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Management Plan for the Louisiana Waterthrush (*Seiurus motacilla*) in Canada

Louisiana Waterthrush

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Canada

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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 management plans for listed Special Concern 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 management of the Louisiana Waterthrush and has prepared this plan, as per section 65 of SARA. It has been prepared in cooperation with the Province of Ontario.

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

Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

The Louisiana Waterthrush (*Seiurus motacilla*) is a wood-warbler (family Parulidae) that breeds in a few areas of southern Ontario and southwestern Quebec. It is an area-sensitive species that breeds in mature riparian forests of eastern North America and winters in similar habitat in Mexico south to northern South America and the Caribbean.

The Louisiana Waterthrush was assessed as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1991, 1996, and 2006, and was listed as Special Concern on Schedule 1 of the *Species at Risk Act* in December 2007. The Louisiana Waterthrush is protected under the *Migratory Birds Convention Act, 1994*.

The Louisiana Waterthrush is widespread in the eastern United States, but the Canadian breeding range is limited to southern Ontario and southwestern Quebec. In Ontario, it is found in highest abundance along the north shore of Lake Erie in Elgin and Norfolk counties, while breeding has been confirmed at only one location in Quebec.

Although not well sampled by the Breeding Bird Survey, data suggest that the continental population of the Louisiana Waterthrush may be relatively stable. This situation is corroborated in Canada, where the results from the Ontario Breeding Bird Atlas suggest a stable population consistent with the continental trend.

Known and potential threats to this species in Canada include off-road vehicle use, logging, agriculture and development, drought or flooding, stream acidification, and water use. Deforestation is suspected to be a threat to this species on its wintering grounds.

Given the apparent stability of the Canadian and global population, the objective of this management plan is to maintain the current size and distribution of the Louisiana Waterthrush population in Canada.

Broad strategies and measures to achieve the objective of this management plan are identified in section 6.

TABLE OF CONTENTS

1. COSEWIC SPECIES ASSESSMENT INFORMATION

Date of Assessment: April 2006

Common Name (population): Louisiana Waterthrush

Scientific name: *Seiurus motacilla*[1]

COSEWIC Status: Special Concern

Reason for COSEWIC Designation: This wood warbler breeds along clear, shaded, coldwater streams in southern Ontario and possibly southwestern Quebec[2]. The Canadian population is small – probably less than 200 pairs – but has been stable over the last two decades and immigration from United States populations probably occurs. Habitat degradation, particularly from ATVs, may be a threat at some sites.

Canadian Occurrence: Ontario and Quebec

COSEWIC Status History: Designated Special Concern in April 1991. Status re-examined and confirmed in April 1996 and in April 2006.

2. SPECIES STATUS INFORMATION

Globally, Louisiana Waterthrush is ranked G5 (Secure), with national ranks of N5B (Secure, Breeding population) in the United States and N3B (Vulnerable, Breeding population) in Canada (NatureServe 2010). This species is ranked subnationally as S3B (Vulnerable, Breeding population) in Ontario and in S1B (Critically Imperiled, Breeding population) in Quebec (NatureServe 2010) [3].

Louisiana Waterthrush is listed as Special Concern under the Canadian *Species at Risk Act* and Ontario's *Endangered Species Act, 2007*. It is not designated under Quebec's *Act respecting threatened or vulnerable species*, but it does appear on Quebec's list of species likely to be designated as threatened or vulnerable. It is not listed on the U.S. *Endangered Species Act*.

[1] Recent genetic evidence indicates that the Louisiana Waterthrush and Northern Waterthrush are not closely related to the Ovenbird (*S. aurocapilla*), and are now recognized by the American Ornithologists' Union as belonging to a separate genus, *Parkesia* (e.g. *Parkesia motacilla*; Chesser et al. 2010).
[2] The information in this box is reproduced from the COSEWIC status report (2006), without deviation. Since the publication of the status report, Louisiana Waterthrush has been confirmed as a breeding species in Quebec (Dendroica Environnement et Faune 2006, 2007).
[3] A complete list of subnational status ranks and definitions is provided in Appendix B.

3. SPECIES INFORMATION

3.1 Species Description

The Louisiana Waterthrush is a relatively large member of the wood-warbler family (Parulidae). It is about 15 centimetres in length and has a brown back and white belly adorned in brown spots, while its throat is generally unspotted and white. It has a broad, white stripe above the eye that widens behind the eye toward the nape. It has a rather large bill for a wood-warbler and also appears rather large bodied for this family of birds. Its flanks can be tinged buff or can be clean white. Its legs are bright pink in colour (Pyle 1997, Mattsson et al. 2009).

This species closely resembles a more common and widespread wood-warbler species, the Northern Waterthrush (*S. noveboracensis* or *Parkesia noveboracensis*; Chesser et al. 2010). The Northern Waterthrush is slightly smaller and has a smaller bill than Louisiana Waterthrush. The Northern Waterthrush is typically tinged yellowish on its belly (where it has darker, more densely-arranged spots which appear to form streaks), its throat tends to be spotted, and its legs are not as brightly coloured as those of the Louisiana Waterthrush. The waterthrushes are perhaps most reliably separated by voice, with the 3-4 groups of notes from the Northern Waterthrush lacking the "clear, ringing introductory notes and weak, jumbled ending" (Dunn and Garrett 1997) of the Louisiana Waterthrush.

3.2 Populations and Distribution

Globally, the Louisiana Waterthrush breeds in eastern North America, including parts of southeastern Canada (Figure 1), with the majority of the population concentrated in Bird Conservation Region [4] 28 throughout the Appalachian Mountains (Mattsson et al. 2009).

The species winters from northern Mexico south to central Panama, and throughout the Greater Antilles and some smaller Caribbean islands (COSEWIC 2006, Mattsson et al. 2009). There have also been casual sightings outside this range (Mattsson et al. 2009). Migration routes are poorly understood, although sightings and specimen collections suggest that migration occurs through the southeastern United States, with many migrants flying across the Gulf of Mexico and some following the Central American coast (COSEWIC 2006, Mattsson et al. 2009).

Figure 1. Global range of the Louisiana Waterthrush (Modified from Ridgely et al. 2007).

[4] Bird Conservation Regions are "a set of 66 ecoregions across North America that have similar biophysical elements, such as soil type, vegetation and associated bird species, and are used as the basis for planning and evaluation of integrated bird conservation" (Ontario Partners in Flight 2008).

In Canada, breeding records for this species are limited to southern Ontario (Figure 2), where it is found in highest abundance along the north shore of Lake Erie in Elgin and Norfolk counties (COSEWIC 2006), and southwestern Quebec. Nesting has been confirmed at only one location in Quebec (Figure 3; Dendroica Environnement et Faune 2006, 2007), although other observations without confirmed breeding have been made elsewhere in the province (Yank and Aubry 1984, David 1996, St-Hilaire and Dauphin 1996, Dendroica Environnement et Faune 2005).

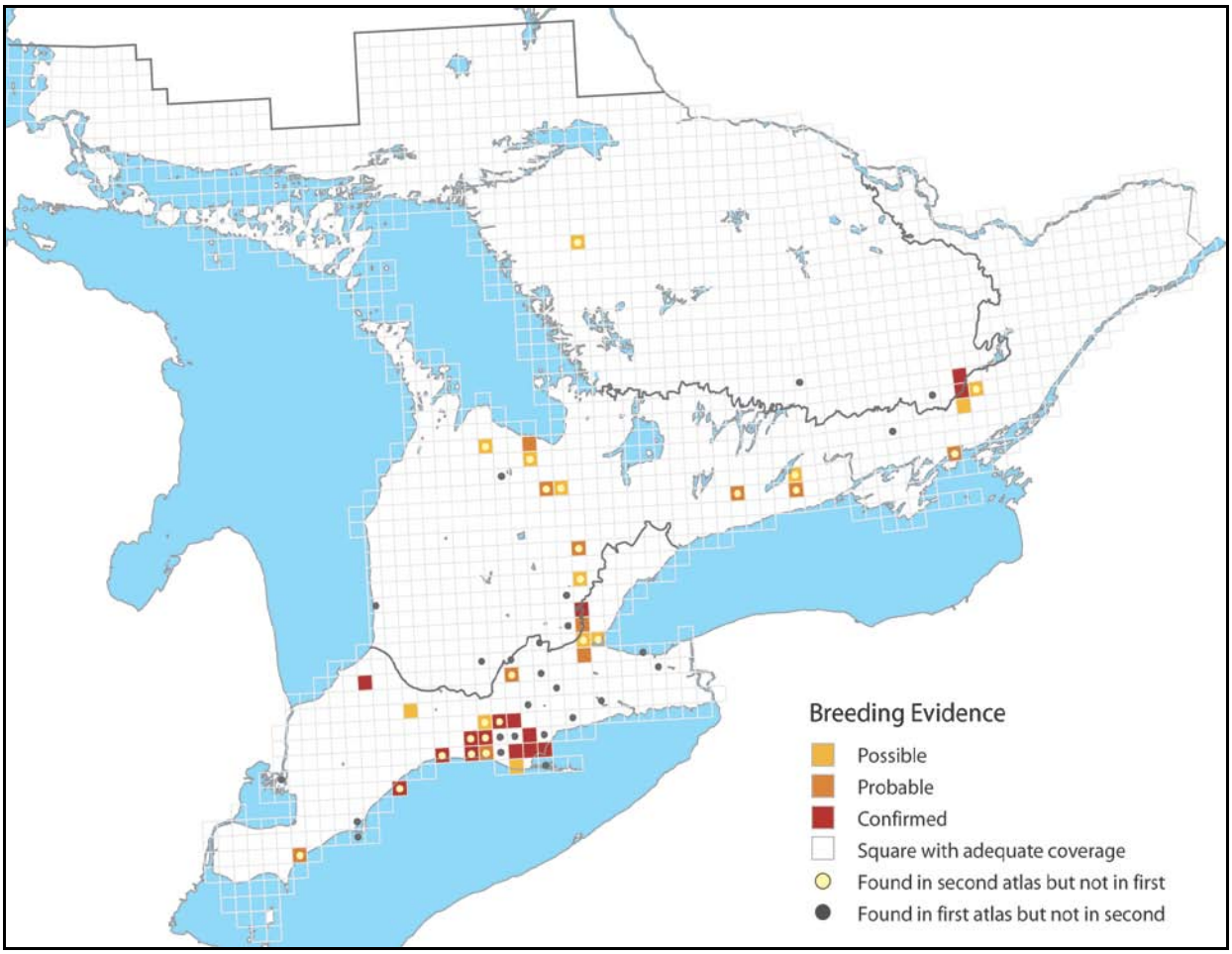

Figure 2. Distribution of the Louisiana Waterthrush in Ontario between 2001 and 2005 (Cadman et al. 2007). Squares are 10x10km. Data collection referred to in the legend was 1981-1985 for the first Ontario Breeding Bird Atlas, and 2001-2005 for the second.

There are difficulties in determining accurate population estimates or trends for Louisiana Waterthrush in Canada. Although meaningful numbers and trends have been recently gathered for Ontario through the Ontario Breeding Bird Atlas (Cadman et al. 2007), no consistent surveys exist to capture robust abundance estimates and trends for Louisiana Waterthrush in Canada over time. Although programs such as the Breeding Bird Survey (BBS) document this species, insufficient data are gathered for Louisiana Waterthrush using this methodology for two main reasons: i) roadside BBS surveys do not adequately survey the forest interior habitat preferred by

this species, and ii) Canadian BBS routes are run between 28 May until 7 July, with early to-mid June being the preferred window, while the peak of Louisiana Waterthrush singing occurs before this period, and is markedly reduced through June in Ontario (McCracken 2007).

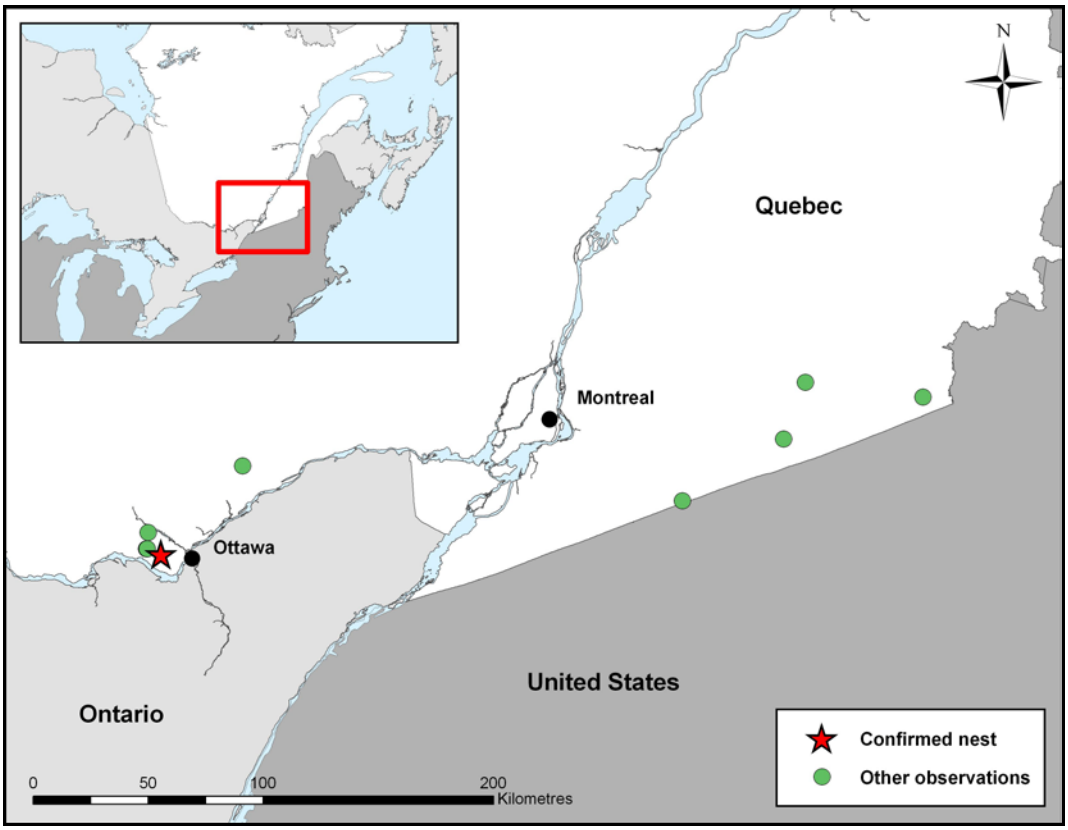

Figure 3. Confirmed nesting location of Louisiana Waterthrush in Quebec. Circles denote other observations of Louisiana Waterthrushes during the breeding season, 1974 to 2006. Data provided by Canadian Wildlife Service – Quebec (F. Shaffer pers. comm.) and Dendroica Environnement et Faune (2006, 2007).

Despite the limitations of existing surveys, the global population is estimated at 260 000 individuals (Rich et al. 2004). The Canadian population is estimated between 105 and 195 pairs (COSEWIC 2006), which represents less than one percent of the continental population. The Louisiana Waterthrush is estimated to occur in Canada over an areal extent of 35 500 km^2 (COSEWIC 2006). Within this extent of occurrence, it is estimated to have an area of occupancy of 2.3 to 4.5 km^2 (COSEWIC 2006).

The global breeding population appears to be stable, and there is even some indication from BBS results that the U.S. population increased by an average rate of 0.9% annually in the period of 1966 to 2005 (McCracken 2007). The situation in Canada is consistent with the trend observed in the United States: the overall Canadian population, although small, appears to be stable (McCracken 2007).

It is likely that the Canadian population is supported by immigration from U.S. populations (COSEWIC 2006). Through population modeling, Tischendorf (2003a, b) determined that a small annual amount of immigration to Canada from U.S. populations was sufficient to maintain a Canadian population of two other forest-breeding bird species that are similarly at the northern limits of their respective breeding ranges. It is suspected that individuals immigrate to Canada from neighbouring states in the U.S. and that this immigration can sustain a Canadian Louisiana Waterthrush population (COSEWIC 2006).

3.3 Needs of the Louisiana Waterthrush

3.3.1 Habitat and biological needs

The Louisiana Waterthrush is found in riparian zones in mature tracts of deciduous-mixed forests (COSEWIC 2006; Mattsson et al. 2009), and it shows a preference for streams below steep-sided slopes (Eaton 1958) in forests containing deciduous trees, often with a hemlock component (Craig 1985; COSEWIC 2006). Nest sites are found along stream banks, under mossy logs, and in roots of fallen trees (Prosser and Brooks 1998; Mattsson et al. 2009). Nest sites are normally well concealed by over-hanging vegetation or roots (Bent 1953; Eaton 1958; Peck and James 1987). Clear headwater streams and associated wetlands are preferred sites, but this species will also inhabit heavily-wooded swamps most often frequented by Northern Waterthrush (Craig 1984, 1985; Curson et al. 1994; Dunn and Garrett 1997).

The Louisiana Waterthrush is described as an area-sensitive forest interior bird (Robbins 1979 *in* COSEWIC 2006) that requires non-fragmented forest (Prosser and Brooks 1998), suggesting that a contiguous stretch of mature forest is an important habitat feature to this species. Robbins (1979 *in* COSEWIC 2006) estimated that the minimum size of contiguous forest to support a viable population is about 100 ha, based on studies in Maryland.

Breeding territories on streams follow the length of the stream, although the reported length used by Louisiana Waterthrush pairs during the breeding season is variable (Table 1), and may reflect the local food availability or mating system (Mattsson et al. 2009). Territories for both swamp- and stream-nesting pairs are estimated to be about 2 ha in area (COSEWIC 2006), with the estimate for the latter based on the territory length average (400 m) from a northern New York study (Eaton 1958) and an estimated 50 m territory width.

Table 1. Reported territory lengths used by breeding Louisiana Waterthrushes.

Location	Range (m)	Average (m)	Source
Northern New York	Not reported	400	Eaton 1958
Connecticut	188 to 538	358	Craig 1981 *in* Mattsson et al. 2009
Southern Illinois	375 - 1200	930	Robinson 1990 *in* Mattsson et al. 2009
Northern Georgia	90 - 1440	520	Mattsson and Cooper 2009
Northeast Pennsylvania	120 - 650	283	Mattsson et al. 2009
Southwest Pennsylvania	250 - 400	Not reported	Mattsson et al. 2009

For streams that support Louisiana Waterthrushes, it is recommended that 75% of the stream length is maintained in a naturally-vegetated state, with a riparian buffer of at least 100 metres wide (Ontario Partners in Flight 2008).

As one of the first neotropical migrants to arrive in Canada in April, the Louisiana Waterthrush probably relies on foraging in streams and the surrounding leaf litter for most of its diet until trees leaf out later in the spring, as has been observed elsewhere in its range (Craig 1984). In addition to its primarily aquatic insect prey, other invertebrates (molluscs, crustaceans, and earthworms), small fish and amphibians may also be taken (Craig 1984; Mattsson et al. 2009).

The species breeds in Canada from time of arrival in April and early May into July. Eggs are laid between 1 May and 15 July and are incubated for 12-14 days (COSEWIC 2006). After fledging, young are cared for by adults for three to four weeks, as observed elsewhere in the species' range (Mattsson et al. 2009), and will remain along natal streams for about a month (COSEWIC 2006). It is estimated that the Louisiana Waterthrush uses up to 25 ha of habitat within a larger forest patch over the course of the breeding season to successfully raise young (COSEWIC 2006).

Louisiana Waterthrushes are early southward migrants in the fall and tend to be solitary (Dunn and Garrett 1997). They occupy similar habitat to that used during breeding, but will also utilize wet areas, such as treed swamps. They migrate at night through the south-eastern U.S. and Mexico following the Mississippi flyway towards their wintering grounds in Central and northern South America and the West Indies (Curson et al. 1994).

Once on the wintering grounds, they prefer habitat that is similar to their breeding habitat (Master et al. 2005) – mature forest with steep-sided ravines near flowing water or mature swamp forest with standing pools of water – and are noted as being territorial (Eaton 1958, Master et al. 2005).

3.3.2 Limiting factors

A strong dependence upon clear, medium to high-gradient, lower order streams through deeply incised ravines in contiguous, mature tracts of deciduous and mixed forest is a significant limiting factor for Louisiana Waterthrush in Canada, as this type of habitat is not abundant across much of the Louisiana Waterthrush's Canadian breeding range.

4. THREATS

4.1 Threat Assessment

Table 2. Threat Assessment Table.*

Threat	Level of Concern	Extent	Occurrence	Frequency	Severity	Causal Certainty
Habitat Loss, Fragmentation or Degradation						
Off-road vehicle use	High	Widespread	Current	Continuous	Medium	Medium
Forest thinning	Medium	Local	Historic/Current	Recurrent	Medium	Medium
Conversion of breeding habitat	Medium	Widespread/ Local	Historic/Current	Recurrent	Unknown	Medium
Deforestation in winter range	Low	Unknown	Unknown	Recurrent	Unknown	Low

Threat	Level of Concern	Extent	Occurrence	Frequency	Severity	Causal Certainty
Changes in Ecological Dynamics or Natural Processes						
Water use	Medium	Local	Current	Recurrent	Unknown	Medium
Climate and Natural Disasters						
Drought or flooding	Low	Widespread	Anticipated	Recurrent	Unknown	Low
Pollution						
Stream acidification	Low	Unknown	Unknown	Unknown	Unknown	Low
Disturbance or Harm						
Human disturbance	Low	Local	Current	Recurrent	Low	Low

* See Appendix C for definitions of each of the threat information categories.

4.2 Description of Threats

4.2.1 Habitat Loss, Fragmentation or Degradation

a) Off-road vehicle use

The use of off-road vehicles (ATVs) to ford rivers and streams increases stream siltation, which is recognized as one of the most important current threats to Louisiana Waterthrushes in Canada (COSEWIC 2006). An increase in siltation can change the aquatic invertebrate community (Environment Canada 2004), reducing the amount of food available to feed developing young, and likely negatively affecting breeding populations. This source of the siltation threat has been most notable in the Norfolk Sand Plain (COSEWIC 2006), a Canadian breeding strong hold. A number of other potential sources of increased siltation in Ontario, including urban development, road construction, and agriculture, are summarized by Kerr (1995).

b) Forest thinning

Forested land used by Louisiana Waterthrush may be threatened by thinning of forests (COSEWIC 2006) due to logging and other forest management activities, which increases the amount of sunlight that reaches streams used as foraging areas. This causes an increase in stream temperatures, which can decrease the aquatic invertebrate populations found therein (Eaton 1988). Furthermore, thinned forests can lead to erosion and run off along steep-sided slopes. This in turn causes increased sedimentation and siltation in nearby streams and rivers (Environment Canada 2001), which, as noted above, can reduce the abundance and diversity of certain aquatic invertebrates.

c) Conversion of breeding habitat

Habitat conversion has already affected southern Ontario to the extent that much of the forested habitat that once existed has been converted and now exists as agricultural land or urbanized areas. Although the direct impact of forest loss on the Louisiana Waterthrush has not been demonstrated in Canada, it is expected to be negative (COSEWIC 2006), as Louisiana Waterthrushes do not occupy areas that have been affected by urbanization or agricultural development (Prosser and Brooks 1998).

The Louisiana Waterthrush is also sensitive to flash-flooding caused by development within watersheds (Ontario Partners in Flight 2008). The impervious surfaces typical of an urban environment contribute to downstream flooding (Environment Canada 2004), which can result in degradation of Louisiana Waterthrush breeding habitat and damage to nests and nesting areas.

While overall forest cover is increasing in the Canadian range of Louisiana Waterthrush, this does not necessarily result in an increase in preferred habitat for this area-sensitive species. An apparent decrease in mean forest patch size in southern Ontario (Ontario Ministry of Natural Resources 2006) suggests that the overall increase may be composed of small scattered patches, which do not provide suitable habitat for breeding Louisiana Waterthrushes. Development of roads and the resulting fragmentation of mature forest results in an increase of forest edge, which decreases the suitability of the habitat for this area-sensitive species, and could exacerbate the risk of other threats.

A fragmented landscape increases the exposure of nesting Louisiana Waterthrush to nest parasites and predators that occupy edge habitats (COSEWIC 2006). Peck and James (1987) documented nest parasitism of breeding Louisiana Waterthrushes by Brown-headed Cowbirds (*Molothrus ater*) at a rate of 25% in Ontario, but with only a sample of eight nests. Cowbirds lay their eggs in host species' nests during the breeding season, where they are then cared for by the host adults. Nest predation, by small mammals and avian predators, also reduces the productivity of nesting Louisiana Waterthrushes.

d) Deforestation in winter range

Louisiana Waterthrush is described as a habitat specialist while on its wintering grounds (Master et al. 2005), and is suspected to be vulnerable to degradation and habitat loss in these areas. Deforestation rates in South and Central America, where the Louisiana Waterthrush winters, are among the highest in the world (FAO 2006).

4.2.2 Changes in Ecological Dynamics or Natural Processes

e) Water use

Irrigation activities and other water use that drains swamps or reduces the flow of streams or rivers are a threat to Louisiana Waterthrush. A reduction in the amount of water available to aquatic invertebrates and insects that require water for part of their life cycle could compromise the food resources available to breeding pairs. This in turn could affect the breeding potential of

Louisiana Waterthrush using areas near or affected by irrigation activities. Similarly, nesting becomes less desirable in areas where resources are scarce. This threat occurs most often during the growing season, or during periods of drought, and is most common in habitat adjacent or near to agricultural landscapes.

4.2.3 Climate and Natural Disasters

f) Drought or flooding

Increased water levels in streams used by Louisiana Waterthrush would likely have negative effects on the reproductive productivity of the species by reducing the number of available nesting areas in flash-flood conditions or by depleting food resources through an increase in stream flow. Drought may also decrease the productivity of the species by reducing the number of nesting areas with adequate access to water or by depleting food resources through a decrease in available habitat for aquatic invertebrates.

Most climate change scenarios for the Great Lakes basin predict warmer temperatures and increased precipitation (e.g., Environment Canada 2001; Mortsch et al. 2006). These trends could lead to flooding and drought conditions in areas where Louisiana Waterthrush are found. Additionally, any potential northward expansion that might occur because of warming temperatures may be negated by decreased availability of water, to which the health of Louisiana Waterthrush populations is so intrinsically tied.

4.2.4 Pollution

g) Stream acidification

Acidification has been shown to affect the water quality of streams in some regions of the eastern United States, and thus have effects on the food resources available to Louisiana Waterthrush (Mulvihill 1999, Mulvihill et al. 2008). While stream acidification has not been demonstrated to be a direct threat to populations in Canada, there is concern that a reduction of Louisiana Waterthrush populations in adjacent states due to stream acidification would be expected to reduce immigration from those areas.

4.2.5 Disturbance or Harm

h) Human disturbance

Disturbance by humans is a potential threat in situations where Louisiana Waterthrush breeding territory overlaps with areas of high human use, such as breeding locations situated adjacent to heavily-used hiking trails (F. Shaffer pers. comm.).

5. MANAGEMENT OBJECTIVES

Given the apparent stability of the Canadian and global population, the objective of this management plan is to maintain the current size and distribution of the Louisiana Waterthrush population in Canada.

Rationale:
The species' Canadian range has historically been restricted to southern Ontario due to suitable habitat availability and climatic factors (COSEWIC 2006). The population, though small, appears to be stable in Canada (McCracken 2007).

Accomplishing the objective of this plan will also support the Partners in Flight objective of maintaining the Louisiana Waterthrush continental population size (Rich et al. 2004).

As the small Canadian population of Louisiana Waterthrush occurs at the northern part of its continental range, and the vast majority of its continental breeding 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 management of this species in Canada. If the continental population of Louisiana Waterthrush experiences an ongoing downward or upward population trend, its range may correspondingly contract towards the centre of its range or expand near the periphery. In these cases, the size of the Canadian population, and the rate of achievement of management objectives, may reflect both these continental range changes and local response to the provision of suitable habitat and mitigation of key threats.

6. BROAD STRATEGIES AND MEASURES TO MEET OBJECTIVES

To achieve the objective of this management plan, two broad strategies are recommended:

1. Maintain the amount and quality of habitat available for current and future populations by mitigating threats, where feasible.
2. Assess and monitor population sizes, trends, and distribution for all Canadian populations.

6.1 Measures to be Taken and Implementation Schedule

The measures and implementation schedule proposed under the broad strategies outlined in section 6 are presented in Table 3. The Minister of the Environment will endeavour to support implementation of this plan, given available resources and varying species at risk conservation priorities.

Table 3. Measures to be Taken and Implementation Schedule

Measure	Priority	Threats or concerns addressed[1]	Timeline
1: Maintain the amount and quality of habitat available for current and future populations by mitigating threats, where feasible			
1.1 Encourage conservation of key breeding sites through protection and stewardship of private, public and First Nation lands, as appropriate, and promote any relevant land management guidelines (e.g. Hilts and Mitchell 1998) or stewardship opportunities to landowners. Encourage awareness of this species and the transfer of Traditional Ecological Knowledge.	High	a,b,c,e	2015
1.2 Address Louisiana Waterthrush requirements in new (or updated) management plans for public lands (Protected Areas, parks, etc.) that support breeding populations, where feasible. Recommended management actions to include in plans: • riparian corridors at least 100m wide • at least 75% of stream length maintained in a naturally-vegetated state • restrictions on recreational use and vehicle access	Medium	a,b,c,h	2015
1.3 Establish and continue communication with international entities (e.g. Partners in Flight, North American Bird Conservation Initiative), other countries' government agencies, researchers, or non-government organizations to be informed on and maintain dialogue about issues related to Louisiana Waterthrush conservation outside of Canada.	Medium	d,g	2015
2: Assess and monitor population sizes, trends, and distribution for all Canadian populations			
2.1 Refine and compile geographical knowledge of Canadian populations, habitat, and land tenure.	High	Need for accurate baseline population information	2014
2.2 Develop and implement program to monitor populations (i.e. abundance, distribution, and trends) in Ontario and Quebec, with surveys occurring at least every five years.	High	Information gaps	2015

[1] Lowercase letter threat descriptors refer to specific threats from section 4.2 Description of Threats

7. MEASURING PROGRESS

Because the Louisiana Waterthrush is a migratory bird protected under the *Migratory Birds Convention Act, 1994*, management of this species falls under the jurisdiction of the Federal Government. Consequently, the Canadian Wildlife Service of Environment Canada will be responsible for monitoring the implementation of this management plan.

Every five years, success of this management plan implementation will be measured against the following performance indicator:

- The size and distribution of the Louisiana Waterthrush population in Canada has been maintained.

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9. PERSONAL COMMUNICATIONS

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APPENDIX A: 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.

Management planning of a species of special concern is intended to benefit species at risk and biodiversity in general. However, it is recognized that plans 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 management plan itself, but are also summarized below in this statement.

Forest landbirds are a priority guild for Bird Conservation Region 13 in Ontario (Ontario Partners in Flight 2008), and activities that benefit the Louisiana Waterthrush are likely to be beneficial to most or all of the 12 other priority species in that guild, as well as other mature forest species (Table 4). It is recognized that management of habitat for the benefit of Louisiana Waterthrush populations could have adverse effects on other species with differing habitat preferences, so any site-specific management prescriptions resulting from the measures proposed in this plan should be assessed on a site-by-site basis given the needs of other species found in the immediate area.

Table 4. Species expected to benefit from conservation and management of mature forests in Canada in the areas where Louisiana Waterthrush occurs.

Common Name	Scientific Name	SARA Status
Acadian Flycatcher*	*Empidonax virescens*	Endangered
American Ginseng	*Panax quinquefolius*	Endangered
Cucumber Tree	*Magnolia acuminata*	Endangered
Gray Ratsnake, Carolinian population	*Pantherophis spiloides*	Endangered
Large-whorled Pogonia	*Isotria verticillata*	Endangered
Nodding Pogonia	*Triphora trianthophora*	Endangered
Prothonotary Warbler*	*Protonotaria citrea*	Endangered
Canada Warbler*	*Wilsonia canadensis*	Threatened
Gray Ratsnake, Great Lakes / St. Lawrence population	*Pantherophis spiloides*	Threatened
Hooded Warbler*	*Wilsonia citrina*	Threatened
Jefferson Salamander	*Ambystoma jeffersonianum*	Threatened
Red-headed Woodpecker*	*Melanerpes erythrocephalus*	Threatened
Cerulean Warbler*	*Dendroica cerulea*	Special Concern
Woodland Vole	*Microtus pinetorum*	Special Concern
Red-shouldered Hawk*	*Buteo lineatus*	Special Concern (Schedule 3)
Eastern Wood-pewee*	*Contopus virens*	
Northern Flicker*	*Colaptes auratus*	
Rose-breasted Grosbeak*	*Pheucticus ludovicianus*	
Wood Thrush*	*Hylocichla mustelina*	

*Ontario Partners in Flight forest guild priority species (Ontario Partners in Flight 2008)

APPENDIX B: NATURESERVE RANKS AND DEFINITIONS

Table 5. Subnational Ranks (S-Ranks) for the Louisiana Waterthrush in North America (NatureServe 2010).

Country	State/Province and subnational ranks
Canada	Ontario (S3B) Quebec (S1B)
United States	Alabama (S5B), Arizona (S1N), Arkansas (S4B), Connecticut (S5B), Delaware (S3B), District of Columbia (S2B,S3S4N), Florida (S2), Georgia (S5), Illinois (S4), Indiana (S4B), Iowa (S3B,S4N), Kansas (S3B), Kentucky (S5B), Louisiana (S3S4B), Maine (S2B), Maryland (S5B), Massachusetts (S4B), Michigan (S2S3), Minnesota (S3B), Mississippi (S3B), Missouri (SNRB), Nebraska (S1), New Hampshire (S4B), New Jersey (S4B), New York (S5), North Carolina (S4B), Ohio (S5), Oklahoma (S4B), Pennsylvania (S5B), Rhode Island (S4B), South Carolina (S4), Tennessee (S4), Texas (S3B), Vermont (S4S5B), Virginia (S5), West Virginia (S5B), Wisconsin (S3B)

The table below lists the conservation status ranks used by NatureServe and their definitions. The numbers and letters are appended to G (global rank, for the whole range), N (national rank for within a nation), or S (sub-national rank, for a province or state). A range rank (e.g. S1S2) is used to indicate a range of uncertainty about the status of the species or community.

Rank	Definition
1	Critically Imperiled – Critically imperiled in the jurisdiction because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.
2	Imperiled – Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines or other factors making it vulnerable to extirpation.
3	Vulnerable – Vulnerable in the jurisdiction due to a very restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
4	Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
5	Secure – common, widespread and abundant in the jurisdiction.
B	Breeding – breeding population of the species in the nation or state/province.
N	Non-breeding – non-breeding population of the species in the nation or state/province.
M	Migrant – occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregate transient population of the species in the nation or state/province.
NR	Unranked – status not yet assessed
NA	Not Applicable – species is not a suitable target for conservation activities.
?	Inexact Numeric Rank—Denotes inexact numeric rank

APPENDIX C: THREAT INFORMATION DEFINITIONS

The definitions for the threat information categories included in Table 2:

Level of concern – Indicates whether managing the threat is an overall high, medium, or low concern for recovery of the species, taking into account all of the above factors.

Extent – Indicates whether the threat is widespread, localized, or unknown across the species range.

Occurrence – Indicates whether the threat is historic (contributed to decline but no longer affecting the species), current (affecting the species now), imminent (is expected to affect the species very soon), anticipated (may affect the species in the future), or unknown. If applicable, also indicates whether the occurrence differs between 'local' populations or smaller areas of the range and the full 'range-wide' distribution.

Frequency – Indicates whether the threat is a one-time occurrence, seasonal (either because the species is migratory or the threat only occurs at certain times of the year), continuous (on-going), recurrent (reoccurs from time to time but not on an annual or seasonal basis), or unknown. If applicable, also indicates whether the frequency differs between 'local' populations or smaller areas of the range and the full 'range-wide' distribution.

Severity – Indicates whether the severity of the threat is high (very large population-level effect), moderate, low, or unknown. If applicable, also indicates whether the severity differs between 'local' populations or smaller areas of the range and the full 'range-wide' distribution.

Causal certainty – Indicates whether the best available knowledge about the threat and its impact on population viability is high (evidence causally links the threat to stresses on population viability), medium (correlation between the threat and population viability, expert opinion, etc.), or low (assumed or plausible threat only). This is a general reflection of the degree of evidence that is known for the threat, which in turn provides information on the risk that the threat has been misdiagnosed. If applicable, also indicates whether the level of knowledge differs between 'local' populations or smaller areas of the range and the full 'range-wide' distribution.