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Conserve Ontario's Carolinian Forests

Preserve Songbird Species at Risk



Canada

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Fax: 819-994-1412
TTY: 819-994-0736
Email: enviroinfo@ec.gc.ca

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CONSERVE ONTARIO'S CAROLINIAN FORESTS: PRESERVE SONGBIRD SPECIES AT RISK

SONGBIRDS OF CANADA'S CAROLINIAN FORESTS

Several of Canada's at-risk forest songbird species, including the Acadian Flycatcher (*Empidonax vireescens*), Cerulean Warbler (*Setophaga cerulea*), Hooded Warbler (*Setophaga citrina*), Louisiana Waterthrush (*Seiurus motacilla*) and Prothonotary Warbler (*Protonotaria citrea*), are migrants that share essential breeding habitat in the forests of Ontario's Carolinian Zone. Like many songbirds that nest in Canada, these species winter in Central and South America, and migrate each year to eastern North America for the spring and summer months. All five of these species nest primarily in the forested regions of the eastern United States, but also nest in the forested regions of Ontario's Carolinian Zone. Natural areas in this region of southwestern Ontario are under pressure from urban expansion and increasing intensification of agricultural practices, all of which result in a reduction in the amount and size of woodlands.

ONTARIO'S CAROLINIAN ZONE

Ontario's Carolinian Zone lies south of an imaginary line between Grand Bend on Lake Huron and Toronto on Lake Ontario. This region enjoys warmer year-round temperatures than any other part of Ontario. The climate supports ecosystems found nowhere else in Canada, along with levels of biological diversity unsurpassed elsewhere in the province.

"Carolinian" is a name coined by early botanists, who observed that hardwood forests in southwestern Ontario share many characteristics with forests as far south as North and South Carolina in the United States. Forests in Ontario's Carolinian Zone are populated with trees having a strong southern affinity, such as tulip tree (*Lireodendron tulipifera*), sassafras (*Sassafras albidum*), Kentucky coffee-tree (*Gymnocladus dioicus*), cucumber tree (*Magnolia acuminata*), black gum (*Nyssa sylvatica*), and pawpaw (*Asimina triloba*).

It has been estimated that more than 50% of the federally-listed species at risk occur in Ontario's Carolinian Zone. Throughout this region, pressures from urban expansion, increased industrialization and intensified agricultural practices have caused extensive wildlife habitat destruction. In parts of this zone, over 90% of the original forests are gone. Most of the remaining forests are too small and isolated to accommodate at-risk forest bird species and other species that depend on the specialized habitats found in larger forest tracts.

A CLOSER LOOK AT THESE CAROLINIAN FOREST SONGBIRDS

All five of these songbird species are considered "area-sensitive," which means they are more likely to be found within large, mature forests (forests with a high density of large trees) during the nesting season. Prior to European settlement, the dominant land cover in southern Ontario was forest, and it is estimated that the majority of it was mature (OMNR 2011). Today, in Ontario's Carolinian

Zone, forest cover ranges from 5% to 25%, with mature forest habitat and older growth conditions diminished in both stand size and overall availability.

Each of these five species is a habitat specialist, requiring forest microhabitats with certain characteristics, and four of the five species are listed as a species at risk both provincially under the *Endangered Species Act, 2007* (ESA) and federally under the *Species at Risk Act* (SARA).¹

Acadian Flycatchers (Endangered under ESA and SARA) are olive-coloured birds with a light eye ring and two white wing bars. They make their homes under tall, closed tree canopies in the dark interiors of mature woodlands, often along steep-sided ravines. These small birds have an explosive song that sounds like “peet-sah,” which may be heard from shady spots along creeks and swamps. Their nests are generally built at heights of 3 to 9 metres over bare, open areas such as streams and pools of water. Nests are typically suspended from the horizontal branches of American beech, eastern hemlock and flowering dogwood trees, and can be distinguished by long, hanging strands of grass or other materials. Although the Canadian population appears to be relatively stable, there are only an estimated 35 to 50 pairs annually, occupying fewer than 50 sites each year. Acadian Flycatchers are common in many large forests in the eastern and southeastern United States, although the continental population has experienced a decline in recent decades.

Cerulean Warblers (Special Concern under SARA; Threatened under ESA) are distinctively sky-blue (in the case of the male) or blue-green (in the case of the female) on their heads, backs and tails. Both sexes have two prominent white wing-bars and white tailspots. Preferring mature deciduous forests with an open understory, male Cerulean Warblers sing a buzzy song from high in the canopy. Their small, tidy, cup-like nests are usually located on high horizontal branches in tall deciduous trees, often near water. The species has experienced widespread declines across much of its North American range. The Canadian population is estimated to be approximately 500 breeding pairs, primarily found within two Ontario regions: the Carolinian Forest and the Great Lakes–St. Lawrence Forest. Population declines are most pronounced in the Carolinian Zone.

Hooded Warblers (Threatened under SARA) are easily identified by their bright yellow faces and underbodies. The males have full black hoods, whereas the females may have nearly complete hoods or no hoods at all. Their loud song suggests the phrase “weeta-weeta-weetee-o.” The nest, best described as a bulky mass of dry leaves, is built in the low, shrubby understory that occurs in small gaps created by natural windfall or selective logging in mature, dry forests. This species prefers to nest close to the ground, often in wild red raspberry (*Rubus idaeus*) and black raspberry (*Rubus occidentalis*) thickets. Although the Canadian population is increasing, there are just over 400 pairs (approximately 1000 to 2000 adults) thought to be present in Ontario each year. Hooded Warblers are common in highly forested regions of the eastern and southeastern United States, but are considered to be at risk in several states (Delaware,

¹ Note status designations and provincial and federal listings of species at risk are subject to change. For example, Cerulean Warbler and Hooded Warbler have been re-designated as Endangered (November 2010) and Not at Risk (May 2012), respectively, by the Committee on the Status of Endangered Wildlife in Canada. For current status designations and listings of species at risk under the Ontario ESA and the federal SARA, see websites listed under Suggested Reading.

Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, New Jersey, Oklahoma, Rhode Island and Wisconsin) due to habitat loss and degradation.

Louisiana Waterthrushes (Special Concern under ESA and SARA) are relatively plain, brown warblers with dark streaking on their white underbodies and sides. They can be distinguished from their Northern Waterthrush relatives by a white eyebrow stripe. Louisiana Waterthrushes inhabit a particularly specialized habitat: pristine, steep-sided, headwater stream valleys and associated wetlands in large mature forests. Their song is led by loud, descending whistles that are followed by a complex series of whistled phrases. Louisiana Waterthrushes spend most of their time on or near the ground, where they forage in streams and pools, and nest amongst the roots of fallen trees, in or under fallen logs, or in hollows along stream banks. Nests are generally well-concealed by roots and hanging vegetation. Population levels in Ontario (estimated at less than 200 pairs), where surveys have been conducted in Canada, have remained relatively constant over the past two decades. Despite being fairly common and widespread in parts of the eastern United States, Louisiana Waterthrushes are at risk in some states neighbouring Canada as well as in Quebec. In Canada, the species' well-being is threatened by woodland loss and degradation, and activities that can degrade water quality, such as the use of off-road vehicles to cross rivers and streams. Off-road vehicles increase stream siltation, alter the aquatic invertebrate community and may reduce food availability for both adult and young birds.

Prothonotary Warblers (Endangered under ESA and SARA) have striking golden-yellow heads and underbodies, with olive-green backs and blue-grey wings and tails. Their loud calls of "tsweet-tsweet-tsweet-tsweet" may be heard in mature and mid-aged deciduous swamps and riparian floodplains with permanent or semi-permanent pools of water. Prothonotary Warblers nest in natural cavities or human-made nesting boxes, usually located at heights of 2 metres over still or slow-moving water. Their Canadian and continental populations have declined substantially in recent decades. Ontario currently supports approximately 10 pairs, which is down from more than 40 pairs during the mid-1980s. Although the species is considered secure in many states, the species is considered at risk in all of the states bordering its Canadian distribution (i.e., New York, Pennsylvania, Ohio and Michigan).

Protecting the populations of these five species in Canada is contingent on conserving the remaining Carolinian forests in Ontario. It is expected that the conservation of Ontario's Carolinian forests will benefit other forest birds as well, including more common forest species such as the Wood Thrush (*Hylocichla mustelina*), Ovenbird (*Seiurus aurocapillus*) and Pileated Woodpecker (*Dryocopus pileatus*). To protect and enhance the habitat of these songbirds, cooperative efforts are required from landowners, managers, foresters, biologists, planners, municipalities, habitat restoration groups and community conservation groups.

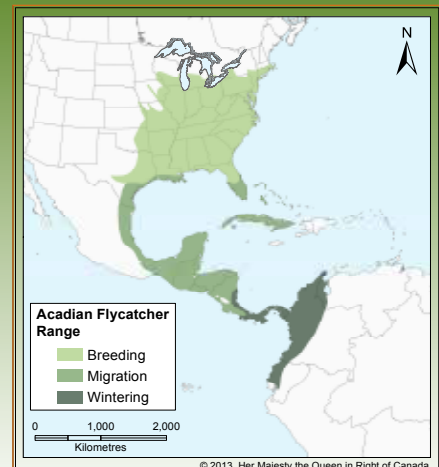
THE SPECIES RANGES AND THE CAROLINIAN ZONE

The majority of forest songbirds in Canada, including these five species, are neotropical migrants, which means that they breed in North America in the summer months and winter in Central and South America or the Caribbean. The Canadian breeding ranges of these five species are largely restricted to the Carolinian Zone of southwestern Ontario. Climate change is thought to be driving a northwards expansion of the range of some of these species. Wildlife found at the northern extent of their breeding range can provide important benefits to their species because these populations often evolve unique genetic and behavioural variations that can contribute to species' survival in the event of rapid changes to the environment or climate, which may affect the core populations in an unfavourable way.

ACADIAN FLYCATCHER



Acadian Flycatcher
Photo: © Michael Patrikeev



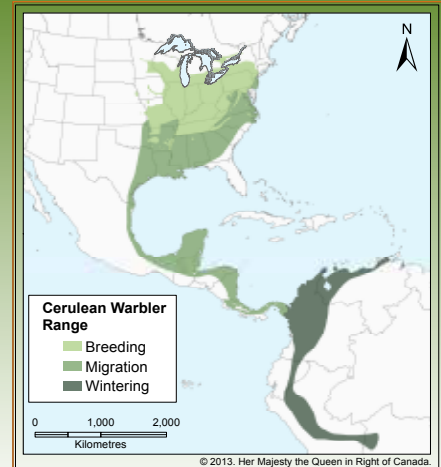
Breeding and wintering range of the Acadian Flycatcher.

Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy – Migratory Bird Program, Conservation International – Center for Applied Biodiversity Science, World Wildlife Fund – US, and Environment Canada – WILDSpace.

CERULEAN WARBLER



Cerulean Warbler
Photo: © Carl Savignac



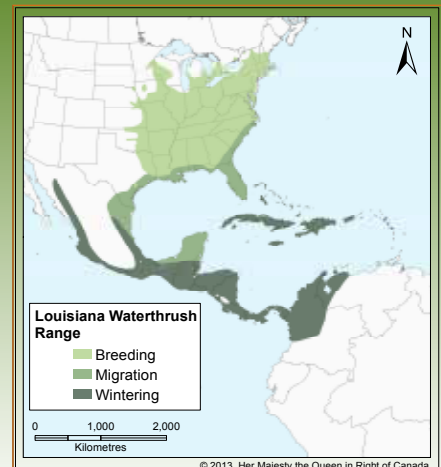
Breeding and wintering range of the Cerulean Warbler.

Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy – Migratory Bird Program, Conservation International – Center for Applied Biodiversity Science, World Wildlife Fund – US, and Environment Canada – WILDSpace.

LOUISIANA WATERTHRUSH



Louisiana Waterthrush
Photo: © George K. Peck



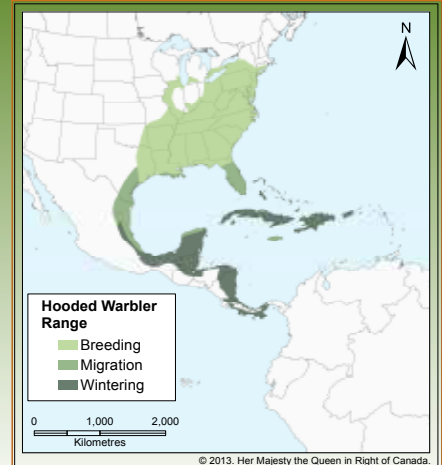
Breeding and wintering range of the Louisiana Waterthrush.

Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy – Migratory Bird Program, Conservation International – Center for Applied Biodiversity Science, World Wildlife Fund – US, and Environment Canada – WILDSpace.

HOODED WARBLER



Hooded Warbler
Photo: © U.S. Fish & Wildlife Service



Breeding and wintering range of the Hooded Warbler.

Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy – Migratory Bird Program, Conservation International – Center for Applied Biodiversity Science, World Wildlife Fund – US, and Environment Canada – WILDSpace.

PROTHONOTARY WARBLER



Prothonotary Warbler
Photo: © U.S. Fish & Wildlife Service

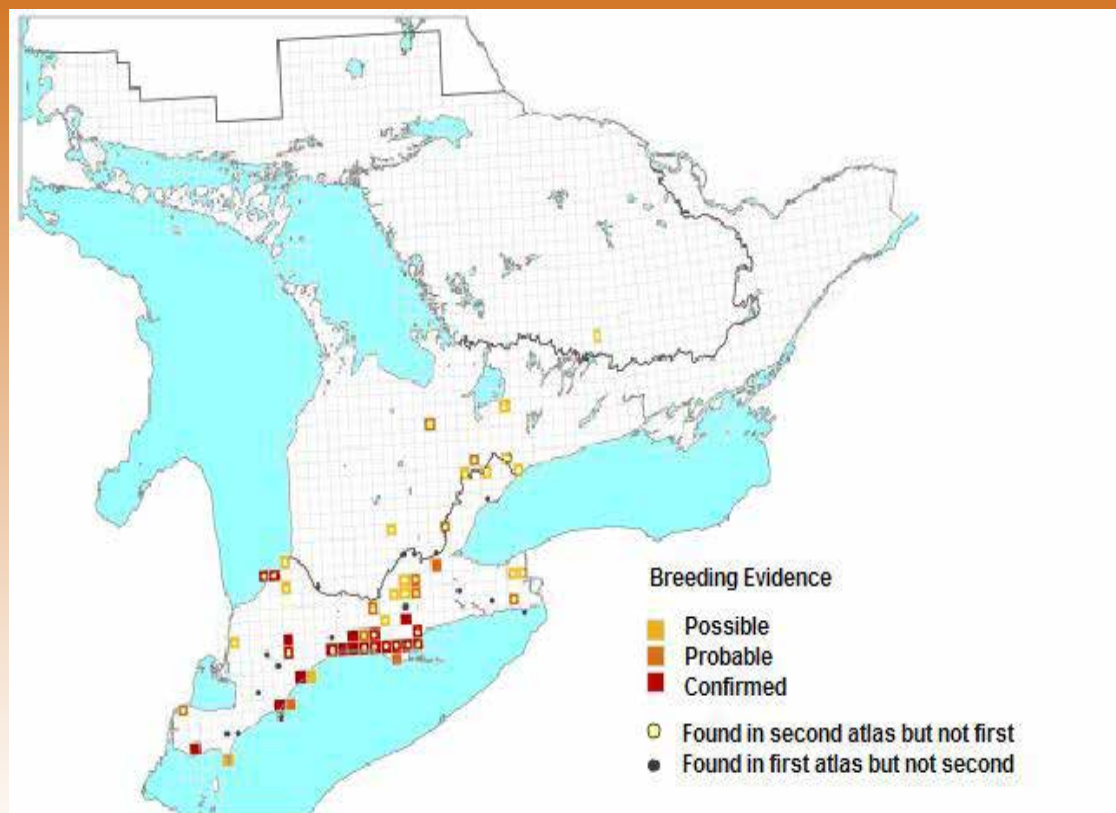


Breeding and wintering range of the Prothonotary Warbler.

Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy – Migratory Bird Program, Conservation International – Center for Applied Biodiversity Science, World Wildlife Fund – US, and Environment Canada – WILDSpace.

The breeding range of any bird species in Canada is often determined through the compilation of various regional surveys of breeding birds. The information from these regional surveys may be used to develop and publish breeding bird atlases, such as the Ontario Breeding Bird Atlas.

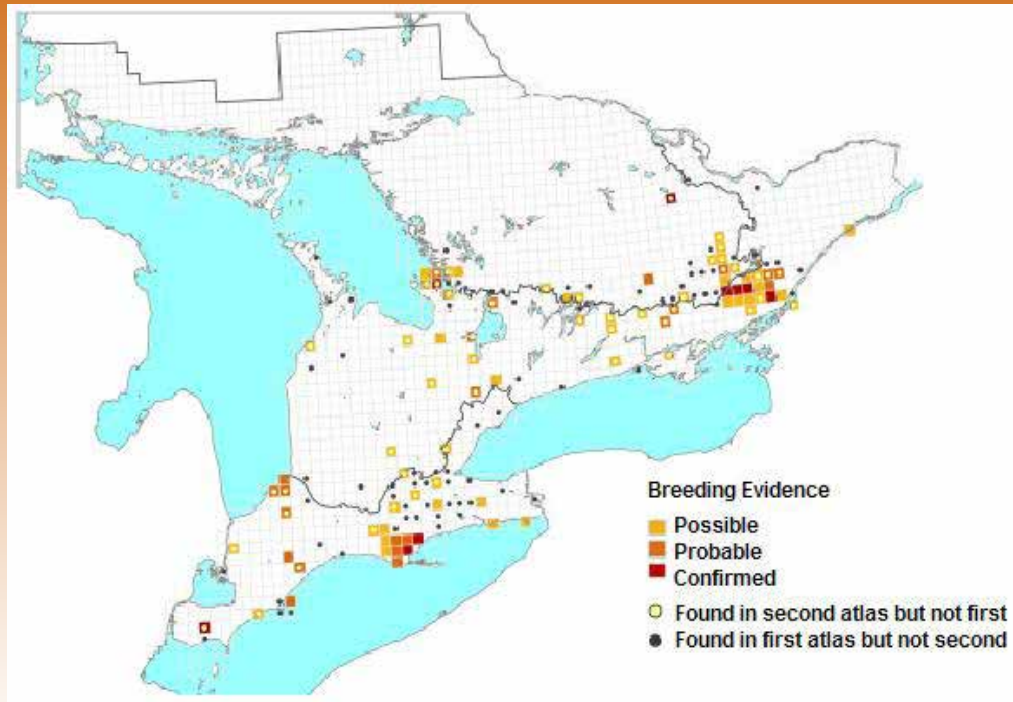
ACADIAN FLYCATCHER



Known breeding distribution of the Acadian Flycatcher in Ontario using data collected from the second Ontario Breeding Bird Atlas (2001–2005).

Data from the first atlas was collected between 1981 and 1985. Maps provided by Bird Studies Canada, from the Atlas of the Breeding Birds of Ontario (2001–2005).
www.birdsontario.org/atlas/index.jspw

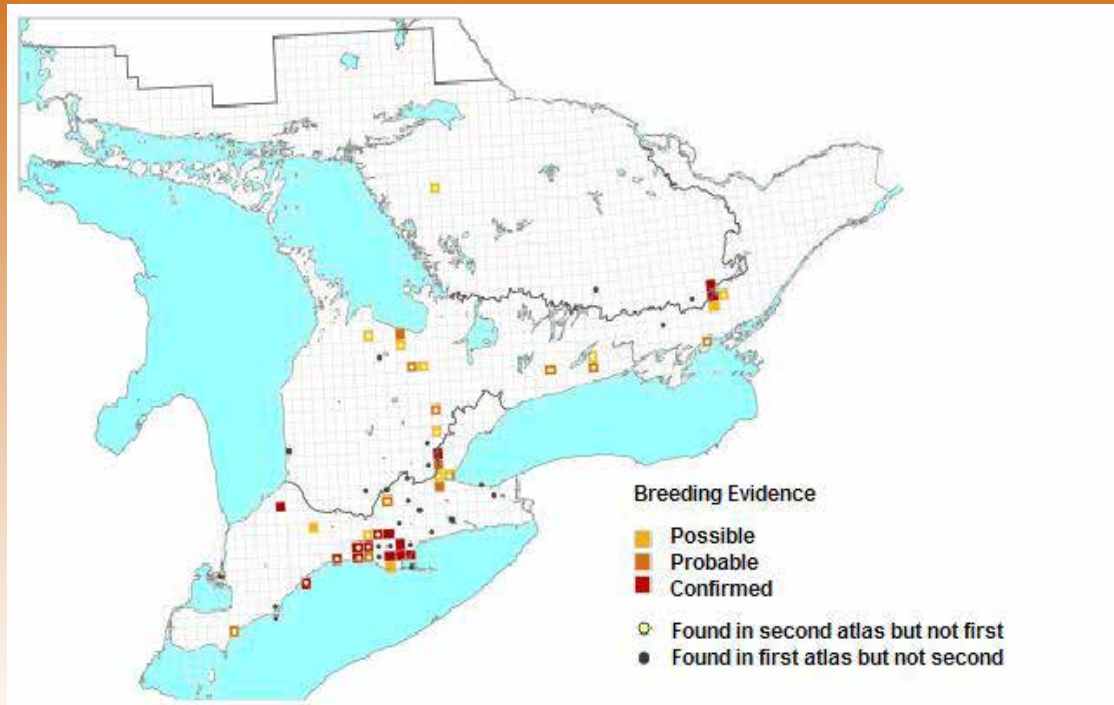
CERULEAN WARBLER



Known breeding distribution of the Cerulean Warbler in Ontario using data collected from the second Ontario Breeding Bird Atlas (2001–2005).

Data from the first atlas was collected between 1981 and 1985. Maps provided by Bird Studies Canada, from the Atlas of the Breeding Birds of Ontario (2001–2005). www.birdsontario.org/atlas/index.jspw

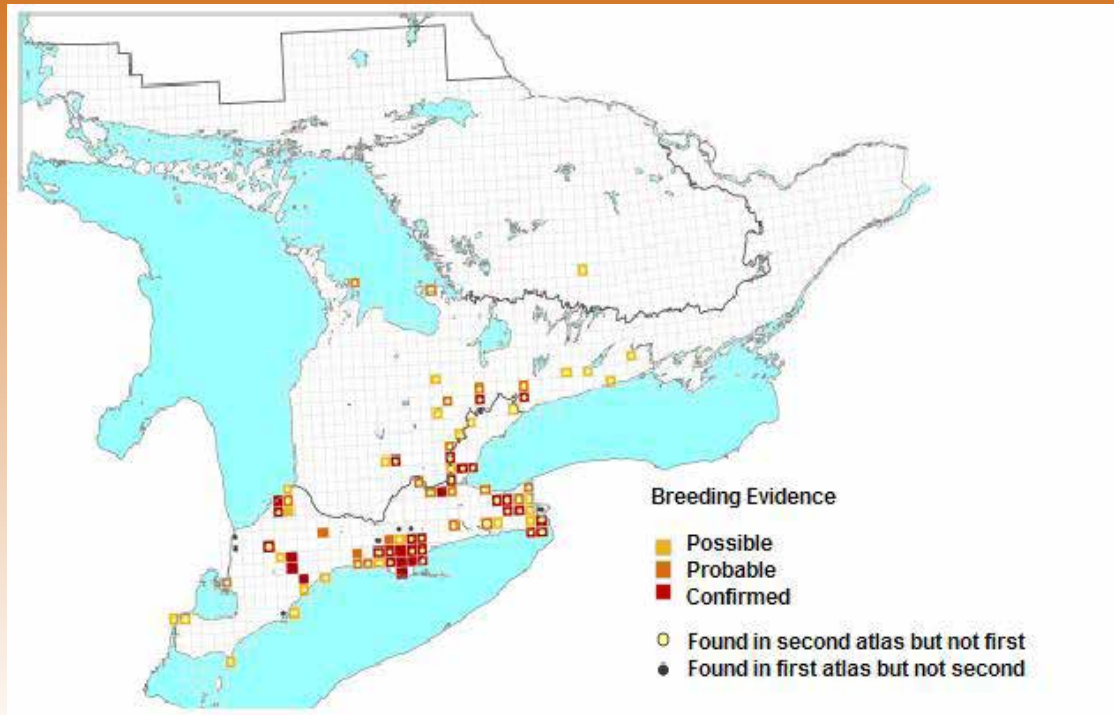
LOUISIANA WATERTHRUSH



Known breeding distribution of the Louisiana Waterthrush in Ontario using data collected from the second Ontario Breeding Bird Atlas (2001–2005).

Data from the first atlas was collected between 1981 and 1985. Maps provided by Bird Studies Canada, from the Atlas of the Breeding Birds of Ontario (2001–2005). www.birdsontario.org/atlas/index.jspw

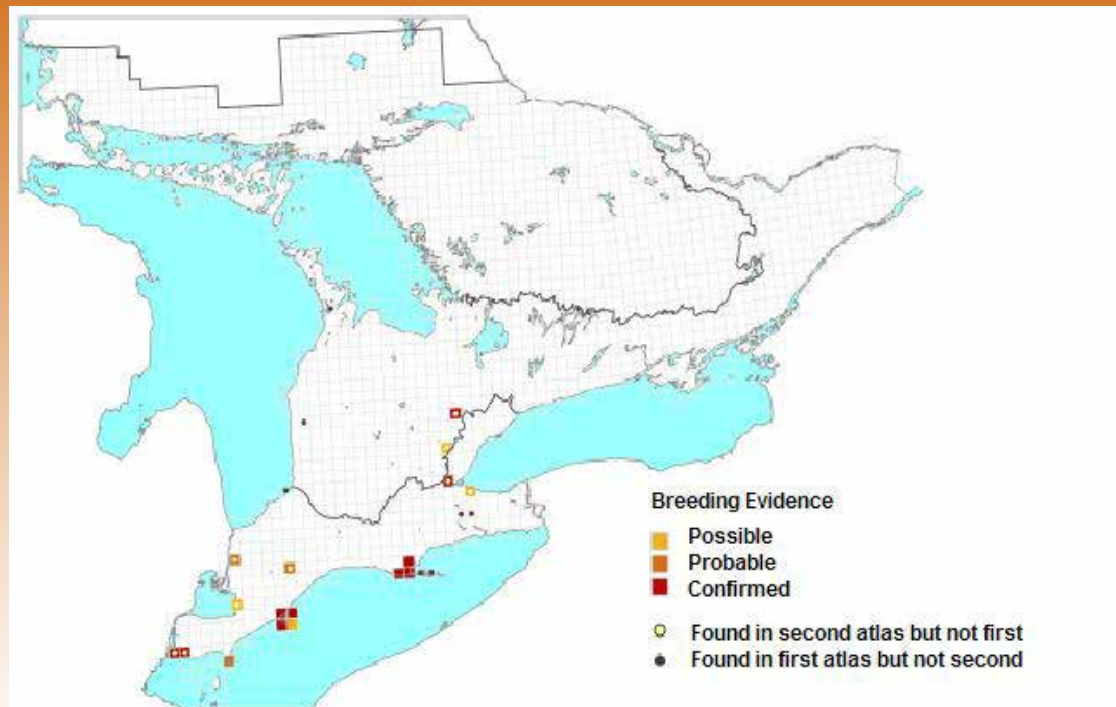
HOODED WARBLER



Known breeding distribution of the Hooded Warbler in Ontario using data collected from the second Ontario Breeding Bird Atlas (2001–2005).

Data from the first atlas was collected between 1981 and 1985. Maps provided by Bird Studies Canada, from the Atlas of the Breeding Birds of Ontario (2001–2005). www.birdsontario.org/atlas/index.jspw

PROTHONOTARY WARBLER



Known breeding distribution of the Prothonotary Warbler in Ontario using data collected from the second Ontario Breeding Bird Atlas (2001–2005).

Data from the first atlas was collected between 1981 and 1985. Maps provided by Bird Studies Canada, from the Atlas of the Breeding Birds of Ontario (2001–2005). www.birdsontario.org/atlas/index.jspw

CANADA'S RECOVERY PLANS

The Committee on the Status of Endangered Wildlife in Canada, known as COSEWIC, is the national assessment body that makes recommendations on the status of species believed to be at risk of disappearing from Canada. The government then reviews these assessments and decides which species are added to the List of Wildlife Species at Risk in Canada (Schedule 1) under SARA. Once species are listed on Schedule 1 of the federal SARA, recovery strategies and action plans (for endangered and threatened species) or management plans (for species of special concern) are prepared for each species and posted on the Species at Risk Public Registry (see Suggested Reading).

Species are also assessed at the provincial level by a separate group of experts (Committee on the Status of Species at Risk in Ontario, known as COSSARO). Status recommendations made by COSSARO are reviewed by the Ontario government, which decides which species are placed on the list of Species at Risk in Ontario (SARO) under the provincial ESA. Recovery strategies (for endangered or threatened species) and management plans (for some species of special concern) are then prepared and are available through the Ontario Ministry of Natural Resources Species at Risk Program (see Suggested Reading).

The objectives of the federal recovery strategies for the Hooded Warbler and Prothonotary Warbler are to increase the current populations of these birds in Ontario. Successful recovery will raise the populations to 500 nesting pairs of Hooded Warblers and 40 nesting pairs of Prothonotary Warblers. The objectives of the federal recovery strategy for the Acadian Flycatcher and the federal management plans for the Cerulean Warbler and Louisiana Waterthrush are to maintain current populations and distribution of these species. Recovery practitioners are working with other stakeholders to achieve these goals by:

- encouraging private landowners and public managers of Carolinian forests in Canada to protect and enhance these rare ecosystems through stewardship strategies, easements, acquisition, tax incentives, policies or legislation;
- providing stewardship and management options to landowners, managers and foresters that are designed to maintain and enhance Carolinian forest habitat; and
- conducting or contributing to ongoing habitat surveys and population monitoring.

BUILDING BETTER FOREST HABITAT

These five forest songbirds prefer large forested landscapes for nesting. In Canada, the largest amount of forest cover within the Carolinian Zone is found in Halton and Norfolk counties, which are approximately 26% and 25% forested, respectively.

EXAMPLES OF TYPICAL NESTING HABITAT IN ONTARIO



Photo: © Bill Rayner and Ron Kingswood

Acadian Flycatchers nest in steep-sided, wooded creek valleys, maple swamps and moist maple-beech woodlands



Photo: © Bill Rayner and Ron Kingswood

Hooded Warblers nest in gaps within large, mature woodlands dominated by white oak, red maple, white pine and/or American beech

Large habitat required

These birds occasionally inhabit forests as small as 10 to 20 hectares (about 25 to 50 acres), but are much more common in forests of at least 100 hectares (about 250 acres). Cerulean Warblers are thought to prefer a minimum of 250 hectares (675 acres). Small forests can, and do, attract some of these species if they are in a landscape with larger amounts of forest cover within the region.



Building on forest interiors Circular or square woodlands have proportionally more interior habitat than long, narrow woodlands of the same area. Strategic reforestation of edges and openings will increase the amount of forest interior habitat and result in larger forests.

Canadian Wildlife Service – Ontario Region, adapted from Conserve Ontario's Carolinian Forests: Preserve Endangered Songbirds/Friesen and Stabb, 2001.

Large mature forests with habitat more than 100 metres from the edges are more likely to contain the variety of specialized microhabitats these songbirds require for nesting, foraging and cover. They also represent a stage in forest development where occasional large mature trees in the canopy die and fall, thus creating natural forest gaps/openings and the specialized microhabitat preferred by Hooded Warblers.

Different from natural forest gaps/openings, hard-edge habitat typically occurs in a fragmented landscape of smaller forests and is characterized by the boundary between two very dissimilar habitat types (e.g., forest and agricultural field). Hard-edge habitat has a very different structure and function than interior forest habitat. For example, nest predators such as raccoons may be more abundant in fragmented landscapes, where forest cover is present in small, more isolated forest patches, surrounded and divided by other land uses than in landscapes with large, intact forests. Fragmented forest habitat usually exists in settled landscapes and is characterized by forest patches mixed with fields, pastures, orchards and residential areas, and a higher proportion of forest-edge habitat.

Birds nesting in large continuous forest cover are exposed to fewer Brown-headed Cowbirds (*Molothrus ater*), a common forest-edge species. As "brood parasites," cowbirds do not build their own nests. Instead, they lay their eggs in the nests of other bird species, which incubate the cowbird eggs and raise the cowbird hatchlings as their own. As a result, the host parents may raise few or none of their own young. The amount of edge habitat can be minimized by protecting large tracts of forest, and increasing the size of individual forests through reforestation projects.

Benefits of mature forests

Mature forests, which are disappearing rapidly in southern Ontario, have special ecological significance. They often support a greater mix of tree and plant species, and habitats at different stages of succession, than younger forests. They also offer the diversity of habitats (microhabitats) required by a suite of area-sensitive forest birds, including species at risk. They have a much greater potential to contain, or be managed to retain and enhance, important old growth characteristics such as large trees, downed wood, cavity trees and multi-layered canopies.

Landowners who manage mature forests on a sustainable basis can maintain a continuous periodic income while maintaining woodland bird habitat with only slightly modified return times and harvesting prescriptions. Also, by leaving some uncut areas and older seed trees of a variety of species, along with providing variable regeneration gap sizes, landowners will maintain overall forest-stand diversity and health over the long term.

Public agencies that own or manage Canada's remaining Carolinian forests are encouraged to manage these properties as mature forest stands. A strong commitment from public landowners will greatly enhance the survival of forest songbird species at risk and other Carolinian species with specialized habitat requirements, and will establish benchmarks for similar stewardship by private landowners.



A GUIDE TO HABITAT-FRIENDLY FOREST MANAGEMENT

Good forestry practices can maintain and improve the economic quality of a forest over a long period of time without harming the ecological processes that sustain and create wildlife habitat. These practices lower the risk of damaging or destroying the habitat of forest bird species at risk. Viable harvesting options are available that can benefit both landowners and area-sensitive species, including species at risk. Many species will thrive in a carefully managed forest, while the forest continues to provide long-term income for the landowner. Harvesting forests wisely builds a significant legacy for the conservation of our natural heritage, and protects long-term economic interests for future generations.

Habitat-friendly forest management practices include *single-tree selection* and *group selection harvesting*, which are designed to mimic small-scale patterns of natural disturbances such as lightning strikes leading to small-scale fires, windthrow, ice storms and disease, under which the hardwood forests of eastern North America evolved. Selection harvesting results in uneven-aged forest stands with a variety of habitats. Removal of one-third or less of the wood volume per cut, across trees of all ages, is preferred to maintain the forest canopy and optimize growth in all remaining trees. Periodic harvesting in this manner provides a reliable financial return, while providing forest structural diversity and a continuous forest canopy.

Detrimental to the conservation of Carolinian forests and the species that depend upon them are: a. *clear-cut harvesting*, where all mature trees are removed in one cutting operation; b. *high-grading or selective cutting*, where the best quality trees or tree species are removed; and c. *diameter-limit cutting*, where all trees larger than a certain size are removed. These practices reduce structural diversity and remove mature forest features required by many forest-breeding birds.

Importance of planning

Careful planning at all stages of forest management can help to determine feasible economic objectives, minimize environmental damage, and protect sensitive species and features of the site. Consultation with professional foresters and other experts is recommended when planning any forest management project including tree harvesting and stand improvement. The choice of method (silvicultural system) will depend on the tree species composition and conditions that exist. Some species can regenerate in shadier conditions and are more suited to single-tree selection, while others need more light and may require the larger gaps that can be created through group selection.

Information on forest management in southern Ontario can be obtained from the Ontario Ministry of Natural Resources (see listed Ontario Ministry of Natural Resources products/weblinks under Relevant Programs and Suggested Reading).

Single-tree selection option

Single-tree selection is the least intrusive cutting system and likely comes closest to imitating a natural pattern of small-scale forest disturbance. For this option, a prescribed selection of variously sized individual trees, targeted either because they are unhealthy or low-quality (as evaluated by a qualified forester or certified tree marker) or because they are desirable for timber, are removed at short intervals of 10 or 20 years. Such cuts leave a scattered pattern of small gaps/openings and encourage the growth of preferred trees with timber, seed, wildlife or other values, while also leaving all the major tree components in place to rejuvenate themselves in a natural pattern. The life expectancy of the gaps is relatively short because they tend to regenerate quickly, but continued single-tree selection will ensure that new gaps are created. Meanwhile, retention of many older-growth trees ensures that essential ecological cycles (including reseeded) are maintained.

Retaining many large-diameter trees in the forest maintains a permanent canopy cover, the habitat most beneficial for the majority of forest songbird species at risk. At the same time, the interspersed small gaps/openings created through single-tree selection will provide other habitat that is ideal for Hooded Warblers. Gaps as small as five metres wide can provide suitable nesting habitat for these songbirds.

Group-tree selection option

Group-tree selection is a method of harvesting small patches or groups of trees, which creates a patchwork of openings within the forest, where young trees can grow. The gaps should have a diameter less than two times the height of the mature trees (canopy), and for most targeted tree species will range between one and two times the canopy height. Because more than one or two trees are removed at a time, the gaps tend to be slightly larger than those found in single-tree selection. Group-tree selection can also be included as part of single-tree selection. In either case, stands should only be cut again when the growth has replaced the volume removed (usually a 10- to 20-year interval between harvesting).

Provided that the operations retain some tracts of mature and uncut deciduous woodland, well-planned group-tree selection treatments can maintain the closed canopy conditions favoured by the majority of forest songbird species at risk. In turn, within a few years of their creation, the woodland gaps begin to regenerate and can attract Hooded Warblers that use these small gaps to nest. The number of gaps installed per cutting cycle should be calculated to be sustainable by a professional forester. In most cases, less than one gap should be installed per hectare, and this will provide shrub cover and foraging habitat for nesting Hooded Warblers. The warblers may return annually until the saplings reach more than 5 metres in height and begin shading out the thick undergrowth, a process which may take 12 years or more.

Other management options

The *shelterwood system* is a form of even-aged forest management involving the removal of all mature trees over multiple partial cuts. Preparatory cutting may be implemented to thin the stand and provide selected trees ample room to grow. The next step, regeneration tree cutting, is intended to stimulate regrowth by increasing light levels. Some years later, one or more removal cuts are performed to harvest the remaining mature trees. Crop tree management focuses on selecting and retaining trees that meet specific forest management objectives and can be implemented at early stages.

If shelterwood harvesting retains sufficient canopy cover, many forest bird species may remain, and the number of bird species may even increase after the regeneration cut as both mature and early-successional habitat is available. However, the abundance of forest birds that specialize in old growth or mature forest habitat will decline compared to uncut or selectively logged stands. Retaining a minimum of 25 mature trees (from the original forest) per hectare in the final cut can help maintain some of this specialized habitat and the species associated with it. As well, altering the frequency and timing of cutting can maintain various stages of growth throughout the harvest area.

The shelterwood system, however, is not a recommended treatment for known locations of any of the five bird species highlighted in this document.

Diameter-limit cuts may limit future options

A diameter-limit cut involves harvesting every tree larger than a specified diameter. This system severely diminishes the ecological health of the forest and reduces opportunities for long-term, sustainable income from future cuts. Landowners are often left with a forest stand of low quality and reduced genetic diversity. As well, diameter-limit cuts remove all of the oldest trees and will almost certainly eliminate breeding habitat for forest songbird species at risk and other woodland birds that need mature forest habitat.

Cut rotation is essential

Best practices for habitat conservation and economic benefit from a forest indicate that only a portion of the forest should be cut at any one time. Rotating cuts ensure that essential forest-bird habitat is maintained by creating a mosaic of closed and open canopy conditions, which address the habitat needs of birds at risk that require mature forests as well as those that require young forest and forest openings. At the same time, periodic cut rotation ensures a sustained income for the landowner.

Minimize impacts of logging

To minimize the impacts of logging on breeding birds, operations must be scheduled outside the nesting season. Destruction of active nests is prohibited for any bird listed under the federal *Migratory Birds Convention Act, 1994*. The best time to log is from October to March, when the ground is either frozen or dry enough to minimize or avoid damage to the forest floor and when birds are

not nesting. Plan carefully to keep the size and number of trails and landings low, which will reduce the number of human-caused disturbances to the forest and help to avoid the spread of invasive native and non-native plants.

Maintain the edge

Open hard edges expose the forest to greater risk of windthrow, drought, disease, exposure to pesticides, and invasive plants. Avoid cutting trees within 20 to 30 metres of the forest edges. A dense stand of trees around the woodland edges, particularly on the southwest-facing side, buffers the forest interior from the damaging effects of wind and sun.

Keep an undisturbed woodland interior

Consider leaving a permanent, unlogged core area in the centre (interior) of the forest as a mature forest reserve. Mature forest habitat supports many plant and animal species that are absent or uncommon in young forests. Mature forests can satisfy the habitat requirements of all forest songbird species at risk because they provide extensive closed-canopy areas, along with a mosaic of natural gaps/openings created by natural tree fall.

IMPROVING AND ENHANCING FOREST HABITAT

Stand improvement

Many southern Ontario forests have experienced degradation through poor management, overharvesting or other activities. Such forests are characterized by poor structural diversity, lack of mature forest elements, few trees of good health and vigour, prevalence of fungal diseases, and/or limited regeneration of good quality seedlings. While rehabilitation plans should be developed in response to specific stand challenges, they should generally focus on the identification and retention of desirable trees, coupled with targeted thinning to improve growth and regeneration.

Additionally, identify and consider protecting special habitat features. For example, retaining some cavity trees and snags (dead standing trees) provides habitat for a large variety of forest birds, species at risk and other wildlife species.

Enlarge and reconnect existing forest

The amount of forest interior habitat can be increased, sometimes significantly, by reforesting fields and other large openings within woodlands, restoring marginal farmland around forest edges, and reconnecting isolated/fragmented forests. Strategic reforestation can have important, lasting ecological benefits for area-sensitive and forest-interior species. The exception is reforesting land that is, or may have been historically naturally open, such as prairies and savannahs, or old fields and other open features that are providing beneficial habitat for other wildlife.

Protect valleylands and swamps

Forests bordering streams and ravines provide important habitat for Acadian Flycatchers, Louisiana Waterthrushes and other forest birds, particularly in regions where little other forest cover exists. Protect ravine forests from erosion and disruption by leaving at least a 10-metre buffer of trees along the top of the ravine slope. Degraded slopes and valleys can be restored by natural or planned regeneration.

It is best to avoid harvesting timber from ravines and stream banks because subsequent erosion may diminish stream water quality.

Swamps provide important habitat for species such as Acadian Flycatcher and Prothonotary Warbler, and more common species such as Wood Duck (*Aix sponsa*) and Northern Waterthrush (*Seiurus noveboracensis*). Swamps and other wetlands also protect the quality and quantity of water supplies. Preserving wetlands provides environmental benefits for humans, birds and other wildlife.

SUMMARY OF MANAGEMENT GUIDELINES FOR MAINTENANCE OF FOREST BIRD DIVERSITY

The Ontario Ministry of Natural Resources has produced a comprehensive guidance document for land managers entitled *A Land Manager's Guide to Conserving Habitat for Forest Birds in Southern Ontario* (2011). This document outlines 10 ways to be a careful land manager to maintain and enhance woodland habitat for biodiversity and other ecosystem values and functions:

1. Get professional forest management advice.
2. Use an appropriate, recognized silvicultural system (move beyond diameter limits, consider group selection).
3. Use a written prescription for harvesting (i.e., use a written document that describes the objectives, measures, conditions to be met and other specific operational strategies to be implemented when harvesting a forest stand in a particular area).
4. Retain large and extra-large trees (some of which will be of low economic quality/value).
5. Maintain or manage for high levels of structural diversity.
6. Consider leaving some uncut areas.
7. Retain old growth and wildlife features:
 - living cavity trees, mast trees, snags (the bigger the better);
 - maintain or improve native tree species diversity;
 - protect existing downed wood and add where possible;
 - retain stick nests where they exist;
 - preserve the integrity of wet areas (ephemeral ponds, seeps, streams, etc.);
 - retain and protect the habitat of species at risk.
8. Demand careful, high-quality logging without damage.
9. Calculate economic benefits over the long term.
10. Enjoy your woodlot!

MANAGEMENT GUIDELINES FOR FOREST SONGBIRD SPECIES AT RISK

The Land Manager's Guide also provides specific management guidelines for individual species, including species at risk. These guidelines will lessen the risk of disturbing or destroying the habitat of these species at risk.

For **Acadian Flycatchers**, emphasis should be placed on conserving large (at least 25 hectares, with preference to forest tracts larger than 100 hectares), mature tracts of forest with little internal disturbance, and maintaining canopy cover in riparian and swamp forest habitat. The highly fragmented landscape and scarcity of large mature forests in southern Ontario limit populations. Restoring and preserving large mature forests not only provides good nesting

habitat, but also may alleviate edge effects (e.g., predation and parasitism), increase population size and facilitate range expansion. This species is tolerant of light selection harvest, but even moderate logging within territories is expected to eliminate populations for years, if not decades, before the habitat is again suitable for this species.

The **Cerulean Warbler** has become a symbol of healthy, mature deciduous forests. It is rather intolerant of intensive habitat disturbances, but breeds successfully in sites managed for maple syrup. Cerulean Warblers benefit from the protection of mature forests or wilderness areas and management efforts that focus on the production of high-quality timber, because they rely on tall, large-diameter trees that form full-forest canopies. These practices allow for longer rotations, uneven-aged structure, vertical diversity and tall canopies. Unsuitable practices for maintaining or restoring Cerulean Warbler habitat include high-grading, diameter-limit cuts and even-aged systems that remove most or all of the largest trees. Carefully applied group selection cuts may be a good tool, because Cerulean Warblers not only associate with small canopy gaps and internal openings, but they also favour trees such as oak and hickory that are tolerant of moderate shade yet require some light to regenerate and grow.

Hooded Warblers move into woodland gaps one to five years after creation, and remain as long as suitable shrubby nesting habitat exists. Hence, both single-tree and group selection in large (preferably forest tracts larger than 100 hectares), mature forests will benefit this species by promoting dense understory and shrub growth. Managed mature conifer plantations with canopy gaps containing low, deciduous understory species will also be occupied. Despite their dependence on disturbance, Hooded Warblers only require small gaps, and nest more successfully in natural tree-fall gaps than those created through intensive forestry. Therefore, emphasis should be placed on conserving large, mature tracts of forest in an effort to remediate the historical loss and fragmentation of woodlands in southern Ontario. Given that Hooded Warblers are area-sensitive, efforts to enlarge or reconnect existing forests will further increase populations of this species and assist in their range expansion.

Louisiana Waterthrushes are area-sensitive and require large (preferably forest tracts larger than 100 hectares) contiguous tracts of mature or old-growth forests with shady riverbank or stream habitats. The species is tolerant of light selection harvest, but given its rarity, care should be taken to retain a large number of trees (particularly large trees), and to refrain from logging or other activities that increase siltation and water temperature of streams wherever this species is found.

Of the five songbirds discussed in this document, **Prothonotary Warblers** are most sensitive to forest management activities and thrive in mature forests with no tree cutting. As a specialized, secondary cavity-nesting species that builds its nest largely out of shade-tolerant mosses, Prothonotary Warblers are sensitive to all forms of forest management. Retention of large, mature swamp forests in an intact condition, particularly at sites that have a record of historical occupancy, is

recommended. Increasing the extent and connectivity of swamp forest habitat in southern Ontario is expected to benefit this and numerous other wildlife species.

The complete Land Manager's Guide and other information on woodland management in southern Ontario can be obtained from the Ontario Ministry of Natural Resources (www.mnr.gov.on.ca/en/Business/Forests/Publication/STDPROD_089385.html) or from the Landowner Resource Centre, 3889 Rideau Valley Drive, Manotick, Ontario K4M 1A5, email: info@lrconline.com.

TAX INCENTIVES FOR SUSTAINABLY MANAGED FORESTS

The Conservation Land Tax Incentive Program and Managed Forest Tax Incentive Program are provincial government property tax programs. Landowners can receive property tax incentives for owning certain environmentally sensitive lands and/or managing those lands for conservation. Landowners interested in these programs should contact the Ontario Ministry of Natural Resources for more information (see Relevant Programs).

Alternatives for long-term conservation

There are a variety of conservation options available to sustain high-quality forest habitat for forest songbird species at risk. A landowner can put a conservation agreement (conservation easement) on the title of his or her property to conserve or protect certain natural features in perpetuity. Some conservation groups will lease significant habitat. Also, the federal Ecological Gifts Program allows landowners to donate ecologically sensitive land or conservation easements to qualified recipients, and receive significant income tax benefits; and the federal Habitat Stewardship Program and provincial Species at Risk Stewardship Fund allow organizations to apply for funding to secure and/or restore habitat for species at risk across Canada and in Ontario, respectively (see Relevant Programs).

THANKS TO THE LANDOWNERS

Many landowners throughout Ontario's Carolinian Zone protect significant woodland habitat. Without their past and continuing stewardship, the region would experience greater depletion of species such as Acadian Flycatcher, Cerulean Warbler, Hooded Warbler, Louisiana Waterthrush and Prothonotary Warbler that are dependent on mature woodland habitat. Numerous landowners also allow access to their lands for wildlife and woodland research. Their generous cooperation and contributions to conservation are deeply appreciated.

SUGGESTED READING

Species at Risk Public Registry: www.sararegistry.gc.ca/default_e.cfm

- **Cerulean Warbler:**
www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=46
- **Hooded Warbler:**
www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=37
- **Acadian Flycatcher:**
www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=19
- **Prothonotary Warbler:**
www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=31
- **Louisiana Waterthrush:**
www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=53

Ontario Ministry of Natural Resources. 2000. *A Silviculture Guide to Managing Southern Ontario Forests*. Available from www.mnr.gov.on.ca.

Committee on the Status of Endangered Wildlife in Canada: www.cosewic.gc.ca

Ontario's Species at Risk Program: www.mnr.gov.on.ca/en/Business/Species/index.html?CSB_ic-name=specialInitiatives&CSB_ic-info=speciesAtRisk_Eng

Ontario Ministry of Natural Resources. 2011. *A Land Manager's Guide to Conserving Habitat for Forest Birds in Southern Ontario*.
www.mnr.gov.on.ca/en/Business/Forests/Publication/STDPROD_089385.html.
Available from Landowner Resource Centre, 3889 Rideau Valley Drive,
Manotick, Ontario K4M 1A5. Email: info@lrconline.com.
Telephone: 613-692-3571 or 1-800-267-3504, Ext. 1128 or 1132.
Fax: 613-692-0831.

A Forest Services Directory for Landowners: www.ontariowoodlot.com

Ontario Woodlot Association website: www.ont-woodlot-assoc.org

RELEVANT PROGRAMS

- For information on forest management in southern Ontario, please contact your local Ontario Ministry of Natural Resources office, local Conservation Authority office, local municipality and/or contact the Ontario Professional Foresters Association via their website (www.opfa.ca) for a list of professional forestry consultants.
- Conservation Land Tax Incentive Program:
www.mnr.gov.on.ca/en/Business/CLTIP/index.html
- The Managed Forest Tax Incentive Program:
www.mnr.gov.on.ca/en/Business/Forests/2ColumnSubPage/STEL02_166335.html
- The Ecological Gifts Program:
www.ec.gc.ca/pde-egp/default.asp?lang=En
- The Habitat Stewardship Program for Species at Risk:
www.ec.gc.ca/hsp-pih/default.asp?lang=Enwebsite
- Species at Risk Stewardship Fund:
www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/STEL01_131229.html

FOR MORE INFORMATION, PLEASE CONTACT

Environment Canada
Canadian Wildlife Service – Ontario
4905 Dufferin Street
Toronto ON M3H 5T4
Telephone: 416-739-4826
Fax: 416-739-4776
Email: enviroinfo@ec.gc.ca

MAP SOURCES

Bird Studies Canada, Environment Canada's Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists and Ontario Ministry of Natural Resources. 2006. Ontario Breeding Bird Atlas Website. www.birdsontario.org/atlas/index.jsp

Ridgely, R. S., T. F. Allnutt, T. Brooks, D. K. McNicol, D. W. Mehlman, B. E. Young, and J. R. Zook, 2007. Digital Distribution Maps of the Birds of the Western Hemisphere, version 3.0. NatureServe, Arlington, Virginia, USA.

www.ec.gc.ca

Additional information can be obtained at:

Environment Canada

Inquiry Centre

10 Wellington Street, 23rd Floor

Gatineau QC K1A 0H3

Telephone: 819-997-2800

Toll Free: 1-800-668-6767 (in Canada only)

Fax: 819-994-1412

TTY: 819-994-0736

Email: enviroinfo@ec.gc.ca