

Recovery Strategy for the Acadian Flycatcher (*Empidonax virescens*) and the Hooded Warbler (*Wilsonia citrina*) in Canada

Acadian Flycatcher and Hooded Warbler



2012

Recommended citation:

Environment Canada. 2012. Recovery strategy for the Acadian Flycatcher (*Empidonax vireescens*) and the Hooded Warbler (*Wilsonia citrina*) in Canada. *Species at Risk Act Recovery Strategy Series*. Environment Canada, Ottawa, Ontario. viii + 32 pp.

For copies of the recovery strategy, or for additional information on species at risk, including COSEWIC Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry (www.sararegistry.gc.ca).

Cover illustrations: Acadian Flycatcher: Michael Patrikeev
Hooded Warbler: U.S. Fish and Wildlife Service

Également disponible en français sous le titre
« Programme de rétablissement du Moucherolle vert (*Empidonax vireescens*) et de la Paruline à capuchon (*Wilsonia citrina*) au Canada »

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ISBN 978-1-100-18539-2
Catalogue no. En3-4/103-2012E-PDF

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PREFACE

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996) 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.

The Minister of the Environment and the Minister responsible for the Parks Canada Agency are the competent ministers for the recovery of the Acadian Flycatcher and Hooded Warbler and have prepared this strategy, as per section 37 of SARA. It has been prepared in cooperation with the Province of Ontario (Ministry of Natural Resources) and Long Point Region Conservation Authority as per section 39 (1) of SARA.

Success in the recovery of these 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, the Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the Acadian Flycatcher and Hooded Warbler 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 Canada, the Parks Canada Agency and other jurisdictions and/or organizations involved in the conservation of the species. Implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

ACKNOWLEDGMENTS

The recovery strategy was developed by members of the Acadian Flycatcher and Hooded Warbler Recovery Team: Lyle Friesen, Debbie Badzinski, Christine Vance, Jon McCracken, Dave Martin, Audrey Heagy, and Angela McConnell. The recovery strategy benefited from input and suggestions from the following individuals and organizations: Bird Studies Canada; Conservation Halton; Toronto and Region Conservation; Stephanie Melles, Corina Brdar, Andre Dupont, Chris Risley, Don Sutherland, Joe Nocera, Kristine Blakey and Bree Walpole – Ontario Ministry of Natural Resources; Clint Jacobs and Jared Macbeth - Walpole Island Heritage Centre; Krista Holmes, Angela Darwin, Marie-Claude Archambault, Madeline Austen, Lesley Dunn, Burke Korol, Lucie Metras, Marie-José Ribeyron and Kari Van Allen – Environment Canada. Thanks are extended to Michael Patrikeev and the U.S. Fish and Wildlife Service for the cover photos.

EXECUTIVE SUMMARY

In Canada, the breeding range of the Acadian Flycatcher (*Empidonax vireescens*) and the Hooded Warbler (*Wilsonia citrina*) is limited to southern Ontario. The Acadian Flycatcher is listed as Endangered federally and appears on Schedule 1 of the *Species at Risk Act*. It also is listed as Endangered provincially and is protected under Ontario's *Endangered Species Act, 2007*. The Hooded Warbler is listed as Threatened nationally under the *Species at Risk Act* and Special Concern provincially under Ontario's *Endangered Species Act, 2007*.

In Canada, the Acadian Flycatcher is confined almost entirely to the Carolinian forest region, where its numerical status, between 35 and 50 pairs in any given year, has been relatively stable since 1997 (when targeted surveys first began). Its continental population experienced an average, annual downward trend of 0.10% from 1966 to 2007, and an annual downward trend of 0.43% since 1980.

In recent years, Hooded Warbler numbers have increased dramatically in Ontario, from 88 territorial males (some of which were not paired) in 1997, to an estimated 436 territorial males (some of which were not paired) in 2007. In that time, the species has expanded its range, occupying other forests within the Carolinian forest region as well as areas to the north and east of this region. The Hooded Warbler has shown an increasing trend continentally at an average annual rate of 0.84% from 1966 to 2007, and showed an increase at an average annual rate of 0.87% since 1980. In Ontario, both species reach their highest densities in large, mature forests set in landscapes with at least 30% regional forest cover.

Both the Acadian Flycatcher and the Hooded Warbler have been regarded as area-sensitive species with a predilection for extensive tracts of deciduous forests. However, most of the original Carolinian deciduous forest cover has been removed, and many of the remaining forests are too small and isolated to accommodate Acadian Flycatchers, Hooded Warblers, and other species that depend on the specialized habitats found in large, mature forests. Specific threats include diameter-limit tree harvest, development for housing and/or agricultural uses, changes to hydrological regimes, invasive species, climate change and a number of threats to the species and their habitat outside of Canada. A single recovery strategy for these two species has been developed due to the similarity in occurrences, threats, and recovery actions. It was determined that recovery activities for both species could be effectively represented within one document.

There are unknowns regarding the feasibility of recovery of the Acadian Flycatcher and the Hooded Warbler. Nevertheless, 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 feasible. This recovery strategy addresses the unknowns surrounding the feasibility of recovery.

The population and distribution objective for the Acadian Flycatcher is to maintain the current population of between 35 and 50 pairs distributed within the species' current Ontario range. The population and distribution objective for the Hooded Warbler is to increase the number of Hooded Warbler breeding pairs to 500 distributed within the species' current Ontario range.

Critical habitat for both the Acadian Flycatcher and the Hooded Warbler is identified within this recovery strategy. Broad strategies to be taken to address the threats to the survival and recovery of these species are presented in the section on Strategic Direction for Recovery.

One or more action plans will be posted on the Species at Risk Public Registry for the Acadian Flycatcher and the Hooded Warbler by December 2017.

RECOVERY FEASIBILITY SUMMARY

Based on the following four criteria outlined by the Government of Canada (2009), there are unknowns regarding the feasibility of recovery of the Acadian Flycatcher and Hooded Warbler. In keeping with the precautionary principle, a recovery strategy has been prepared as per section 41(1) of SARA, as would be done when recovery is determined to be feasible. This recovery strategy addresses the unknowns surrounding the feasibility of recovery.

Acadian Flycatcher

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. Individuals capable of reproduction are present in Ontario and in nearby New York, Pennsylvania, Ohio, and Michigan to sustain the population or improve its abundance.

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

Yes. Sufficient habitat is available to sustain the current estimated population. Additional habitat could be made available to support the species through habitat management techniques or restoration efforts to support an increase in species' abundance.

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

Unknown. Many of the threats on the breeding grounds in Canada can be avoided or mitigated through targeted recovery actions. However, the extent and feasibility of mitigating threats on United States breeding grounds and/or wintering grounds are unknown at this time. Further, it is currently unknown if some threats, such as invasive species, can be effectively mitigated. These threats will greatly affect the recovery of the species in Canada but without further research it can not be determined whether it is possible to successfully mitigate them. Recovery on a global scale is critical for the recovery of the species in Canada.

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

Unknown. Some of the necessary recovery techniques are available (e.g., protection of existing mature forests and management of woodlands for older growth). However, it is unknown whether using these recovery techniques will be effective in meeting the population and distribution objectives.

As the small Canadian population of Acadian Flycatchers occurs at the northern part of its continental range, and the vast majority of its continental distribution and population occurs further south in the United States, it is important to note that population changes at the continental level may have a significant effect on recovery feasibility in Canada. As the continental population of the Acadian Flycatcher is experiencing an ongoing downward population trend, its range may contract away from the current periphery, with individuals remaining closer to the centre of the range. In such a case, despite best efforts described in this strategy to ensure that sufficient suitable habitat is available and key threats are mitigated, the numbers of Acadian Flycatcher in Canada may continue to decline.

Hooded Warbler

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. Individuals capable of reproduction are currently available in Ontario and are known to be contributing to the current population increase and range expansion.

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

Yes. Given that the Hooded Warbler has expanded its Ontario range, sufficient habitat is available to support the present estimated population. Additional habitat could be made available through management techniques or restoration efforts to support an increase in species' abundance.

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

Unknown. Many of the threats on the breeding grounds in Canada can be avoided or mitigated through targeted recovery actions. However, the extent and feasibility of mitigating threats to the United States breeding grounds and/or winter grounds are unknown at this time. Further, it is currently unknown if some threats, such as invasive species, can be effectively mitigated. These threats will greatly affect the recovery of the species in Canada but without further research it can not be determined whether it is possible to successfully mitigate them. Recovery on a global scale is critical for the recovery of the species in Canada.

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

Unknown. The necessary recovery techniques are available and effective (e.g., protection of existing mature forests, management of woodlands for older growth, and the use of sound forestry practices). However, it is unknown whether using these restoration techniques will be effective in meeting the population and distribution objectives.

As the small Canadian population of Hooded Warbler occurs at the northern part of its continental range, and the vast majority of its continental distribution and population occurs further south in the United States, it is important to note that population changes at the continental level may have a significant effect on recovery feasibility in Canada. As the continental population of the Hooded Warbler is experiencing an ongoing increasing population trend, its range may expand outward from the current periphery, and individuals may emigrate out from the centre of the range. In such a case, in response to the provision of sufficient suitable habitat and mitigation of key threats, the rate of recovery of the Canadian population of Hooded Warblers and rate of achievement of population and distribution objectives may exceed those anticipated here.

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1. COSEWIC¹ SPECIES ASSESSMENT INFORMATION

Date of Assessment:	April 2010
Common Name (population):	Acadian Flycatcher
Scientific Name:	<i>Empidonax virescens</i>
COSEWIC Status:	Endangered
Reason for Designation:	In Canada, this species is restricted to certain types of mature forest in southern Ontario. Only small numbers breed in Canada. Although the population appears to have been relatively stable over the past 10-20 years, this is most likely due to immigration from U.S. populations. The species is threatened by forestry practices, particularly those that target removal of large trees. Serious conservation concerns, both in Canada and the adjacent U.S. also stem from increasingly widespread losses of a variety of favoured nest tree species owing to the spread of an array of invasive forest insects and pathogens. Collectively, these threats to habitat greatly reduce potential for rescue from adjacent U.S. populations.
Canadian Occurrence:	Ontario
COSEWIC Status History:	Designated Endangered in April 1994. Status re-examined and confirmed Endangered in November 2000 and April 2010. Last assessment based on an update status report.

Date of Assessment:	November 2000
Common Name (population):	Hooded Warbler
Scientific Name:	<i>Wilsonia citrina</i>
COSEWIC Status:	Threatened
Reason for Designation:	This population is small and the quantity and quality of habitat will likely decline in the future. The likelihood of a rescue effect from U.S. populations is limited by availability of suitable habitat in Canada.
Canadian Occurrence:	Ontario
COSEWIC Status History:	Designated Threatened in April 1994. Status re-examined and confirmed in November 2000. Last assessment based on an update status report.

¹COSEWIC – Committee on the Status of Endangered Wildlife in Canada

2. SPECIES STATUS INFORMATION

Acadian Flycatcher

The Acadian Flycatcher is listed as Endangered both nationally under the *Species at Risk Act* and provincially under Ontario's *Endangered Species Act, 2007*. It is considered globally secure (G5) (NatureServe 2009). In the United States, the species is nationally secure (N5B) (NatureServe 2009) and occurs in 33 states with varying subnational ranks (Table 1). In Canada, the species is considered imperiled nationally (N2B) and subnationally imperiled to vulnerable (S2BS3B) (NatureServe 2009). It is estimated that less than 1% of the Acadian Flycatcher's global population occurs in Canada (Martin 2007; BirdLife International 2010a).

Table 1. Subnational conservation ranks (S-rank) for the Acadian Flycatcher (NatureServe 2009)

U.S.	Alabama (S5B), Arkansas (S4B), Connecticut (S4B), Delaware (S5B), Florida (SNRB), Georgia (S5), Illinois (S5), Indiana (S4B), Iowa (S3B,S3N), Kansas (S3B), Kentucky (S5B), Louisiana (S5B), Maryland (S5B), Massachusetts (S2B), Michigan (S3S4), Minnesota (S3B), Mississippi (S5B), Missouri (SNRB), Nebraska (S4), New Jersey (S4B), New York (S3), North Carolina (S5B), Ohio (S5), Oklahoma (S4B), Pennsylvania (S5B), Rhode Island (S1B,S1N), South Carolina (S4), South Dakota (SH), Tennessee (S5), Texas (S4S5B), Virginia (S5), West Virginia (S5B), Wisconsin (S3B)
Canada	Ontario (S2S3B)

S1 – critically imperilled; S2 – imperilled; S2S3 – imperilled to vulnerable; S3 – vulnerable; S3S4 – vulnerable to apparently secure; S4 – apparently secure; S4S5 – apparently secure to secure; S5 – secure; SH – possibly extirpated; SNR – unranked; B – breeding population; N – non-breeding population.

Hooded Warbler

The species is listed as Threatened nationally under the *Species at Risk Act* and Special Concern under Ontario's *Endangered Species Act, 2007*. It is considered globally secure (G5) (NatureServe 2009). In the U.S., the Hooded Warbler is considered nationally secure (N5B) but within the 36 states where the species occurs, the subnational ranks vary from critically imperilled to secure (Table 2). In Canada, the species is considered vulnerable nationally (N3B) and subnationally (S3B) (NatureServe 2009). It is estimated that less than 1% of the Hooded Warbler's global population occurs in Canada (Badzinski 2007; BirdLife International 2010b).

Table 2. Subnational conservation ranks (S-rank) for the Hooded Warbler (NatureServe 2009)

U.S.	Alabama (S5B), Arizona (S2M), Arkansas (S4B), Colorado (SNA), Connecticut (S4B), Delaware (S1B), District of Columbia (S3S4N), Florida (SNRB), Georgia (S5), Illinois (S3S4), Indiana (S3B), Iowa (S1B,S2N), Kansas (S1B), Kentucky (S5B), Louisiana (S5B), Maryland (S4S5B), Massachusetts (SXB, S2N), Michigan (S3), Minnesota (S3B), Mississippi (S5B), Missouri (S3), Nebraska (SNRN), New Jersey (S3B), New Mexico (S4N), New York (S5), North Carolina (S5B), Ohio (S5), Oklahoma (S2B), Pennsylvania (S4B), Rhode Island (S3B), South Carolina (S4?B), Tennessee (S4), Texas (S5B), Virginia (S5), West Virginia (S5B), Wisconsin (S2S3B)
Canada	Ontario (S3B)

S1 – critically imperilled; S2 – imperilled; S2S3 – imperilled to vulnerable; S3 – vulnerable; S3S4 – vulnerable to apparently secure; S4 – apparently secure; S4S5 – apparently secure to secure; S5 – secure; SNA – conservation status not applicable because the species is not a suitable target for conservation activities; SNR – unranked; B – breeding population; N – non-breeding population; M – migrant/transient population.

3. SPECIES INFORMATION

3.1 Species Description

Acadian Flycatcher

The Acadian Flycatcher is a small, sparrow-sized flycatcher that measures approximately 14cm to 16.5 cm in length. Adults are olive-green above and white below, with yellowish sides. They have a light eye ring and two white wing bars. Juveniles resemble adults but have buffy wing bars and buff-edged body feathers. This flycatcher is most often found by following the male's loud "PEET-sa" or "TEE-chup" song. Nesting females make frequent "chiff" calls.

Hooded Warbler

The male Hooded Warbler is strikingly coloured; its greenish back and satiny black hood contrast with a bright yellow face and underparts; it is about 12.5cm to 14.5cm in length. Flashing white patches in the tail also help to confirm its identity. Females are similar in appearance to males, except that they have varying amounts of black on their crown and throat. Although males have several song types, one of the most common and recognizable songs has been likened to "weeta-weeta-weetee-o". Nesting females make frequent metallic "chip" calls.

3.2 Population and Distribution

To document the status, distribution and trends of Acadian Flycatcher and Hooded Warbler populations in Canada, extensive surveys of known and potential habitat were carried out in 1997 (Heagy et al. 1997), 1998 (McCracken et al. 1998), 2002 (Carson et al. 2003) and 2007 (Heagy and Badzinski 2008). The purpose of these surveys was to: determine which of the known historic breeding sites in Ontario are still occupied; check a selection of other potential sites to determine if they were occupied; produce an updated and reliable estimate of the population size of Acadian Flycatchers and Hooded Warblers in Ontario; and assess and monitor the status of these two species in the province (Heagy and Badzinski 2008). Additional surveys

have also been conducted in the last ten years by Bird Studies Canada and the Ontario Ministry of Natural Resources.

Acadian Flycatcher

The Acadian Flycatcher breeds throughout much of the eastern United States and northward into southern Ontario, where it reaches the northern limit of its breeding range (Figure 1). Its winter range extends along both the Caribbean and Pacific slopes of Central America from Nicaragua south to northwestern South America (Sauer et al. 2005).

Globally, the Acadian Flycatcher has an estimated population of about 2 350 000 pairs (Rich et al. 2004). It has been described as a common bird in many large forests in the core part of its U.S. breeding range (Whitehead and Taylor 2002). In Canada, the Acadian Flycatcher population is estimated to be approximately 35 to 50 pairs in any given year (Martin 2007; Heagy 2010; Lyle Friesen pers. comm.). Its continental population experienced an average, annual downward trend of 0.10% from 1966 to 2007, and an annual downward trend of 0.43% between 1980 and 2007 (Sauer et al. 2008).

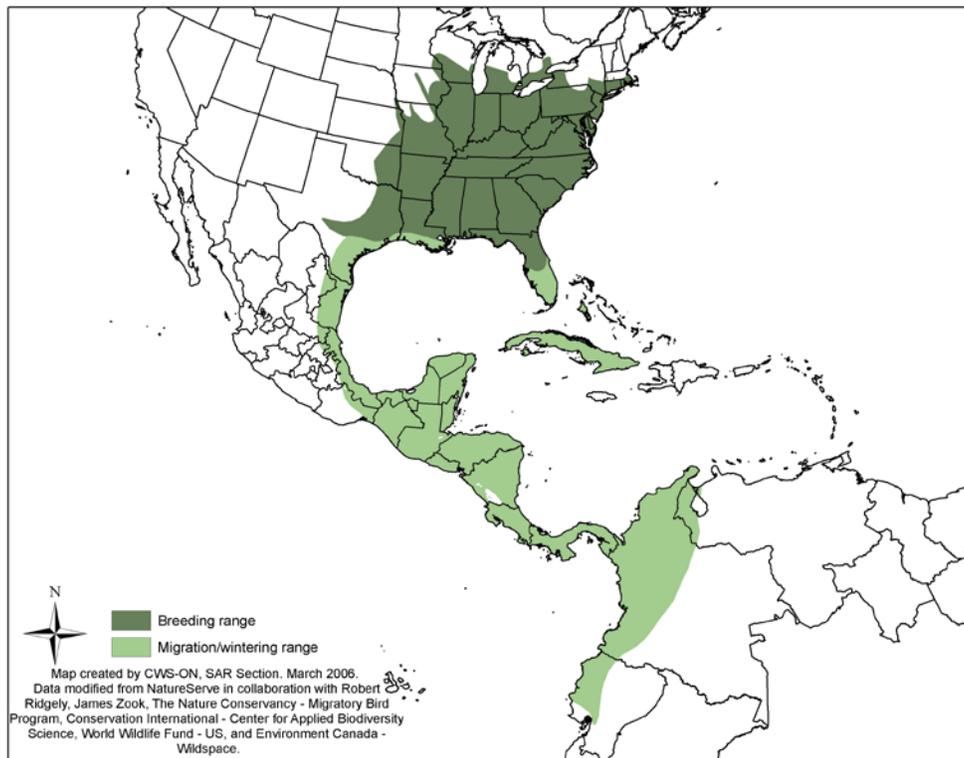


Figure 1. Summer and winter range of the Acadian Flycatcher in North America

In Canada the Acadian Flycatcher occurs only in Ontario. The species breeds primarily in the Carolinian forest region of Ontario, especially in Elgin and Norfolk counties. During the first Ontario Breeding Bird Atlas (1981–1985), Acadian Flycatchers were found in 29 (10km X 10km) squares in eight regions (Cadman et. al 2007). During the second atlas (2001-2005), the flycatcher was found in 50 squares in 11 regions (Martin 2007) (Figure 2). Much of the Ontario increase may be attributable to directed searches for the species since 1997,

rather than an actual increase in numbers (Martin 2007). It also appears that some core sites are intermittently occupied and breeding activity at other sites is sporadic (Heagy 2008). However, the number of sites occupied annually is relatively stable, with sites that are not re-inhabited offset by newly inhabited sites.

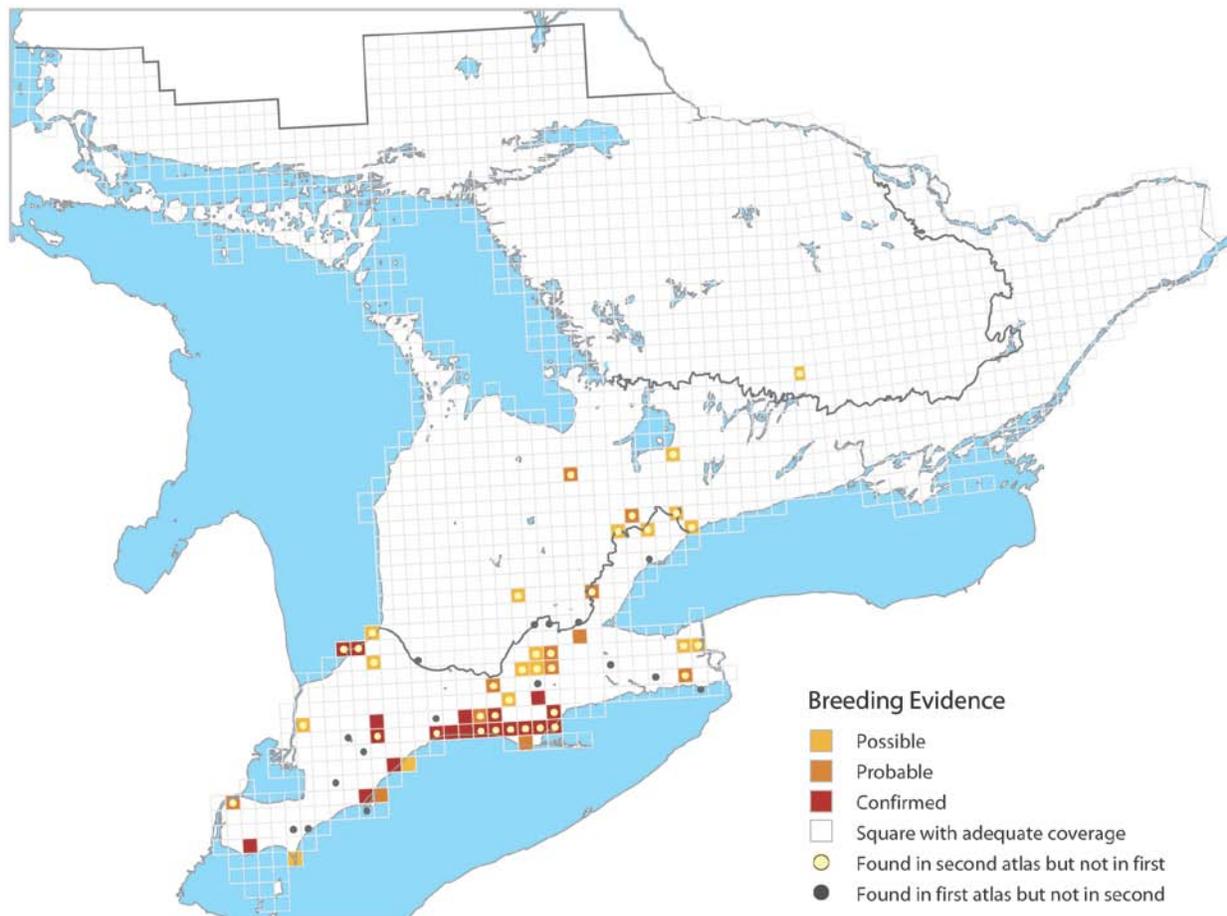


Figure 2. Distribution of the Acadian Flycatcher in Ontario during the first (1981–1985) and second (2001–2005) Ontario Breeding Bird Atlas²

Hooded Warbler

During the breeding season the Hooded Warbler is widely distributed in woodlands throughout the eastern and mid-western United States and sparingly in southern Ontario, where it reaches the northern limit of its breeding range (Figure 3). Its primary wintering grounds are along the Caribbean coast between central Mexico and southern Costa Rica, with lower, but still significant, densities in the Greater Antilles (Evans, Ogden and Stutchbury 1994).

Globally, the Hooded Warbler has an estimated population of about 2 000 000 pairs (Rich et al. 2004).

² Map produced by Andrew Couturier, Bird Studies Canada. Source: Cadman et al., 2007.

The North American Hooded Warbler population trend has shown an increase at an average annual rate of 0.84% from 1966 to 2007 and by 0.87% since 1980 (Sauer et al. 2008). Since the last COSEWIC report (James 2000), considerably more data have been obtained on the abundance and distribution of the species in Ontario. This data indicates that there has been a significant population expansion in the province.

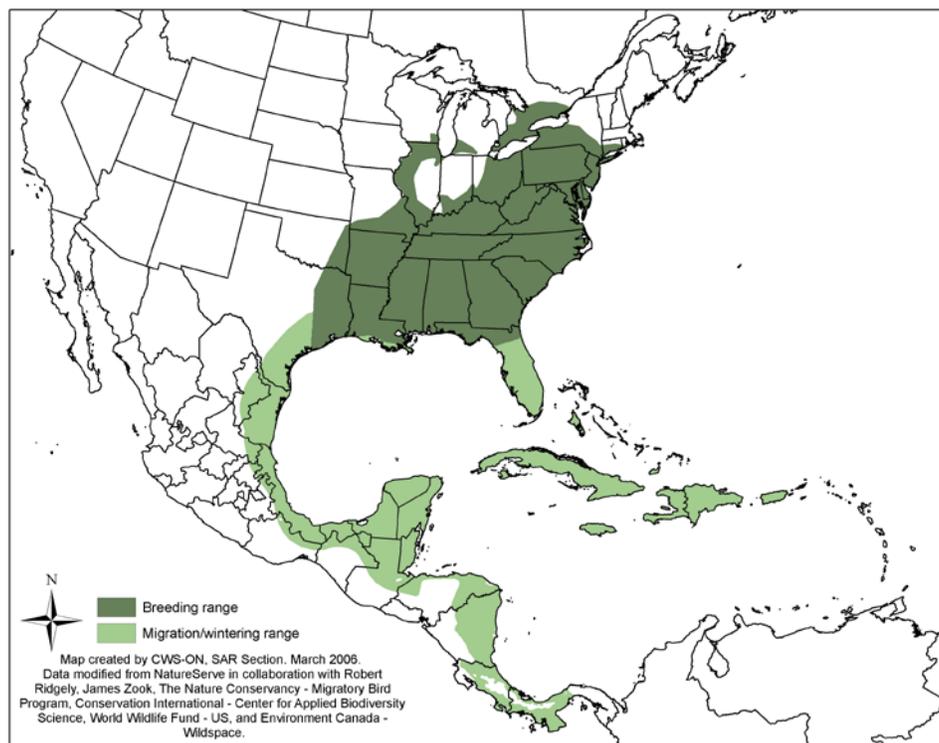


Figure 3. Summer and winter range of the Hooded Warbler in North America

In Canada, the Hooded Warbler occurs only in Ontario. Historically, the majority of the Canadian population was found at only a few breeding sites, with most occurring in Norfolk County (Badzinski 2007). In the last twenty years, the species has expanded its range to the north, west and east. Although still most commonly found in the Carolinian forest region, Hooded Warblers are now also known to occur in the Lake Simcoe-Rideau and Southern Shield Regions.

During the first Ontario Breeding Bird Atlas, the species was recorded in 21 atlas squares in six regions within the Carolinian forest region (Sutherland and Gartshore 1987). During the second atlas, the species was reported from 77 squares in 14 regions, with almost 21% of the squares outside the Carolinian forest region (Badzinski 2007) (Figure 4). Surveys in recent years have shown a marked population increase — from an estimated 88 territorial males (some of which were not paired) found in 1997 to 436 territorial males (some of which were not paired) in 2007. Surveys conducted since 1997 suggest that the bulk of Ontario's Hooded Warbler population is concentrated within eight forest complexes³.

³ Woodlots 10 hectares in size or larger that are in close proximity to each other.

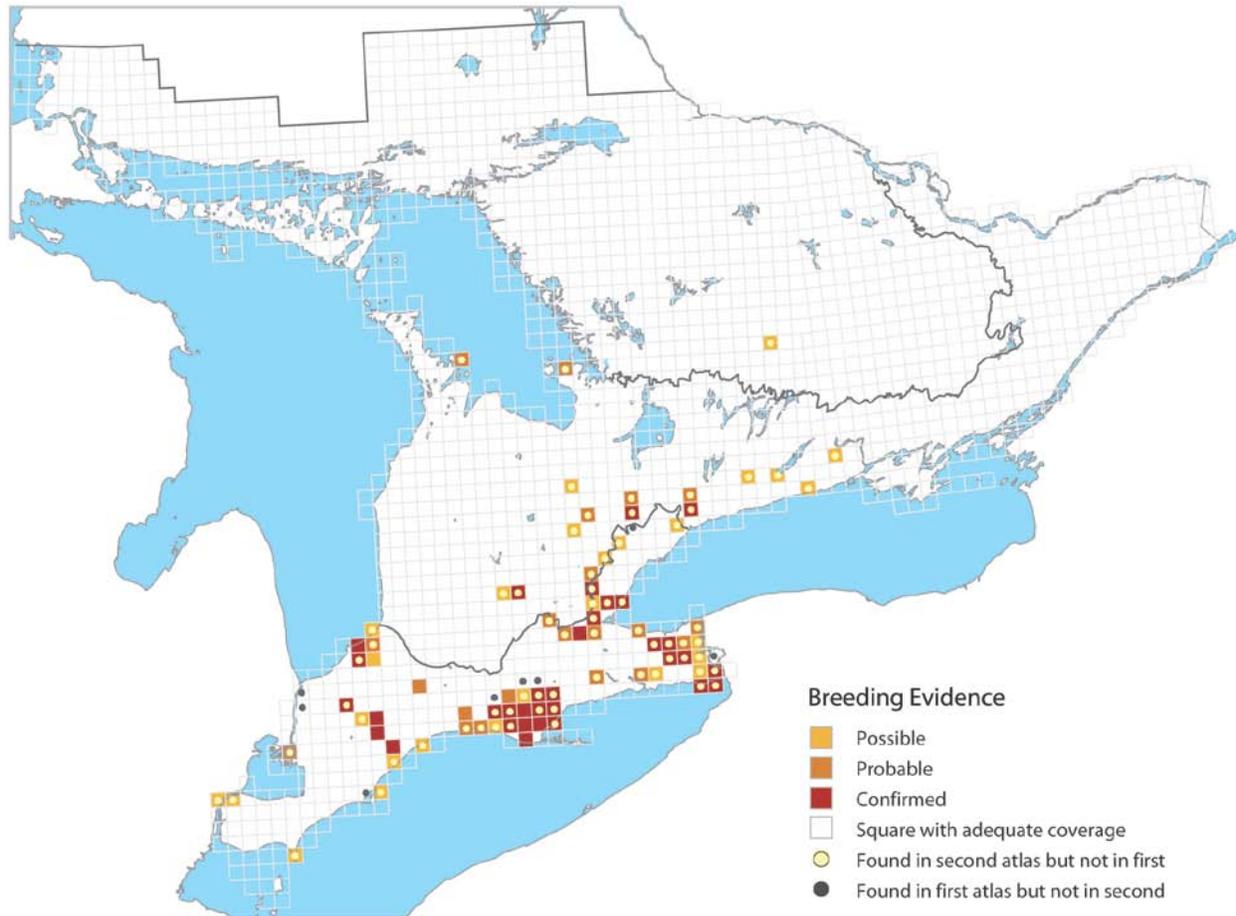


Figure 4. Distribution of the Hooded Warbler in Ontario during the first (1981–1985) and second (2001–2005) Ontario Breeding Bird Atlas⁴

3.3 Needs of the Acadian Flycatcher and Hooded Warbler

Both Acadian Flycatchers and Hooded Warblers return to Ontario from wintering areas in early to mid-May, with females typically arriving a few days later than males. Nest construction begins in May or early June, and the nest site is used for approximately five weeks. Double-brooding in both species is a common occurrence in Ontario, which extends the active breeding season to the end of August. Triple-brooding in Hooded Warblers has also been documented in Ontario (Bird Studies Canada 2003).

Returning males of both species often occupy the same territory in subsequent years. Adults and juveniles of both species depend on a wide variety of insects, insect larvae, and other arthropods (Evans Ogden and Stutchbury 1994; Whitehead and Taylor 2002).

⁴ Map produced by Andrew Couturier, Bird Studies Canada. Source: Cadman et al., 2007.

Both the Acadian Flycatcher and the Hooded Warbler prefer large, mature woodlands in areas with high (>30%) regional forest cover (Environment Canada 2004). Although the species have slightly different habitat preferences, larger blocks of mature forest with structural diversity are likely to accommodate the habitat requirements of both species. More details of specific habitat elements for each species are outlined below.

Acadian Flycatcher

Forest size and regional forest cover

The Acadian Flycatcher is an area-sensitive species throughout most of its breeding range, choosing large forests over small ones (Whitehead and Taylor 2002). In Ohio, for example, the species preferentially selects deciduous forests exceeding 40 ha, although it is regularly found in smaller forest blocks that are located near extensive forests (Peterjohn and Rice 1991). In Ontario, 92% of the patches supporting breeding Acadian Flycatchers are larger than 25 ha, and 56% of the patches are larger than 100 ha (B. Woolfenden and B. Stutchbury, unpubl. data). Of the 14 most productive breeding forests in Ontario, 11 are located in areas with more than 30% forest cover within 1 km of the nest (B. Woolfenden and B. Stutchbury, unpubl. data).

Forest type

The Acadian Flycatcher occupies a broad spectrum of deciduous and mixed woodlands across its breeding range (Whitehead and Taylor 2002). In Ontario, the species is found in uplands, swamps, and well-wooded ravines (D. Martin, unpubl. data 2004). It inhabits a range of forest types, including maple–beech, oak–maple, and beech–hemlock. Nests have been found in at least 20 tree species in Ontario, with the majority in American Beech (*Fagus grandifolia*) and Eastern Hemlock (*Tsuga canadensis*) (D. Martin, unpubl. data; B. Woolfenden and B. Stutchbury, unpubl. data).

Forest structure

Acadian Flycatchers occupy mature woodlands and prefer forests with a closed canopy, a relatively open understorey, and sparse ground layer. The species prefers woodlands with permanent or ephemeral ponds and steep-sided, wooded ravines with streams. The presence of water may help to maintain the structure of woodlands preferred by the flycatcher (e.g., vernal pools prevent the establishment of a dense shrub layer). Territories are established in areas where there are few shrubs or branches within 2 to 3 m of the ground (Walkinshaw and Brewer 1991). Although the flycatcher sometimes builds nests in relatively dry woods (Peterjohn and Rice 1991), it often suspends nests over water (D. Martin, unpubl. data), or other open areas (Whitehead and Taylor 2002).

Post-fledging/pre-migration habitat

There is little information on the habitat used by Acadian Flycatchers after the young have left the nest, or the habitat that is used by adults and young prior to migration. Post-fledging habitat likely contains elements essential to juvenile survival such as vegetation for cover and food.

Habitat on wintering grounds

Acadian Flycatchers winter in dry, humid and wet mature forests (Whitehead and Taylor 2002). They are found in primary (>100 years) and secondary forests (50 to 80 years) at elevations

ranging from lowland (50 m) to premontane (2700 m), and they tend to avoid patchy or open areas (Whitehead and Taylor 2002).

Hooded Warbler

Forest size and regional forest cover

The Hooded Warbler is an area-sensitive species over most of its breeding range and prefers larger tracts of mature forest to smaller ones (Evans Ogden and Stutchbury 1994). The minimum threshold forest size for the species was 30 ha in Maryland (Robbins 1979) and 15 ha in New York and Ohio (Eaton 1988; Peterjohn and Rice 1991). In northwestern Pennsylvania, where regional forest cover is much higher than in southern Ontario, Hooded Warblers often nest in extremely small (3–5 ha) forest fragments (Norris and Stutchbury 2001). In Ontario, the majority of occurrences of Hooded Warbler have been in forests larger than 100 ha (Flaxman 2003). However, the species has nested successfully in woodlots as small as 8 ha when the woodlot was located near larger forests (Melles 2004). These variations in area sensitivity likely reflect differences in the amount of regional forest cover (Freemark and Collins 1992). At three forest complexes in Ontario where Hooded Warblers and Acadian Flycatchers both occur, regional forest cover ranged from 61% to 77% within 1 km of the nest sites (B. Woolfenden and B. Stutchbury, unpubl. data).

Forest type

Hooded Warblers prefer woodlands where trees are large enough (i.e. Diameter at Breast Height >38cm) to create tree-fall gaps with a median size of 40 to 200 m² (Evans Ogden and Stutchbury 1994; Whittam et al. 2002). Maple, beech, and oak usually dominate occupied deciduous forests throughout the breeding range of the Hooded Warbler (Evans Ogden and Stutchbury 1994). In Ontario, well-drained sandy sites dominated by Red Maple (*Acer rubrum*), White Oak (*Quercus alba*), Sugar Maple (*Acer saccharum*), American beech, and Eastern White Pine (*Pinus strobus*) are preferred breeding areas (Gartshore 1988). Shrub layer plants include Maple-leaf Viburnum (*Viburnum acerifolium*), Wild Red Raspberry (*Rubus idaeus*), Black Raspberry (*Rubus occidentalis*), White Ash (*Fraxinus americana*) and Chokecherry (*Prunus virginiana*) (Gartshore 1988). Red Elderberry (*Sambucus racemosa ssp. pubens*) is a fairly common shrub layer plant in forest complexes with large concentrations of Hooded Warblers in Canada (Heagy and Badzinski 2006).

Forest structure

Hooded Warblers generally breed in mature woodlands with canopy gaps where there is a proliferation of shrubs, saplings, vines, brambles, and other herbaceous growth (Evans Ogden and Stutchbury 1994). Territories are located around the gaps, with nests being typically located within the gaps, or at their edges. The size of the gaps can vary considerably, although it is not clear how this affects nesting success and productivity (Whittam et al. 2002; D. Burke, unpubl. data). Suitable habitat can persist for periods of approximately 10 to 15 years from the time the ground vegetation is established until the canopy closes (Whittam et al. 2002)

Hooded Warbler territory size is variable and is likely influenced by population density, habitat quality and breeding status. In the St. William's Conservation Reserve, mean territory size ranged from 2.3 to 3.5 ha in the three years that it was studied (BSC, unpub. data). It is also well

known that male and female Hooded Warblers will travel within the forest – well beyond their territorial boundaries (e.g., for extra-pair copulations; Stutchbury et al. 2005).

Post-breeding/pre-migration habitat

There is limited information on what habitat adults or fledglings use in Ontario after nesting is finished and before migration begins. During the first week post-fledging, young are incapable of flight and move only short distances from the nest site. Post-fledging habitat selection is a critical period because mortality rates can be very high in the 1 to 2 weeks post-fledging before flight ability is obtained (Rush and Stutchbury 2008). In southern Ontario, Hooded Warbler pairs attend their young into early September, at which time the fledglings have undergone a pre-basic moult, attaining adult-like plumage. As young mature, they move progressively further from the nest site, possibly in search of future breeding territories.

In late August and September, this species joins mixed flocks before migrating (A. Heagy, unpubl. data). During this period, the species uses forest edge and scrub habitat (B. Stutchbury, unpubl. data). When breeding season movements, post-fledging and pre-migratory movements are considered, Hooded Warblers will use most of the forested area within a site.

Habitat on wintering grounds

Winter habitat for Hooded Warbler ranges from brushy fields and late successional shrubs to dry deciduous and semi-evergreen forest, second-growth forest, and mature forest. Both males and females establish winter territories, although in different habitats, with males occupying more mature habitats than females (Evans Ogden and Stutchbury 1994).

4. THREATS

4.1 Threat Assessment

Table 3. Threat Assessment Table for Acadian Flycatcher and Hooded Warbler

Threat	Level of Concern ⁱ	Extent	Occurrence	Frequency	Severity ⁱⁱ	Causal Certainty ⁱⁱⁱ
Habitat Loss or Degradation						
Diameter limit tree harvest	High	Widespread	Current	Recurrent	High	High
Housing development/ Development for agricultural uses in or adjacent to woodlands	High	Widespread	Current	Continuous	High	High
Activities that change water and moisture regimes in woodlands	High	Widespread	Anticipated	Continuous	High	Unknown

Threat	Level of Concern ⁱ	Extent	Occurrence	Frequency	Severity ⁱⁱ	Causal Certainty ⁱⁱⁱ
Recreational vehicles	High/Medium	Local	Current	Recurrent	Unknown	Unknown
Loss of overwintering or United States breeding habitat	High	Unknown	Current	Unknown	Unknown	Unknown
Exotic, Invasive, or Introduced Species/Genomes						
Invasive plants	High/Medium	Widespread	Current	Continuous	Medium	High/Medium
Insects and disease	Medium	Widespread	Anticipated	Continuous	Medium	High/Medium
Climate and Natural Disasters						
Changes in weather/climate	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

ⁱ *Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the recovery of the species, consistent with the population and distribution objectives. This criterion considers the assessment of all the information in the table.*

ⁱⁱ *Severity: reflects the population-level effect (High: very large population-level effect, Moderate, Low, Unknown).*

ⁱⁱⁱ *Causal certainty: reflects the degree of evidence that is known for the threat (High: available evidence strongly links the threat to stresses on population viability; Medium: there is a correlation between the threat and population viability e.g., expert opinion; Low: the threat is assumed or plausible).*

4.2 Description of Threats

In general, the Acadian Flycatcher, with its more exacting requirements for undisturbed forests, is more vulnerable to threats that impact the age, structure, and function of woodlands than the Hooded Warbler. All threats described below pertain to the species' habitats versus individuals of the species directly, and are listed in order of importance.

*Diameter-limit tree harvest*⁵

Diameter-limit harvesting is widely practiced in southern Ontario woodlands (OMNR 2000) but is incompatible with the needs of the Acadian Flycatcher and the Hooded Warbler. This silvicultural treatment removes all or most of the oldest and largest trees, thereby eliminating the closed canopy condition required by Acadian Flycatchers. Forests harvested in this manner may lack suitable Acadian Flycatcher habitat for up to 40 years (K. Elliott, unpubl. data). Hooded Warblers readily occupy sites that have been selectively logged⁶ provided that many large-diameter trees have been retained (Evans Ogden and Stutchbury 1994; Whittam et al. 2002).

⁵ Diameter-limit tree harvesting involves the removal of all trees greater than a pre-determined diameter-limit. The diameter-limit in eastern deciduous forests traditionally has been 30.5 cm

⁶ Selective logging is the removal of a proportion of standing trees based on specified limits of minimum tree size and/or minimum large trees that must remain. Selective logging allows forest regeneration following and between selective harvests and results in a forest structure similar to a natural mix of tree ages. The ecological impact and long term sustainability of the forest depends upon the application and adherence to specifications applicable to the forest type and the history of logging and other uses of the forest area.

Conversely, diameter-limit logging removes too many large-diameter trees and reduces nest success for Hooded Warblers by increasing brood parasitism and predation rates (Friesen and Stabb 2001).

Housing development/Development for agricultural uses

i) In woodlands containing Acadian Flycatcher or Hooded Warbler Habitat

The Carolinian forest is one of Canada's most threatened habitats. Agricultural and development pressures have been intense in the Carolinian forest region, where existing forest cover ranges from 3% to 22% (Riley and Mohr 1994). The remaining woodlots are generally too small and isolated to support area-sensitive species such as Acadian Flycatchers and Hooded Warblers. There appears to be a strong relationship between the amount of forest cover on a landscape and bird occurrence — where regional forest cover is low, the likelihood of either species occurring is also low. The loss of forests for residential housing (or any other type of development) would intensify negative pressures on these species.

ii) Development adjacent to woodlands

The expansion of rural estate housing and other development activities adjacent to woodlands could negatively affect both species at the local level. Certain portions of the bird community — neotropical migrants in particular — decline or disappear when forests are surrounded or fragmented by residential housing (Friesen et al. 1995; Kluza et al. 2000). The reasons for these changes are unknown but may be related to elevated predation (by both wild and feral animals) and brood parasitism rates, changes in vegetation and food supply, or an avoidance to anthropogenic activity (Manke and Gavin 2000; Chase and Walsh 2006). The construction and expansion of urban and rural estate housing are currently not widespread at or adjacent to sites where Acadian Flycatchers and Hooded Warblers are concentrated, but are known to occur in several locations (L. Friesen, pers. comm.) Fragmentation of forests, like direct habitat loss, exacerbates existing negative pressures on these species.

The preceding threats may also contribute to increased brood parasitism rates. In some years, the brood parasitism rates on Hooded Warblers have been low (18% in 2001, 15% in 2004) and in other years, they have been much higher (52% in 1999). Hooded Warblers are small-sized birds and productivity is significantly reduced if their nests contain cowbird young. Sound forestry practices (e.g., selective logging) and prevention of forest fragmentation are effective ways to reduce cowbird parasitism rates.

Activities that change water and moisture regimes in woodlands

Acadian Flycatchers may be impacted by management activities that alter water tables and moisture regimes in forests because standing water in woodlands helps maintain the open understorey conditions necessary for this species. If water conditions are altered so that the understorey is dry for long periods, woody vegetation may flourish and modify habitat structure. Agricultural tiling, drainage, and irrigation projects are examples of activities that can lower water tables in forests. It is not known how a change in water and moisture regime may impact Hooded Warblers.

Loss of overwintering or United States breeding habitat

Threats on the wintering grounds may represent a significant challenge to Acadian Flycatchers and Hooded Warblers. The continued deforestation of mature forests in the tropics will almost certainly have negative impacts on both species (Evans Ogden and Stutchbury 1994; Whitehead and Taylor 2002; Stutchbury 2007). In addition, threats similar to those in Canada may impact on the United States breeding grounds, leading to a decline in Acadian Flycatcher and/or Hooded Warbler populations and reducing the likelihood of population rescue effect occurring into Ontario. More information is required on the threats to these species in both the wintering grounds and the United States breeding grounds before it can be determined to what level these will impact the Canadian population.

Recreational Vehicles

Use of motorized vehicles, including snowmobiles and all-terrain vehicles, can degrade existing habitats by damaging the native understorey, thereby decreasing habitat quality for Hooded Warblers. Additionally, recreational vehicle use has been linked to soil erosion, soil compaction and the establishment of invasive species. Such effects can dramatically alter the composition and structure of woodlands, with uncertain results for Acadian Flycatchers and Hooded Warblers.

Invasive Plants

Invasive plants can significantly alter the open understorey and sparsely vegetated ground cover preferred by Acadian Flycatchers. Acadian Flycatchers are absent at some apparently suitable ravine locations along Lake Erie where the entire ground layer is composed of Garlic Mustard (*Alliaria petiolata*) (D. Martin, unpubl. data). In other unoccupied ravines, Multiflora Rose (*Rosa multiflora*) dominates the ground layer and understorey. Finally, in some deeply shaded woodlands in Middlesex County, Common Buckthorn (*Rhamnus cathartica*) forms dense tangles in the shrub layer and understorey and renders the sites unsuitable for Acadian Flycatchers (D. Martin, unpubl. data). Effects of invasive plants on Hooded Warbler site occupancy are currently unknown.

Insects and diseases

Ontario's woodlands could be fundamentally altered by invasive forest insects such as the Emerald Ash Borer (*Agrilus planipennis*) and Hemlock Woolly Adelgid (*Adelges tsugae*). Tree diseases such as Beech Bark (*Neonectria faginata*), Dogwood Anthracnose (*Discula sp.*) and Ash Yellows (caused by mycoplasma-like organisms) also have the potential to kill large numbers of trees. This could benefit Hooded Warblers up to a point (by creating or enhancing breeding habitat through the creation of a thick shrub layer for nesting) but would be detrimental if too many large trees were eliminated. Extensive removal of the canopy layer would have severe consequences for Acadian Flycatchers. The Woolly Adelgid causes extreme damage to hemlocks which often are an important component of Acadian Flycatcher breeding habitat in ravines and riparian settings in southern Ontario.

Changes in Weather/Climate

The potential impacts of projected climate change on the habitat and nesting success of the Hooded Warbler and the Acadian Flycatcher in Ontario are unknown. Climate change could affect forests in southern Ontario by modifying precipitation patterns and increasing the

frequency and intensity of ice and wind storms. Individually or in combination, these changes could dramatically alter the composition and structure of woodlands across landscapes to the detriment of Acadian Flycatchers and Hooded Warblers. Alternatively, climate change could have a positive impact on one or both species in Ontario by creating favourable climatic conditions for northern range expansion (Matthews et al. 2004).

5. POPULATION AND DISTRIBUTION OBJECTIVES

Acadian Flycatcher

The population and distribution objective for the Acadian Flycatcher is to maintain the current population of between 35 and 50 pairs distributed within the species' current Ontario range. This will maintain the current population, which has been essentially unchanged in size for the last decade and has remained stable over the past few decades (COSEWIC 2010).

An earlier recovery goal of 250 pairs identified in the 2000 recovery plan (Friesen et al. 2000) was partially based on the belief, widely held at the time that a sustainable population had to comprise several hundred pairs of breeding individuals (Salwasser et al. 1984). Recent research suggests that the recruitment of only one immigrating breeding pair every two years may be sufficient to prevent the extirpation of the current population of Acadian Flycatchers in Ontario (Tischendorf 2003).

As the small Canadian population of Acadian Flycatchers occurs at the northern part of its continental range, and the vast majority of its continental distribution and population occur further south in the United States, it is important to note that population changes at the continental level may have a significant effect on the recovery feasibility in Canada. As the continental population of the Acadian Flycatcher is experiencing an ongoing downward population trend, its range may contract away from the current periphery, and individuals may immigrate towards the centre of the range. In such a case, despite best efforts described in this strategy to ensure that sufficient suitable habitat is available and key threats are mitigated, the numbers of Acadian Flycatcher in Canada may decline.

Hooded Warbler

The population and distribution objective is to increase the number of Hooded Warbler breeding pairs to 500 distributed within the species' current Ontario range.

Both the continental population and the Canadian population of Hooded Warbler are experiencing an increase in numbers. There has been a sizeable expansion in the Canadian population and range since the last COSEWIC status report update in 2000. Since the Canadian Hooded Warbler population comprises less than 1% of the global population, it is important to note that population changes at a continental level may have a significant effect on the recovery feasibility in Canada. It is currently not known why the population of Hooded Warblers is increasing and expanding its range to the north. More research is required to determine the causes of such significant increases.

6. BROAD STRATEGIES AND GENERAL APPROACHES TO MEET OBJECTIVES

6.1 Strategic Direction for Recovery⁷

Table 4. Recovery Planning Table for Acadian Flycatcher and Hooded Warbler

Threat or Limitation	Priority	Broad Strategy to Recovery	General Description of Research and Management Approaches
Diameter limit tree harvest; Activities that change water and moisture regimes in woodlands; Invasive plants; Insects and disease; Species habitat specificity and site fidelity	High	Stewardship (including Outreach)	<ul style="list-style-type: none"> • Develop and/or contribute to stewardship information and outreach materials; Distribute this information to landowners, land managers and forest users. • Encourage the transfer of Traditional Ecological Knowledge • Collaborate with appropriate agencies to develop and implement outreach material and management strategies for invasive species. • Encourage appropriate habitat stewardship and restoration (e.g., good forest management strategies)
Diameter limit tree harvest; Housing development/ Development for agricultural uses in or adjacent to woodlands; Activities that change water and moisture regimes in woodlands; Loss of overwintering habitat; Invasive plants, Insects and disease; Species habitat specificity and site fidelity	High	Habitat Protection	<ul style="list-style-type: none"> • Identify strategies where necessary to safeguard habitat (e.g., stewardship, easements, acquisition, tax relief). • Encourage application of appropriate conservation tools including legislation, policies and stewardship strategies (as outlined above) at priority sites. • Encourage incorporation of habitat needs into management planning for public and private lands.
All	High	Survey and Monitoring	<ul style="list-style-type: none"> • Collect Ecological Land Classification habitat data for areas not yet characterized • Conduct population and habitat surveys (monitoring) • Monitor threats.

⁷ Although the Broad Strategies to Recovery are applicable to both species, specific management activities will need to consider any and all Species at Risk in a given location, particularly those of greater conservation concern.

Threat or Limitation	Priority	Broad Strategy to Recovery	General Description of Research and Management Approaches
Diameter limit tree harvest; Housing development/ Development for agricultural uses in or adjacent to woodlands; Activities that change water and moisture regimes in woodlands; Loss of overwintering habitat; Invasive plants; Insects and disease; Small population size; Species habitat specificity and site fidelity.	Medium	Research	<ul style="list-style-type: none"> • Characterize the habitat used by Acadian Flycatcher during all life cycle stages (particularly post-breeding) • Collect detailed information on the use of identified critical habitat by Hooded Warblers during post-fledging and pre-migratory period. • Determine cause of the population increase in Hooded Warbler. • Assess the scope of the threats facing the Acadian Flycatcher and Hooded Warbler outside of Canada. • If needed, work with other countries' government agencies, researchers, and non-government organizations to benefit the species' recovery in the species wintering grounds and U.S. breeding grounds.

7. Critical Habitat

7.1 Acadian Flycatcher Critical Habitat

7.1.1 Identification of the Species' Critical Habitat

SARA defines critical habitat as "...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."

Critical habitat is identified in this recovery strategy for the Acadian Flycatcher based on the best available data (up to and including 2009). Additional critical habitat may be identified across the range as new information becomes available for the Acadian Flycatcher in Ontario.

The identification of critical habitat for the Acadian Flycatcher is based on two criteria: habitat suitability and multi-year occupancy by Acadian Flycatchers.

7.1.1.1. Suitable Habitat

Habitat suitability is characterized as the areas where individuals of the species carry out essential aspects of their breeding cycle (i.e., courtship, territory defense, feeding, nesting and post-fledgling) in Canada. The Acadian Flycatcher is an area sensitive species throughout most of its breeding range (Whitehead and Taylor 2002) with a predilection for extensive tracts of deciduous forests (Freemark and Collins 1992). For the Acadian Flycatcher, suitable habitat includes large blocks of relatively undisturbed, mature, deciduous or mixed forests, as well

as steep-sided, forested ravines. As a result, suitable habitat for the Acadian Flycatcher has been identified in the following two manners:

Forest:

In forests, suitable habitat consists of large contiguous⁸ blocks of relatively undisturbed, mature, deciduous or mixed forests. It contains a closed canopy structure, a relatively open understory and sparse ground cover layer and is typically dominated by combinations of tree species including maple-beech, oak-maple, and beech-hemlock. Swamps or sites with permanent or ephemeral ponds or streams are also typical in suitable habitat, although they may be difficult to detect in some years due to drought or low water tables.

Suitable habitat is the contiguous forest. A forest is considered contiguous where it is a connected area. Patches separated by anthropogenic features, including municipal gravel roads, unmaintained roadways and utility lines, will not be considered contiguous.

Riparian:

In riparian sites, that is, sites with a linear spatial distribution associated with watercourses, Acadian Flycatchers have been shown to have a linear arrangement of territories following the watercourses. In Pennsylvania, telemetry studies conducted on Acadian Flycatchers in riparian habitats have documented that males travel an average distance of 910 m away from their territorial nests in search of other females to copulate with (extra-pair fertilization) and, consequently, utilize a large amount of suitable riparian habitat (Wolfenden et. al. 2005).

For these reasons, suitable habitat is the connected forest within the ravine (i.e. from the watercourse to the top of bank) to a distance of up to 1 km upstream and downstream (including tributaries) of the observation or to the end of contiguous habitat, whichever comes first.

7.1.1.2. Suitable Habitat Occupancy

Suitable Habitat Occupancy Criterion:

Suitable habitat that has confirmed, probable, or possible breeding evidence of Acadian Flycatchers during the breeding season for at least two separate years from 1995 to 2009 **and** where at least one of these records was categorized as confirmed or probable evidence of breeding in any single year from 1995 to 2009.

The Suitable Habitat Occupancy Criterion identifies areas of suitable habitat that have evidence of both within-season territoriality (evidence of probable or confirmed breeding in at least one year) and between-season fidelity (i.e., where Acadian Flycatchers have returned to the same area of suitable habitat in multiple years). Acadian Flycatchers may occasionally occupy habitat in a specific area for only one year and never return. Evidence of breeding in suitable habitat for at least two years, however, indicates that the site is sufficiently suitable to warrant critical habitat identification.

⁸ A forest is considered contiguous where it is a connected area (i.e., there are few breaks in the forest canopy, and these breaks are a result of gap dynamics).

The definition of confirmed, probable, or possible breeding follows standard Breeding Bird Atlas codes in Canada (Table 5). Observations of a single Acadian Flycatcher without attributes of breeding (e.g., singing males, incidental observations, etc.) are not considered probable breeders as they could be prospecting for territories, or be transient birds occupying suitable habitat. Confirmed, probable and possible breeding evidence must be obtained on the site from reliable sources⁹ for the site to be considered as critical habitat.

A 15 year window (1995 to 2009) has been identified as an appropriate time frame for including Acadian Flycatcher breeding records to assess population trends in species and be representative of the current nesting habitat use. This time frame best corresponds to the 12 year longevity record for an individual Acadian Flycatcher (Twedt 2008), a species that exhibits site fidelity to its breeding site (Whitehead and Taylor 2002) and is the most appropriate time interval to assess the population trends based on the current Acadian Flycatcher monitoring programs in Ontario.

Table 5. Standard Ontario Breeding Bird Atlas Codes (Cadman et al. 2007)

DESCRIPTION ¹⁰
<u>POSSIBLE breeder</u>
Singing male(s) present, or breeding calls heard, in suitable nesting habitat in breeding season
Species observed in its breeding season in suitable nesting habitat
<u>PROBABLE breeder</u>
Pair observed in their breeding season in suitable nesting habitat
Permanent territory presumed through registration of territorial behaviour (song, etc.), or the occurrence of an adult bird, on at least two days a week or more apart, at the same place, in suitable nesting habitat during the breeding season
Courtship or display between a male and a female or two males including courtship feeding or copulation
Visiting probable nest site
Agitated behaviour or anxiety calls of an adult indicating nest-site or young in the vicinity
Brood patch on adult female or cloacal protuberance on adult male
Nest building or carrying nest materials.
<u>CONFIRMED breeder</u>
Distraction display or injury feigning
Used nest or egg shells found (occupied or laid within the period of the survey). Use only for unique and unmistakable nests or shells
Recently fledged young or downy young
Adults leaving or entering nest sites in circumstances indicating occupied nest (including nests which content cannot be seen)
Adult carrying fecal sac
Adult carrying food for young during its breeding season.
Nest containing eggs
Nest containing young seen or heard

⁹ Reliable sources may include, but are not limited to: records held by the Ontario Natural Heritage Information Centre, records from the Ontario Breeding Bird Atlas, observations from acknowledged species experts, observations from recognized birders with photographic evidence, OMNR, CWS, or BSC survey reports.

¹⁰ The breeding season for both the Acadian Flycatcher and the Hooded Warbler in southern Ontario is recognized as being from early May to the end of August.

7.1.1.3. Critical Habitat Identification for the Acadian Flycatcher

Critical habitat is identified in this recovery strategy as the area of suitable habitat (see Section 7.1.1.1) currently known to be occupied by the Acadian Flycatcher according to the Suitable Habitat Occupancy Criterion in Section 7.1.1.2. Open areas, including fields, and existing anthropogenic features such as roads or houses are excluded from critical habitat. Critical habitat excludes any human-made structures.

Using available data (up to and including 2009) 28 sites are identified as critical habitat, with an estimated total area for critical habitat of 4,546 ha (Appendix 2); all of these sites are on non-federal lands (provincial parks, conservation authority lands and private lands). It is anticipated that the identified critical habitat will provide sufficient habitat to meet the population and distribution objectives of maintaining the current population of approximately 35 to 50 pairs within the species' current Ontario range. As additional information becomes available, critical habitat sites may be added or refined where they meet the critical habitat criteria at sites across the range of the Canadian Acadian Flycatcher population.

7.1.2 Activities Likely to Result in the Destruction 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 (Government of Canada, 2009).

Activities that are likely to result in the destruction of Acadian Flycatcher critical habitat include, but may not be limited to:

- Diameter-limit tree harvesting, development for housing or agricultural purposes, and other activities that are detrimental to the retention of mature trees and/or canopy cover in critical habitat locations. These activities destroy critical habitat because they eliminate the closed canopy condition required by Acadian Flycatchers.
- Activities that cause radical or lasting alterations to hydrological regimes, such as the drainage of wetland, the construction of dams and infilling of swampy lowlands. These activities can destroy critical habitat by altering the open understorey conditions preferred by Acadian Flycatchers in riparian areas.
- Activities that create habitat fragmentation such as the construction of infrastructure and the development of roads, trails and footpaths. These activities can result in the destruction of critical habitat because they reduce the area of contiguous and relatively undisturbed forest required by the species.
- Upgrades and / or maintenance of existing infrastructure (e.g., buildings and roads) either within or adjacent to critical habitat, as Acadian Flycatchers appear to avoid areas of anthropogenic activity.

7.2 Hooded Warbler Critical Habitat

7.2.1 Identification of the Species' Critical Habitat

SARA defines critical habitat as "...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."

Critical habitat is identified in this recovery strategy for Hooded Warbler based on the best available data (up to and including 2009). Additional critical habitat may be identified across the range as more information becomes available on Hooded Warbler in Ontario.

The identification of critical habitat for the Hooded Warbler is based on two criteria: habitat suitability and multi-year occupancy by Hooded Warblers.

7.2.1.1 Suitable Habitat

Habitat suitability is characterized as the areas where individuals of the species carry out essential aspects of their breeding cycle (i.e., courtship, territory defense, feeding, nesting, and post-fledgling) in Canada. Suitable habitat includes mature deciduous or mixed forests that are contiguous and have canopy gaps that have been created through tree-fall or by selective logging. Dense ground vegetation (i.e. shrub layer within 1 m of the ground) and large mature trees (Diameter Breast Height >38cm) have also been shown to be components of suitable habitat (Whittam et al. 2002).

Suitable habitat is the contiguous forest. A forest is considered contiguous where it is a connected area. Patches separated by anthropogenic features, including municipal gravel roads, unmaintained roadways and utility lines, will not be considered contiguous.

7.2.1.2. Suitable Habitat Occupancy

Suitable Habitat Occupancy Criterion:

Suitable habitat that has confirmed or probable breeding evidence of Hooded Warblers during the breeding season for at least two separate years from 2000 to 2009.

The Suitable Habitat Occupancy Criterion identifies areas of suitable habitat that have evidence of breeding within a breeding season (evidence of probable or confirmed breeding in a given year) and between-season fidelity (i.e., suitable habitat where Hooded Warblers have returned to breed in multiple years). Hooded Warblers may occasionally occupy habitat in a specific area for only one year and never return. Evidence of breeding in suitable habitat for at least two years, however, indicates that the site is sufficiently suitable to warrant critical habitat identification.

The definition of probable or confirmed breeders follows standard Breeding Bird Atlas codes in Canada (Table 5). Observations of Hooded Warblers without attributes of breeding (e.g., singing males, incidental observations etc.) are not considered probable breeders as they could be

prospecting for territories, or be transient birds occupying suitable habitat. Confirmed and probable breeding evidence must be obtained on the site from reliable sources¹¹ for the site to be considered as critical habitat.

A 10 year window (2000 to 2009) has been identified as an appropriate time frame for including Hooded Warbler breeding records because habitat is ephemeral, with forest gaps becoming suitable about 3 years after the creation of a forest gap and remaining suitable for about 10 years. Whittam et al. (2002) found that gap age at Hooded Warbler nest sites ranged from 1 to 14 years with an average gap age of 6.2 and 7.6 years in 1999 and 2000 respectively. Any record outside of ten years would need to be validated to determine the continued presence of suitable habitat and use of the site by Hooded Warblers.

7.2.1.3 Critical Habitat Identification for the Hooded Warbler

Critical habitat is identified in this recovery strategy as the area of suitable habitat (see Section 7.2.1.1) currently known to be occupied by Hooded Warbler according to the Suitable Habitat Occupancy Criterion in Section 7.2.1.2. Open areas, including fields, and existing anthropogenic features such as roads or houses are excluded from critical habitat. Critical habitat excludes any human-made structures.

Using available data (up to and including 2009), 58 sites are identified as critical habitat, with an estimated total area for critical habitat of 9,740 ha (Appendix 3); all of these sites are on non-federal lands (provincial parks, conservation authority lands and private lands). It is anticipated that the identified critical habitat will provide sufficient habitat to meet the population and distribution objective of 500 pairs. As additional information becomes available, critical habitat sites may be added or refined where they meet the critical habitat criteria across the range of the Canadian Hooded Warbler population.

7.2.2 Activities Likely to Result in the Destruction of Critical Habitat

Destruction is determined on a case by case basis. Destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by the species. Destruction may result from a single or multiple activities at one point in time or from the cumulative effects of one or more activities over time.

Activities that are likely to result in the destruction of Hooded Warbler critical habitat include, but may not be limited to:

- Diameter-limit tree harvesting, development for housing or agricultural purposes, and other activities that are detrimental to the retention of mature trees and canopy openings in critical habitat locations. These activities destroy Hooded Warbler critical habitat which consists of mature trees, contiguous forest and small canopy gaps. Additionally, such practices can increase brood parasitism and nest predation rates.

¹¹ Reliable sources may include but are not limited to: records within the Ontario Natural Heritage Information Centre, records in the Ontario Breeding Bird Atlas, observations from acknowledged species experts, observations from recognized birders with photographic evidence, OMNR, CWS, or BSC survey reports, etc.

- Activities that cause habitat fragmentation, such as the construction of infrastructure, the development of roads, trails and footpaths. These activities destroy critical habitat by reducing the area of contiguous and relatively undisturbed forest required by Hooded Warbler and also lead to increases in brood parasitism and nest predation.
- Upgrades and/or maintenance of existing infrastructure (e.g., buildings and roads) either within or adjacent to critical habitat, which can damage or reduce the dense, shrubby vegetation used during Hooded Warbler nesting and post-fledging periods.
- Activities that cause soil erosion and compaction, such as the use of motorized vehicles (e.g., snowmobiles, all-terrain vehicles), which can result in the destruction of critical habitat by introducing invasive species and destroying the native understorey required by the species.

8. MEASURING PROGRESS

The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objectives. Specific progress towards implementing the recovery strategy will be measured against indicators outlined in subsequent action plans.

Acadian Flycatcher

To measure progress, every five years, success of recovery strategy implementation will be measured against the following performance indicators:

- Having maintained the continued persistence of between 35 and 50 pairs of the Acadian Flycatcher in Canada;
- Having maintained the current distribution of Acadian Flycatchers in Canada.

Hooded Warbler

To measure progress, every five years, success of recovery strategy implementation will be measured against the following performance indicators:

- Having increased the breeding population to 500 pairs in Canada;
- Having maintained the current distribution of Hooded Warblers in Canada.

9. STATEMENT ON ACTION PLANS

One or more action plans will be posted on the Species at Risk Public Registry for the Acadian Flycatcher and the Hooded Warbler by December 2017.

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Appendix 1: 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*. 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 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.

Recovery activities that protect large tracts of mature forest for the Acadian Flycatcher and the Hooded Warbler will positively affect a number of other species requiring similar habitats.

List of species that are expected to benefit from recovery activities directed at the Acadian Flycatcher and Hooded Warbler, based upon confirmed records of overlap of occurrence at known occupied sites.

Common Name	Scientific (Latin) Name	COSEWIC Status
Prothonotary Warbler	<i>Protonotaria citrea</i>	Endangered
Cerulean Warbler	<i>Dendroica cerulea</i>	Special Concern
Louisiana Waterthrush	<i>Seiurus motacilla</i>	Special Concern
Red-shouldered Hawk	<i>Buteo lineatus</i>	Not at Risk
Southern Flying Squirrel	<i>Glaucomys volans</i>	Not at Risk
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	Threatened
American Chestnut	<i>Castanea dentata</i>	Endangered
American Ginseng	<i>Panax quinquefolius</i>	Endangered
Cucumber Tree	<i>Magnolia acuminata</i>	Endangered
Large-whorled Pogonia	<i>Isotria verticillata</i>	Endangered
Nodding Pogonia	<i>Triphora trianthophora</i>	Endangered
Red Mulberry	<i>Morus rubra</i>	Endangered
Crooked-stem Aster	<i>Aster prenanthoides</i>	Threatened
Round-leaved Greenbrier	<i>Smilax rotundifolia</i>	Threatened
White Wood Aster	<i>Aster divaricatus</i>	Threatened

Acadian Flycatcher and/or Hooded Warbler habitat is shared by many other species including other species at risk. While some of the proposed recovery activities will benefit the environment in general and are expected to positively affect other sympatric native species, there could be consequences to those species whose requirements differ from those of Acadian Flycatcher and/or Hooded Warbler. Consequently, it is important that habitat management activities for the Acadian Flycatcher and/or Hooded Warbler be considered from an ecosystem perspective through the development, with input from responsible jurisdictions, of multi-species

plans, ecosystem-based recovery programs or area management plans that take into account the needs of multiple species, including other species at risk.

Many of the stewardship and habitat improvement activities to benefit the Acadian Flycatcher and Hooded Warbler will be implemented through existing ecosystem-based recovery programs that have already taken into account the needs of other species at risk.

Appendix 2: Sites Identified as Critical Habitat for the Acadian Flycatcher in Canada

Municipality	Site Name	Geographic Centroid of Critical Habitat Sites ¹²			Size (ha) ¹³
		Zone	Easting	Northing	
Brant	Oakland Swamp	17	551238	4768841	409
Chatham-Kent	Clear Creek	17	442066	4700693	15
Chatham-Kent	Rondeau Provincial Park	17	429965	4682369	130
Elgin	Big Otter James Road	17	512815	4730886	156
Elgin	Copenhagen Woods	17	501628	4723995	43
Elgin	Hawk Cliff	17	485392	4724004	68
Elgin	Rush Creek	17	500171	4724872	23
Elgin	South Otter Headwaters	17	520231	4724554	65
Elgin	Springwater Forest Complex	17	498125	4732107	192
Essex	Spring Garden Natural Area	17	330731	4680798	52
Hamilton	Dundas Valley Southwest	17	579637	4786312	217
Lambton	Lambton County Forest	17	426669	4785566	321
Middlesex	County Line Woods East	17	432021	4731827	31
Middlesex	County Line Woods South	17	431261	4730501	100
Middlesex	County Line Woods West	17	431364	4731934	34
Middlesex	Skunk's Misery Middle Central	17	433518	4721378	82
Middlesex	Skunk's Misery North Centre	17	433363	4722596	267
Middlesex	Skunks Misery Northeast	17	434776	4724149	186
Middlesex	Skunk's Misery Southeast	17	434337	4720846	138
Norfolk	Backus Woods North Block	17	541832	4724332	265
Norfolk	Backus Woods South Block	17	542144	4723032	307
Norfolk	Burwell Tract	17	528657	4724231	152
Norfolk	Deer Creek Valley	17	536397	4727032	169
Norfolk	South Walsingham Southwest Block	17	536300	4719576	249
Norfolk	Spooky Hollow Turkey Point First Concession East	17	554669	4730253	324
Norfolk	Turkey Point Bluff Southwest	17	553935	4726671	140
Norfolk	Ungers Corners Forest Complex	17	547381	4727533	191
Norfolk	Wilson Tract	17	535695	4720695	219

¹² Some irregularly shaped sites may have a site centroid that falls outside the boundary of the site.

¹³ Site size is approximate

Appendix 3: Sites Identified as Critical Habitat for the Hooded Warbler in Canada

Municipality	Site Name	Geographic Centroid of Critical Habitat Sites ¹²			Size (ha) ¹³
		Zone	Easting	Northing	
Durham	Walker Woods West	17	650501	4876160	192
Elgin	Big Otter James Road Rattlesnake Point and Crawford	17	512815	4730886	156
Halton	Lake Conservation Areas	17	586026	4813971	493
Hamilton	Dundas Valley Northwest	17	579196	4787358	67
Hamilton	Dundas Valley Southeast	17	580905	4786474	146
Hamilton	Dundas Valley Southwest	17	579637	4786312	217
Hamilton	North Shore Cootes Paradise	17	588050	4792528	138
Lambton	Lambton County Forest	17	426669	4785566	321
Middlesex	County Line Woods East	17	432021	4731827	31
Middlesex	County Line Woods West	17	431364	4731934	34
Middlesex	Skunk's Misery Middle East	17	435281	4723173	64
Middlesex	Skunk's Misery North Centre	17	433363	4722596	267
Middlesex	Skunk's Misery Northeast	17	434776	4724149	186
Middlesex	Skunk's Misery Southwest	17	432199	4721113	94
Niagara	Bay Woods	17	654937	4746757	206
Niagara	Effingham Forest	17	637891	4771252	87
Niagara	Fonthill Sandhill Valley	17	640429	4768666	116
Niagara	Holloway Bay Road	17	653592	4747702	53
Niagara	Niagara Escarpment - Beamsville Section	17	626809	4778657	155
Niagara	Niagara Escarpment - Wolverton Section	17	612063	4783279	139
Niagara	St. John's Conservation Area	17	639743	4769539	73
Norfolk	Abbot-Townsend Tract	17	529831	4740232	160
Norfolk	Backus Woods North Block	17	541832	4724332	265
Norfolk	Backus Woods South Block	17	542144	4723032	307
Norfolk	Barrett-Sanderson Tract	17	541855	4725770	73
Norfolk	Bill's Corner	17	552485	4740186	177
Norfolk	Buchner Mason Tract	17	548166	4726695	181
Norfolk	Cultus Woods Centre Block	17	529754	4723096	235
Norfolk	Cultus Woods East Block	17	530978	4722036	219
Norfolk	Deer Creek Valley	17	536397	4727032	169
Norfolk	Elmer Connell County Forest	17	545279	4742235	70
Norfolk	Fishers Glen	17	556870	4730600	105
Norfolk	Jackson Tract	17	531825	4725401	57
Norfolk	Lake Erie Farms	17	535018	4722098	199
Norfolk	Landon Tract South	17	550484	4737500	204
Norfolk	Langton Forest North	17	534557	4734069	32

Municipality	Site Name	Geographic Centroid of Critical Habitat Sites ¹²			Size (ha) ¹³
		Zone	Easting	Northing	
Norfolk	Lefebvre Tract North Walsingham NW3	17	541001	4725094	26
Norfolk	County Forest	17	533030	4733920	26
Norfolk	Pinegrove Forest Northeast	17	544745	4738217	211
Norfolk	Pinegrove Forest Northwest	17	543444	4738113	15
Norfolk	South Walsingham Southeast Block	17	537425	4721111	68
Norfolk	South Walsingham Southwest Block	17	536300	4719576	249
Norfolk	Spooky Hollow Turkey Point First Concession East	17	554669	4730253	324
Norfolk	St Williams Forest North Block	17	543162	4728310	446
Norfolk	St Williams Forest Southeast Block	17	544969	4727849	132
Norfolk	St Williams Forest Southwest Block	17	543415	4726892	248
Norfolk	Turkey Point First Concession West	17	552390	4729039	234
Norfolk	Turkey Point Second Concession West	17	551859	4730069	113
Norfolk	Ungers Corners Forest Complex	17	547381	4727533	191
Norfolk	Venison Creek South	17	534554	4723407	132
Norfolk	Vittoria Road Woods	17	545067	4730830	76
Norfolk	Walsh Forest Northeast	17	547991	4734361	280
Norfolk	Walsh Forest Southeast	17	548041	4733079	173
Norfolk	West of Backus Woods	17	540193	4723880	8
Norfolk	Wilson Tract	17	535695	4720695	219
Norfolk	Yuell Road East	17	546914	4738518	135
York	Happy Valley East	17	611964	4869036	541
York	Happy Valley West	17	610330	4869084	207

¹² Some irregularly shaped sites may have a site centroid that falls outside the boundary of the site.

¹³ Site size is approximate.