report it from Louisiana, Mississippi, Alabama and Florida (NatureServe, 2005).

9.2 Canadian Range

The only location of this species in Canada is in southern Ontario (Figure 2). There are five extant sub-populations, less than two kilometres apart along the Burlington Bluffs, extending between Hamilton and Burlington on the Hamilton Harbour shoreline. This plant is at the northern extent of its range in Ontario, which is why it is so rare.

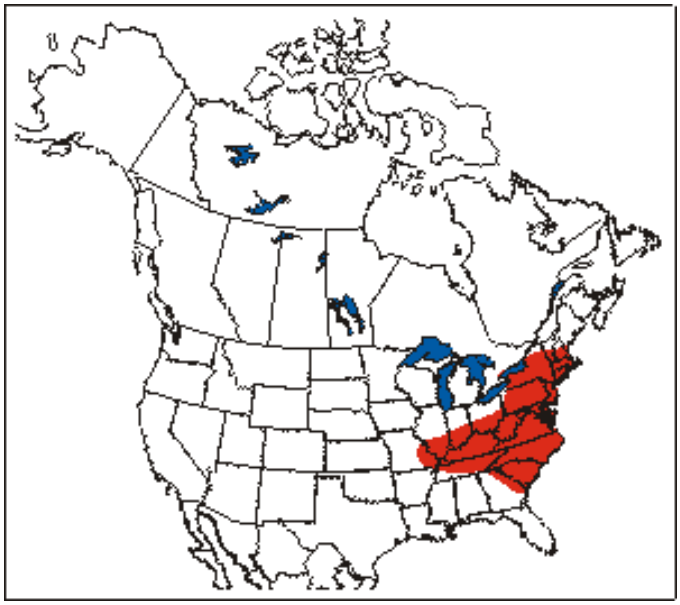

Figure 1. North American distribution of *Pyncnanthemum incanum,* (Argus et al., 1982-87).

9.3 Percent of Global Distribution in Canada

It is estimated that Canada comprises less than 1% of the species global range.

9.4 Distribution Trend

There does not appear to be any significant change in the distribution of this species in Canada over the last 25 years.

10. Population Abundance

10.1 Global Abundance

The global abundance of this species is unknown, but it is ranked as G5 meaning that it is very common globally and secure under current conditions. It is widespread and relatively common throughout a major portion of its range in the eastern United States. However, three states on the edge of its range identify it as extremely rare (S1), these are Delaware, New Hampshire, and Vermont. It is also listed as Endangered in New Hampshire and Vermont. It is ranked as common (S4) in North Carolina, very common (S5) in Kentucky and West Virginia, and under review (SU) in Florida. In all other states in its range, Hoary Mountain-mint is ranked SNR, which indicates that it is found in the state but not ranked, probably due to a lack of information. These states are Alabama, Connecticut, District of Columbia, Georgia, Illinois, Louisiana, Maryland, Massachusetts, Mississippi. New Jersey, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, and Virginia, .

Table 2. Summary of Canadian Hoary Mountain-mint Observations Since 1984

Site *	1984[1] (Crins)	1986[1] (Oldham)	1991[1] (Bradley)	1991[1] (Kirk and Coulson)	1997[1] (White and Kirk)	2000[2] (RBG and MNR)	2005[3] (Kirk and Hay)
HS1	41 stems	About 40 stems		No count, but hard to find	48 stems	12 plants	15 stems
WC1			35 stems in one clump, and 4 single stems		One stem (where the 35-stem clump previously occurred)	2 plants	5 stems
WC2						12-15 plants	
WC3						~6 plants	
WC4						~ 750 plants	
CP1			1 stem	3 plants, numerous stems	None found	None found	

*Site – Site codes represent precise locations. This information has been kept confidential for the protection of the species.
[1] White, 1997
[2] O'Hara, 2001
[3] Unpublished observations, 2005

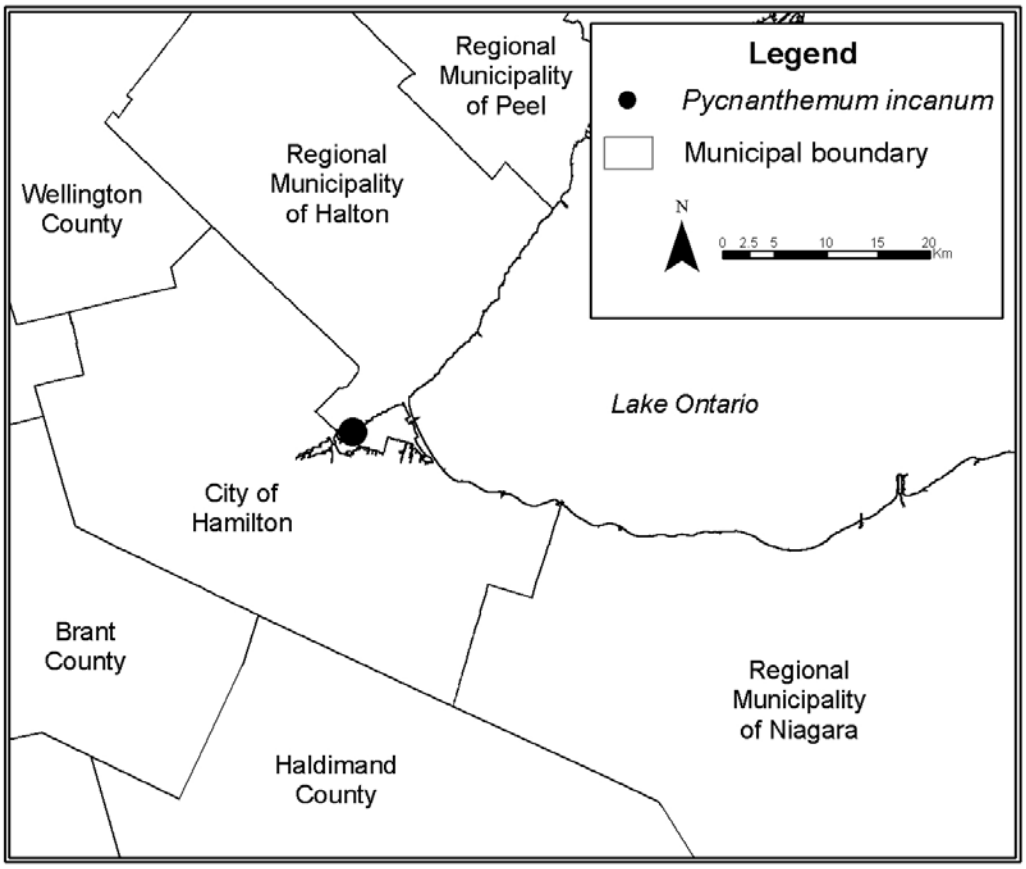

Figure 2. Canadian distribution of *Pycnanthemum incanum*

10.2 Canadian Abundance

In Canada, Hoary Mountain-mint is listed as N1, and in Ontario it is listed as S1. This means that both nationally and provincially it is extremely rare. It was documented several times between 1885 and 1900 near Burlington, Ontario, but was not seen again until 1981, when it was collected in the same general area. All current and historic populations were found within a few kilometers of each other in Hamilton and Burlington, Ontario. There are two extant occurrences (or populations) of Hoary Mountain-mint in Canada, and one recently extirpated occurrence. The observations of these occurrences are provided in Table 2.

The largest extant occurrence of Hoary Mountain-mint is in Hamilton on the Burlington Bluffs. This occurrence consists of 4 sub-populations. One sub-population is quite large and consists of more than 700 individuals located in a 50 metre area along a dry, difficult to access, very steep (and highly unstable) south-facing slope. The second sub-population consists of 5 stems. It occurs in a relatively large opening in the forest that could be described as a hanging prairie. This site is a very steep, south-facing slope dominated by the prairie grasses Little Bluestem (*Schizachyrium scoparium*) and Big Bluestem (*Andropogon gerardii*) (White, 1997). The other two sub-populations were discovered in 2000. One consists of approximately 12 plants, while the other consists of approximately 6 plants. No stem counts were completed at this site.

The second extant occurrence is on the top of a bluff in an oak woodland opening. In 1984, it consisted of 41 stems and in 2005 there were only 15 stems.

10.3 Percent of Global Abundance in Canada

The percent of global abundance in Canada is likely less than 1%.

10.4 Population Trend

Observations of the Hoary Mountain-mint populations were recorded by several individuals since its rediscovery in 1981 and many of these include stem or plant counts. These observations are compiled in Table 2 and show declines in the three sub-populations which have multiple observations. The rates of these declines are of great concern. There was 100% loss of CP1, 87% loss of WC1 and 68% loss of HS1 since they were first recorded. It is not known if the three sub-populations found in 2000 are evidence of recruitment because there are no previous observations to compare against. There does not seem to be a decline in global population abundance.

11. Biologically Limiting Factors

It is possible that the habitat requirements of this species have prevented it from spreading elsewhere in Ontario. In addition, the relative isolation of the population from other colonies in the United States, in combination with the small population size may result in the loss of genetic diversity. The fact that this species is at the northern limit of its range may also limit its recovery in Canada. This species is easily propagated and is known to survive in garden settings further north. It is unknown why the species has not spread and is not encountered more frequently in Ontario.

12. Threats

There are several identified threats to the Canadian populations of Hoary Mountain-mint. No studies have been completed to evaluate the degree of these threats. However, based on site observations and current knowledge, they are listed below in order of significance, beginning with the most significant.

Succession and Fire Suppression

This species requires sunny openings in dry areas. The loss of habitat through succession of shrubs such as Staghorn Sumac (*Rhus typhina*), Grey Dogwood (*Cornus racemosa*), Riverbank Grape (*Vitis riparia*), Black Raspberry (*Rubus occidentalis*) and Choke Cherry (*Prunus virginiana*) is also a recognized threat. An increase in the amount of canopy cover has likely decreased the size of some populations and limited spread to the surrounding areas through over-shading. Fire suppression may be a contributing factor to the succession of shrubs and trees. At one site, a long time land manager recalled at least two grass fires had occurred during his lifetime where the Hoary Mountain-mint is present. It is likely that periodic fires helped keep the canopy open and amenable to Hoary Mountain-mint and other prairie species.

Invasive Species

All populations of Hoary Mountain-mint are threatened by the encroachment of alien species. There is an unusually high diversity of exotic woody plants in the area, reflecting the intensive horticultural development adjacent to the slopes which support Hoary Mountain-mint. The species habitat is home

to many non-native shrubs including Tartarian Honeysuckle (*Lonicera tatarica)* and Buckthorn (*Rhamnus cathartica*). Some native willows (*Salix eriocephala*) were planted on parts of the slope in the early 1980s to combat erosion, and are contributing to the encroachment of Hoary Mountain-mint. In addition to a dense shrub layer, much of the wooded area along the bluffs has been colonized by garlic mustard (*Alliaria petiolata*). These factors have led to a loss of diversity in native flora at the site. It is likely that Hoary Mountain-mint is affected by competition with invasive species, which have already colonized large areas of the bluffs and have resulted in the extirpation of a population located on Carroll's Point.

Slumping

Some of the populations occur on very steep and highly unstable south-facing bluffs, which are difficult to access and the presence of numerous groundwater seepage areas along the bluffs contributes to internal stability problems. There is evidence of slumping above and adjacent to some populations. The population located at the hanging prairie has been reduced drastically in size since its discovery. The decline could be due to slumping or erosion of the steep slope. It is possible that the largest clump of plants at the hanging prairie was close to the edge and may have fallen over the bank (D. Kirk, pers. comm., 2000). Although slumping may be a threat to established populations of Hoary Mountain-mint, it may also be of benefit by creating openings in the canopy for new Hoary Mountain-mint plants to colonize.

Dumping and Development

The dumping of garden waste and other materials over the rim of the slope is a common occurrence in the deep valleys surrounding Hamilton Harbour. Many of these areas are used by local residents as dumping grounds. This problem has been curbed slightly in this area because of the presence of the cemeteries, yet some dumping still occurs. The source of this dumping is in part from cemetery operations and from cemetery visitors. It is not uncommon to find plant pots, plastic wreaths and other assorted materials at the edge of the bluffs, as well as grass and tree clippings. This dumping occurs along the forest edge of the cemetery and may jeopardize the survival of this species. Dumping of horticultural materials could lead to the introduction of more non-native or invasive species to the area. In addition, the dumping of waste over the slope could damage plants and disturb their habitat.

Development of the areas near the slope has led to the accumulation of large piles of dirt that are being pushed near to and over the rim of the bluffs. This work is slightly isolated from the site, but it may have an impact on the potential habitat of this species. The bluffs are currently regarded as wasteland by the landowners and the City of Hamilton. The bluffs are very steep and as they border on the water's edge, they will never be developed.

Small Population Size

Due to the low numbers of Hoary Mountain-mint and its limited distribution in Canada, it may be threatened by a small gene pool. This is of increased concern, because the plants appear to be reproducing primarily through vegetative means. Vegetative reproduction produces new stems and plants with an identical copy of the parent's DNA. This lowers the genetic diversity of the population, and over generations this can result in a decreased ability of the species to adapt to change and possibly extirpation from Canada. The genetic diversity among the Canadian populations is unknown and therefore it is difficult to assess the degree of this threat.

Potential Threats
Although some of the landowners are currently aware of the locations of the rare species, and the species is currently regulated under the *Endangered Species Act*, it is possible that individual plants may still be at risk of accidental destruction. For example, the presence of a trail adjacent to one of the populations may increase the potential of trampling the plants.

Crins (1989) also noted that the fragrance and beauty of the plant, as well as its value in producing high quality honey, could potentially put the species at risk of collection by gardeners and apiculturists (although no evidence of collection has been found as of this time). It has also been noted by the recovery team that the species is in cultivation and is available for sale through a small number of sources. The origin of the plants and/or seed used for this purpose is unknown. At this time, the recovery team does not recommend the collection of seed from the native populations of Hoary Mountain-mint for non-scientific purposes or purposes not sanctioned by the recovery team.

13. Habitat Identification

13.1 Habitat Needs
Hoary requires dry, open, sandy-clay habitats in open-canopied deciduous woods on warmer-than-normal slopes (Crins, 1986). In Ontario, two out of three habitats in which Hoary is found have been classed as Dry Black Oak-White Oak Tallgrass Woodland Type and the third has been classed as a Mineral Treed Bluff Ecosite (using the Ecological Lands Classification for Southern Ontario (Lee et. al, 1998). The habitat data on the labels of historical specimens indicates that this species has been found in open woods (probably oak savanna), roadsides, thickets, pastures, and sunny banks. The only factor that is similar among these sites is that they are normally dry and warm (Crins, 1985). In the northernmost states of the species range, habitat preference does not seem to be as limited. In New Hampshire, this species is found in dry slopes, pastures, shady clearings, and dry oak forest. In all cases the species is located on a slope or hill (Sara Cairns, pers. comm.). In North Carolina the species occurs in woodlands, thickets, old fields, pastures, roadsides and utility right-of-ways (Jame Amoroso, pers. comm.). Hoary is much more common and much less habitat-specific as it moves further south into the centre of its range.

13.2 Critical Habitat
Under SARA, critical habitat is defined as "the habitat that is necessary for the survival or recovery of a listed wildlife species". At this point in time, the critical habitat of the extant populations of Hoary Mountain-mint will be identified, to the extent possible. More critical habitat may be added in the future as new populations are created or as additional information is acquired.

The goal of the Hoary Mountain-mint recovery strategy is "to ensure that the extant populations are protected with no further losses of habitat or populations. In addition, it is imperative to implement proper management practices to portions of the recovery habitat of this species in order to allow for the potential reintroduction of self-sustaining populations to historical locations." To achieve this goal, the critical habitat for Hoary Mountain-mint should protect the immediate locations of the plants and their associated vegetation communities. These areas have already been mapped using the habitat mapping guidelines for the Conservation Land Tax Incentive Program (MNR, 1998) as Occupied Habitats and Endangered Plant Communities. All of these communities are found on the north shore of Hamilton Harbour between Desjardin Channel and half a kilometre east of Willow Point. The communities are Dry Black Oak-White Oak Tallgrass Woodland and Mineral Treed Bluff. However, further study is

needed to assess if additional habitat is required for population expansion. A schedule of studies has been identified in section 13.4 to direct this research.

13.3 Examples of Activities that are Likely to Result in Destruction of the Critical Habitat

The primary activities that will likely result in destruction of critical habitat are:

- Activities such as fire suppression that create conditions favourable for invading and encroaching plants that shade the Hoary Mountain-mint plants
- Activities that increase slumping and instability of the slope due to the processes of natural erosion and slippage caused by groundwater seepage. The lack of vegetative cover on the steep slopes of the largest population accelerates the erosion. Lake erosion at the base of the bluff causes further slippage of the loose soil.
- Dumping of organic and inorganic debris
- Trampling from adjacent trail use

13.4 Schedule of Studies

Further study is needed to evaluate whether the population is large enough to ensure long-term population viability (and is outlined in Table 3). If research demonstrates that an increase in population distribution is required, additional critical habitat will be identified and mapped.

Table 3. Schedule of Studies

Description of Research Activity	Expected Results	Start Date*	Completion Date*
Identify life history attributes, germination and dispersal requirements, and genetic variation across Canadian population.	Improve understanding of limiting factors to population and distribution expansion.	April 2006	October 2007
Complete a Population Viability Analysis (PVA).	To determine population viability under current conditions and to help evaluate the number of individuals and amount of habitat required to attain viability.	Nov 2007	Mar 2008
If an increase in population is deemed necessary, suitable habitat along the Burlington Bluffs should be identified for restoration. This requires identifying the abiotic and biotic habitat needs for the species, and identifying unoccupied habitat which have these qualities.	Identify potential Critical Habitat for population expansion, if deemed necessary by PVA.	April 2008	Mar 2009

* These are tentative dates and may be modified as necessary.

13.5 Habitat Protection/Ownership

One population of Hoary Mountain-mint is under public ownership (provincial Crown land) and the remaining two are under private ownership. The species is currently listed in regulation under the *Endangered Species Act*, which protects regulated endangered species and their habitat from willful destruction or interference. Section 2.1 of the Provincial Policy Statement (PPS) issued under the *Planning Act* does not permit development or site alteration in significant habitat of threatened and endangered species. The recommended approach to determining the impacts of any development applications requires a review of habitat descriptions in the recovery plan, an evaluation of the significant habitat, and consultation with experts and with the Ontario Ministry of Natural Resources (OMNR,

1999). The OMNR encourages municipalities to identify significant habitat and protect it through the appropriate zoning category to ensure no development or site alteration occurs.

Hoary Mountain-mint is also listed as Endangered in Schedule 1 of the federal *Species at Risk Act*. This act includes prohibitions against harming the species or destroying its critical habitat on federal lands. SARA prohibitions do not apply to private lands unless an Order of Government in Council is recommended by the Minister of the Environment and agreed to by Parliament.

14. Ecological Role

The ecological role of this species is unknown at this time.

15. Importance to People

Like many members of the mint family this plant has been used to treat colds, fevers, and digestive disorders, especially gas (Foster & Duke, 1990). Its use as a carminative is well established. A leaf tea is usually used as a remedy but a tincture would also provide the active components (Greive and Leyel, 1996). The Cherokee used a leaf poultice for headache, drank leaf tea for heart trouble and to prevent diarrhea when they ate green corn (Hamel & Chiltowsky, 1975). According to Crins (1985), Hoary Mountain-mint has been shown to contain a high natural rubber content, and may have some potential as a rubber-hydrocarbon crop. Hoary Mountain-mint is also known to be very attractive to honey bees and could be useful in honey production. Furthermore, other species of Mountain-mint have shown odor-blocking and anti-fungal properties, and have been used to flavor soups and meats.

16. Anticipated Conflicts or Challenges

No major conflicts or logistical difficulties are anticipated that would interfere with the realization of the short and long-term goals and objectives of the recovery strategy for this species.

17. Knowledge Gaps

Current knowledge of this species is limited to general characteristics and habitat preferences, but is adequate for the implementation of some recovery actions. Detailed information on the biology of Hoary Mountain-mint should be collected in order to increase our understanding of the species. More detailed information on the status of the species and its threats in other localities (USA) would also foster a better understanding of the species and its long term needs.

17.1 Survey Requirements

Searches of potential habitat and historical locations for populations have been completed. This led to the rediscovery of the large population on the Burlington Bluffs in 2000 that had not been relocated since 1971. Other areas have been searched and a complete inventory of the entire bluff area was completed in 2001 using Ecological Lands Classification methodology. It may be worthwhile to search similar habitats along the Lake Ontario shoreline, but further searching is unlikely to turn up any other populations in Ontario, since this species has never been found at any other locality and was once thought to be extirpated in Canada.

17.2 Biological/Ecological Research Requirements

The germination requirements of this species should be determined. This plant is known to be in cultivation in Ontario and some native plant growers may have knowledge of the species' germination requirements. Repeated yearly monitoring of the demography of large populations is needed in order to increase the level of understanding of the life history of the species. This would allow for the determination of the life span of individual plants and the amount of seedling establishment and mortality. Threats to the populations could then be assessed on an individualized basis. Monitoring should record population size, area, and an estimation of seed set in a given year. Any advances in the successional stage of the surrounding community should be tracked. If any intentional or unintentional manipulation of a population area occurs, the effects of the manipulation should be monitored and recorded. Determining quantifiable population goals would also assist the Recovery Team in evaluating the success of recovery efforts.

Seed dispersal patterns for this species must be defined. Seed transport mechanisms for Hoary Mountain-mint are unknown. Identifying known predators and pollinators of this species may aid in determining the seed dispersal mechanisms used by this species.

17.3 Threat Clarification Research Requirements

In the case of slumping, further research needs to be done on how to improve the stability of the slope that supports the largest population of Hoary Mountain-mint. It is believed that the majority of the population at one of the sites was nearly eliminated (with the exception of 2 plants) due to slumping.

The dependence of this species upon partially open areas may require special management. Human disturbance may reduce or increase the amount of habitat suitable for persistence or recolonization of this species. Periodic removal of woody vegetation may be necessary in order to maintain habitat in a suitably open condition. While the species may be dependent on some form of disturbance for survival, not all disturbances may be beneficial. More research is required to determine the impacts of management.

18. Ecological and Technical Feasibility of Species Recovery

Based on current knowledge of the Hoary Mountain-mint, it is considered that recovery of this species is technically and biologically feasible.

The number of stems per plant is an important parameter, as this is a good indication of plant age and vigor. Crins (1986) felt that Hoary Mountain-mint was reproducing largely through vegetative means. This is possible, although the species is producing viable seed in sufficient quantities for reproduction. It is possible that germination requirements are not being met for the species. In addition, competition with native and non-native shrubs might be reducing the amount of reproduction through seed. Hoary Mountain-mint is known to be self-compatible, so that the lack of a nearby population does not affect the probability of sexual reproduction (Chambers, 1961, 1962). It is not known whether this species maintains a viable seed bank.

Ideal habitat conditions include areas where natural disturbance and succession of open habitat by woody vegetation is minimal (Obee, 1994). A limited amount of suitable, uncolonized habitat is present in the area. Since this species occurs mainly on the south facing slopes of the Burlington Bluffs, the available habitat is very restricted. Also, the process of succession and the introduction of

invasive species have eliminated much of the suitable habitat for this species, which is more suited to open, dry habitats. There is potential for the reintroduction of this species in some suitable areas, but prescribed burning or manual shrub removal would have to be undertaken in order to prepare the habitat.

Herbaceous species found in relatively open areas within wooded lands are often gap-colonizers which benefit from natural disturbances such as windthrows, fire and erosion within a mosaic of successional stages (Obee, 1994). The alteration of this natural process may result in a successional stage dominated by mature woody vegetation of uniform age and the elimination of Hoary Mountain-mint. However, recovery potential of populations should be good as long as a seed source of Hoary Mountain-mint is present near newly available habitat. Since the bluffs are currently not maintained and development is not possible, there is potential for the restoration of adjacent areas using a management plan that includes a prescribed burn.

This species is currently being propagated through the Seed Bank Pilot Project at the Royal Botanical Gardens in Hamilton, Ontario, and seed has been collected and stored in a seed bank. In addition, the RBG has grown and outplanted approximately 400 plants in a demonstration prairie garden for educational/seed collection purposes. It would be beneficial to transplant some of the plants grown in 1999 to the hanging prairie site in order to secure the survival of this species at that location. Growth of this species in ex situ populations indicates that it has high germination rates (83% under suitable conditions) as well as high survival rates. Vigorous root growth has also been observed in specimens grown in captivity (P. O'Hara, pers. comm.).

19. Recommended Approach/Scale for Recovery

The small amount of area that represents the current habitat for this species can be easily managed as its own entity, and distinct management practices relating specifically to the habitat requirements of Hoary Mountain-mint should be considered.

Coordination with the Few-flowered Club-rush recovery team and strategy should be investigated because these species share some similar threats and habitat requirements. Additionally, both species may benefit from the same recovery actions.

The Hoary Mountain-mint was originally considered a part of the Tallgrass Communities of Southern Ontario (Rodger, 1998). It is not considered a prairie species, but it is possible that Hoary Mountain-mint occurs in tallgrass prairie sites due to its affinity for dry open habitats. Other *Pycnanthemum* species (*P. verticillatum var. pilosum, P. virginianum, P. tenuifolium)* are considered prairie affiliates and are listed under the Tallgrass Communities Recovery Strategy (Rodger, 1998) The extreme degradation of the Hoary Mountain-mint habitat and the lack of sufficient “rare” affiliates in the area may make the species an unsuitable candidate for recovery under the auspices of the Tallgrass Community Recovery Strategy. However, this option should be explored in further detail through discussion with members of the Tallgrass Recovery Team.

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ADDENDA

Jurisdictional response

Ontario

Acknowledgement of Receipt of the
***Recovery Strategy for Hoary Mountain-mint* (*Pycnanthemum incanum* (L.) Michx.) in Canada *2006-2011* (May 2006)**
by the Ontario Ministry of Natural Resources
on behalf of the Province of Ontario

This proposed *Recovery Strategy for Hoary Mountain-mint (Pycnanthemum incanum (L.) Michx.) in Canada 2006-2011* (May 2006) has been prepared in cooperation with the members of the Hoary Mountain-mint Recovery Team, Canadian Wildlife Service (CWS) and the Ontario Ministry of Natural Resources (OMNR). It represents advice to the OMNR on the recovery goals, approaches and objectives that are recommended to protect and recover the species. It does not necessarily represent the views of all individual members of the recovery team, or the official positions of the organizations with which the individual team members are associated. The goals, objectives and recovery approaches identified in the strategy are based on the best existing knowledge and are subject to modifications resulting from new findings and revised objectives. Implementation of the plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

Received by Cameron Mack
Director, Fish and Wildlife Branch
Natural Resource Management Division
Ontario Ministry of Natural Resources
On behalf of the Province of Ontario

Date: July 2006

Species at risk – act today so they have tomorrow

DECLARATION FROM ENVIRONMENT CANADA

This recovery strategy has been prepared in cooperation with the jurisdictions responsible for the Hoary Mountain-mint. Environment Canada has reviewed and accepts this document as its recovery strategy for the Hoary Mountain-mint, as required under the *Species at Risk Act*. This recovery strategy also constitutes advice to other jurisdictions and organizations that may be involved in recovering the species.

The goals, objectives and recovery approaches identified in the strategy are based on the best existing knowledge and are subject to modifications resulting from new findings and revised objectives.

This recovery strategy will be the basis for one or more action plans that will provide details on specific recovery measures to be taken to support conservation and recovery of the species. The Minister of the Environment will report on progress within five years.

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 Canada or any other jurisdiction alone. In the spirit of the Accord for the Protection of Species at Risk, the Minister of the Environment invites all responsible jurisdictions and Canadians to join Environment Canada in supporting and implementing this strategy for the benefit of the Hoary Mountain-mint and Canadian society as a whole.

STRATEGIC ENVIRONMENTAL ASSESSMENT

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*. 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.

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

This recovery strategy will clearly benefit the environment by promoting the recovery of the Hoary Mountain-mint. The potential for the strategy to inadvertently lead to adverse effects on other species was considered. Any management practices put in place for Hoary Mountain-mint would be expected to have a positive effect. Removal of invasive species will be especially important, as these are primarily exotic, the overall effect will be beneficial to native species. The SEA concluded that this strategy will clearly benefit the environment and will not entail any significant adverse effects.

RESIDENCE

SARA defines residence as: *a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating* **[Subsection 2(1)]**.

Residence descriptions, or the rationale for why the residence concept does not apply to a given species, are posted on the SARA public registry: www.sararegistry.gc.ca/plans/residence_e.cfm