COSEWIC
Assessment and Update Status Report

on the

Louisiana Waterthrush
Seiurus motacilla

in Canada

SPECIAL CONCERN
2006

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

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Previous reports:

Page, A.M. 1996. Update COSEWIC status report on the Louisiana Waterthrush *Seiurus motacilla* in Canada. Committee on the Status of Endangered Wildlife in Canada. 1-24 pp.

McCracken, J.D. 1991. COSEWIC status report on the Louisiana Waterthrush *Seiurus motacilla* in Canada. Committee on the Status of Endangered Wildlife in Canada. 1-26 pp.

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Louisiana Waterthrush — Illustration courtesy of Peter Burke.

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COSEWIC
Assessment Summary

Assessment Summary – April 2006

Common name
Louisiana Waterthrush

Scientific name
Seiurus motacilla

Status
Special Concern

Reason for designation
This wood warbler breeds along clear, shaded, coldwater streams in southern Ontario and possibly southwestern Quebec. 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.

Occurrence
Ontario and Quebec

Status history
Designated Special Concern in April 1991. Status re-examined and confirmed in April 1996 and in April 2006. Last assessment based on an update status report.

COSEWIC
Executive Summary

Louisiana Waterthrush
Seiurus motacilla

Species information

The Louisiana Waterthrush, *Seiurus motacilla*, is a relatively large, drab, thrush-like member of the Wood Warbler family (Parulidae). Males and females are identical in external appearance. The upper parts are dull brown. The lower parts are cream-coloured, with dark streaking on the breast and flanks, which fade out in the undertail coverts. A bold, broad, white supercilium extends to the nape. The legs are bubble-gum pink, and the bill is rather long and heavy for a warbler.

Distribution

In Canada, the Louisiana Waterthrush breeds locally only in southern Ontario, primarily within the Norfolk Sand Plain region bordering the north shore of Lake Erie. Smaller populations are concentrated along southern portions of the Niagara Escarpment and in the Kingston area. It probably nests sporadically in southwestern Quebec, but breeding has never been confirmed. The bulk of its global breeding population (>99%) resides within the eastern U.S. Its winter range, though poorly known, includes much of Mexico, the Caribbean, Central America, and extreme northwestern South America.

Habitat

The Louisiana Waterthrush occupies specialized habitat, showing a strong preference for nesting and wintering along pristine, headwater streams and associated wetlands that occur in large tracts of mature forest. Steep-sided talus slopes and stream courses are generally preferred. Although it prefers running water (especially clear, coldwater streams), it also less frequently inhabits heavily wooded, deciduous swamps having large pools of open water. It is considered to be an area-sensitive forest species and exhibits a preference for older growth woodland.

Biology

The Louisiana Waterthrush is among the earliest long-distance, neotropical migrants to arrive back to Canada in the spring, typically arriving by mid-April. It displays annual fidelity to both breeding and wintering sites. Clutch size ranges from 4-6 eggs

and incubation extends from 12-14 days. Incubation is done entirely by the female, but both parents feed the young, which remain in the nest for about 10 days. The species is single-brooded.

The Louisiana Waterthrush has a specialized diet, feeding mostly on aquatic and flying insects, and sometimes small molluscs, fish, crustaceans, and amphibians.

Population sizes and trends

The Canadian breeding population is estimated to be between 105 and 195 pairs. Although the species has declined locally in some parts of its Canadian breeding range (due to historical habitat loss and degradation), overall population levels have been relatively stable in Canada and much of the U.S. over the past 20 years.

Limiting factors and threats

The Louisiana Waterthrush has restricted and specialized habitat requirements on both its breeding and wintering grounds. As such, its population is sensitive to changes in habitat quality and quantity. The following threats have been identified: i) reduced insect prey caused by factors that increase stream turbidity (e.g. off-road vehicles), water temperatures (e.g. logging), and water contamination (e.g. acid precipitation); ii) reductions in water supply and/or the groundwater table that stem from agricultural drainage, excessive irrigation during drought years, and climate change; iii) logging activities that result in loss of “older growth” features; iv) increased numbers of nest predators/parasites associated with urban, industrial, and rural estate encroachment and associated habitat fragmentation.

Special significance of the species

Within both its breeding and wintering range, the Louisiana Waterthrush is likely an excellent bio-indicator of the health of headwater, medium-gradient streams.

Existing protection

Apart from protection afforded through the Migratory Birds Convention Act, there is no specific legislation that protects the Louisiana Waterthrush in any province or state, or on its wintering grounds. A variety of legislative policies are in place in Ontario that provide some measure of protection of its specialized breeding habitat. In addition, some degree of protection is afforded within steep-valley, streamside habitats that are inherently difficult to log, farm, or otherwise develop.

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5th 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS (2006)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and it is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

Environment Canada / Environnement Canada
Canadian Wildlife Service / Service canadien de la faune
Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

Update
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2006

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SPECIES INFORMATION

Name and classification

Scientific name: *Seiurus motacilla*
English name: Louisiana Waterthrush
French name: Paruline hochequeue

No subspecies or races are recognized, although eastern birds tend to be slightly larger than those in the west (Eaton 1958).

Morphological description

The Louisiana Waterthrush is a relatively large, drab, thrush-like member of the Wood Warbler family (Parulidae). Males and females are identical in external appearance. The upper parts are dull brown. The lower parts are cream-coloured, with dark streaking on the breast and flanks, which fade out in the undertail coverts. A bold, broad, white supercilium extends to the nape. The legs are bubble-gum pink, and the bill is rather long and heavy for a warbler (see Curson *et al*. 1994).

The species is easily confused with the Northern Waterthrush (*Seiurus noveboracensis;* Curson *et al.* 1994), which is more common and widespread in Canada. The most notable plumage difference between the two species is that the Northern Waterthrush supercilium is cream-coloured or yellowish, relatively thin, and tapers behind the eye. The Northern Waterthrush also has fairly bold, brown blotches on its undertail coverts, which are less distinct in the Louisiana Waterthrush (though very difficult to see except in the hand). The two species are best separated in the field by song and habitat differences. The Louisiana Waterthrush song is preceded by a short series of very loud, down-slurred, piercing whistles, followed by a cascading series of jumbled whistles. Though both species can sometimes be found occupying swamp forest where their breeding ranges overlap, the Louisiana Waterthrush is more apt to be found along cold-water streams during the breeding season than is the Northern Waterthrush.

Genetic description

No information is available.

DISTRIBUTION

Global range

<u>Breeding</u>

The Louisiana Waterthrush breeds only in North America, from eastern Nebraska, north central Iowa, east central and southeastern Minnesota, central Wisconsin,

southern Michigan, southern Ontario, central New York, central Vermont, central New Hampshire, and southern Maine south to eastern Kansas, eastern Oklahoma, eastern Texas, central Louisiana, southern Mississippi, southern Alabama, northern Florida, central and southwestern Georgia, central South Carolina, and central and northeastern North Carolina, with the bulk of its global breeding population (>99%) within the eastern U.S. (American Ornithologists' Union 1998; Figure 1).

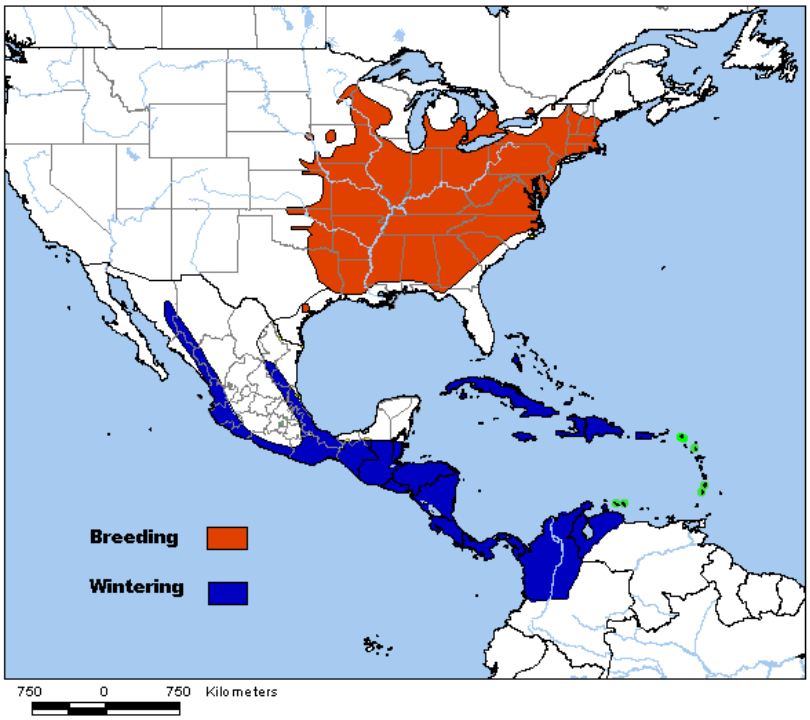

Figure 1. Breeding and wintering distribution of the Louisiana Waterthrush (from Ridgely *et al.* 2003).

Wintering

The Louisiana Waterthrush's winter range is poorly known owing to difficulties in detecting wintering birds and confusion with the very similar Northern Waterthrush (Bent 1963). It winters from Mexico (Sonora, Nuevo Leon, Tamaulipas), southern Florida, the Bahamas and Bermuda, south through Central America (both slopes, although more commonly on the Gulf Caribbean side) and the West Indies (south to St. Vincent in the Lesser Antilles and Trinidad, though generally rare east of Puerto Rico), and rarely to northeastern Colombia and northwestern Venezuela (Schwartz 1964; Gochfeld 1979; American Ornithologists' Union 1998; Figure 1).

Canadian range

Breeding

In Canada, the Louisiana Waterthrush breeds locally in southern Ontario (Godfrey 1986; Page 1996), where it is considered a rare summer resident (Speirs 1985; Eagles

1987; James 1991). The species may also breed in southern Quebec, although this has not been confirmed (Savignac 2005).

Intensive coverage of Ontario during the first Breeding Bird Atlas (1981-1985) resulted in breeding evidence for more sites than were previously known, including the Bayfield River valley along Lake Huron and ravines in the Niagara Escarpment area of Grey Co. (Eagles 1987). Many more breeding stations were discovered after the atlas, primarily as a result of intensive regional surveys of natural areas in the former Regional Municipality of Haldimand-Norfolk (McCracken 1987; Graham 1988) and Elgin Co. (Naturalists of Elgin County 2004).

The Louisiana Waterthrush's current distribution in Ontario (Figure 2) is governed by the distribution of suitable habitat (predominantly steep-sided forested creek valleys) within climatic confines. It nests primarily in the Carolinian forest zone and in the Great Lakes - St. Lawrence forest south of the Canadian Shield. In Ontario, it typically occurs at elevations less than 300 m and in regions above the 6^{o} C mean yearly isotherm (McCracken 1991).

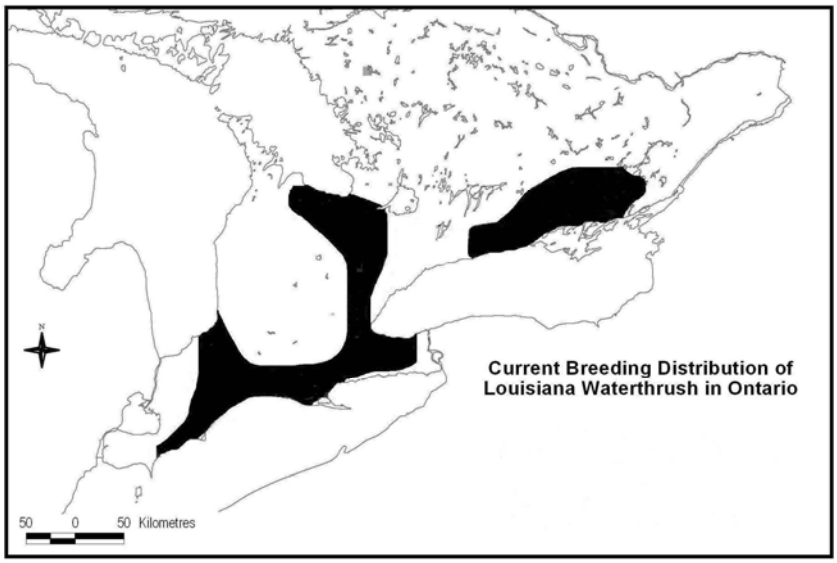

Figure 2. Breeding distribution of the Louisiana Waterthrush in Ontario (2001-04).

McCracken (1991) and Page (1996) both provided regional accounts of its breeding occurrence in Ontario, and little has changed since then. Due to a large amount of suitable habitat (especially deeply incised ravines), its centre of abundance still lies within the Norfolk Sand Plain (eastern Elgin Co., southern Oxford Co., southern Middlesex Co. and Norfolk Co.). It also occurs locally along portions of the Niagara Escarpment in Niagara, Hamilton-Wentworth, Halton, Dufferin, Simcoe and Grey; along the Oak Ridges Moraine in Durham and Northumberland; in the Rideau Lakes region north of Kingston; and at other localities along the Grand River valley in Brant and Waterloo and the Ausable River valley in Lambton Co. Portions of the Niagara

Escarpment and the Oak Ridges Moraine are generally inaccessible and it is likely that additional suitable, but as yet unexplored, habitat exists in these areas.

The Louisiana Waterthrush is probably also a rare and sporadic breeding species in southwestern Québec, where a series of breeding season occurrences (e.g. singing males) in suitable habitat (especially in the Gatineau Hills region) are quite suggestive of the presence of a disjunct breeding population (see David 1980, 1996; Gosselin and David 1981, 1982; Yank and Aubry 1984; Godfrey 1986; St-Hilaire and Dauphin 1996, Savignac 2005; for a summary list of records see http://www.oiseauxqc.org/listann_details.jsp?no=9284.0).

Non-breeding

Being at the northern limits of its range in Canada, the Louisiana Waterthrush is by necessity rare in migration. Even at Point Pelee and Long Point, where it is a regular spring migrant, it is an uncommon species (McCracken 1991).

It is considered a "rare vagrant" in Nova Scotia (Tufts 1986). There are at least a dozen Nova Scotian records, all of which are from Sable and Seal Islands (McLaren 1981a; Godfrey 1986; Tufts 1986). In contrast to Quebec, the bulk of the Nova Scotian records are from the fall period, fitting a well-established pattern of southwest to northeast fall vagrancy for migrant passerine species in Nova Scotia (McLaren 1981b).

Based on the range envelope polygon described by occurrences reported during the second Breeding Bird Atlas in Ontario (2001-2004), the extent of occurrence for the Louisiana Waterthrush is approximately 35,500 km^2. Within this range, the area of occupancy is 2.1 to 3.9 km^2. This estimate is based on the current population estimate of 105 -195 breeding pairs, each with a maximum territory size of 2 ha.

HABITAT

Habitat requirements

The Louisiana Waterthrush nests amongst the roots of fallen trees, in niches of stream banks, and in and under mossy logs (Walkinshaw 1957; Robinson 1995; Prosser and Brooks 1998). Nests are generally well concealed by roots and hanging vegetation and are usually 0.5 m to 4 m above the water surface (Eaton 1958; Bull 1974).

The Louisiana Waterthrush occupies specialized habitat, showing a very strong preference for nesting along pristine, headwater streams and associated wetlands that occur in large tracts of mature forest (Walkinshaw 1957; Buffington *et al.* 1997; Prosser and Brooks 1998). Under such circumstances, deciduous-mixed forests, especially those that have a strong hemlock component, seem to be preferred. Steep-sided talus slopes, particularly south-facing ones, and stream courses are generally preferred

(Eaton 1958). Although it favours running water, especially clear, coldwater streams, it also less frequently inhabits heavily wooded swamps occupied by Northern Waterthrushes (e.g. see Craig 1984, 1985).

In New York, nesting is generally limited to elevations below 600 m (Bull 1974). In Connecticut, streamside habitats were dominated by mixed deciduous-coniferous and deciduous growth (Craig 1985). Tree density and basal area averaged 666 trees/ha and 253 m^2/ha, respectively. In Ontario, forest cover is typically late successional and often has a maple - hemlock component (Ontario Birds at Risk unpubl. data).

Robbins (1979) regarded the Louisiana Waterthrush as an "area-sensitive" species — one that requires large tracts of unbroken forest. Based upon studies in Maryland, he estimated that the minimum contiguous forest cover required to sustain a viable breeding population of Louisiana Waterthrushes was about 100 ha. Freemark and Collins (1992) also listed the Louisiana Waterthrush as an area-sensitive species, but did not suggest a minimum forest size, noting that area requirements are very much influenced by the regional pattern of forest cover. Where it occupies linear territories along forested streamsides, no information is available on whether a minimum area of forested buffer is required on the adjacent tableland, but the species appears to be sensitive to forest fragmentation (Prosser and Brooks 1998).

During migration, the Louisiana Waterthrush occurs in habitats similar to that in the breeding range and in a variety of non-typical habitats where water is available (Walkinshaw 1957; Robinson 1995).

In winter, it favours riparian woodland in hilly and montane areas (American Ornithologists' Union 1998; Robinson 1995). It is rare in lowland wetlands and mangrove forests, which are more clearly favoured by Northern Waterthrushes (Lack and Lack 1972; Robinson 1995).

Habitat trends

Much of southwestern Ontario’s historic wetlands and forests have disappeared, been heavily fragmented, and/or have been drained for agricultural purposes (see Snell 1987; Page 1996). There are very few, large intact blocks of deciduous swamp forest remaining in this region. Loss of Louisiana Waterthrush nesting habitat within forested ravines has occurred as well, but not nearly to the same extent. Nonetheless, quality of primary nesting habitat in forested ravines has undoubtedly declined significantly in some regions (including adjacent U.S. states) owing to forest fragmentation, logging, stream pollution, and siltation.

Despite significant losses in the extent of swamp forest habitat in southwestern Ontario, there is still suitable streamside habitat, much of which is either not occupied by Louisiana Waterthrushes or is occupied intermittently. Failure to occupy all available habitat is likely because the species is at its northern breeding limits in Canada (and adjacent U.S.), where the population is relatively small and patchy.

Habitat protection/ownership

The bulk of suitable breeding habitat in Canada occurs on private lands. It is unknown how much nesting habitat occurs in formally protected areas (parks, nature reserves, conservation lands), but it is likely no more than 20%. On federal lands, Louisiana Waterthrush formerly nested at Point Pelee National Park (Kelley 1978), but apparently not since 1968-69 (Vicki McKay, pers. comm.). On First Nations lands, breeding evidence is available for the Six Nations reserve in Brant County (Chamberlain *et al.* 1985) and Walpole Island First Nation (Eagles 1987), but the evidence is rather weak. There are a number of breeding occurrences within provincial parks and nature reserves in Ontario (e.g. Wheatley, Rondeau, Komoka, Short Hills, Pretty River Valley, Frontenac, Turkey Point, St. Williams Forest, and Peter's Woods Provincial Nature Reserve).

Some habitat occurs in "Environmentally Sensitive Areas" or "Areas of Natural and Scientific Interest," which are afforded various levels of protection through regional sensitive-lands planning. In addition, much of the typical habitat occupied by this species (ravines and floodplains) is apt to be zoned "hazard land," and hence receives some measure of protection against development. There are also provincial laws, enforced by the Ministry of the Environment and the Ministry of Natural Resources, which are designed to protect stream habitats.

Moreover, habitat that is associated with steep-sided ravine slopes may be afforded some protection because it is not easily developed, logged or converted to agriculture.

BIOLOGY

Life cycle and reproduction

Male Louisiana Waterthrushes sing profusely when they arrive on their breeding territories in April and early May. However, the frequency of singing drops as nesting starts, before resuming at a low level after hatching (Eaton 1958; Bent 1963; Robinson 1995).

The Louisiana Waterthrush aggressively defends its territory against conspecifics (Craig 1984), and it is strictly a solitary breeder. In Ontario, territories are rarely, if ever, contiguous to one another (Don Sutherland, pers. comm.).

Where the species occupies forested swamp habitat in Ontario, territories are estimated to be about 2 ha (J. McCracken, pers. obs.). Along stream courses, breeding territories are linear (Eaton 1958; Robinson 1995). Eaton (1958) estimated that each pair of Louisiana Waterthrushes occupied about 400 m of stream course. Assuming that adults defend linear territories that are about 50 m wide, then territories along streams occupy about 2 ha. Territories were much smaller in a study in Connecticut, averaging 0.67 ha (Craig 1984).

Mating is generally monogamous (Mulvihill *et al*. 2002). Egg dates in Ontario ranged from 1 June - 8 July (Peck and James 1998), but this was based on only five

nests. In New York, Andrle and Carroll (1988) reported eggs from 25 April - 1 June. Hence, a more realistic range of dates for Ontario would be from about 1 May – 15 July (including renesting attempts). Nests are constructed by both sexes (Eaton 1958; Robinson 1995). Incubation ranges from 12-14 days and is done entirely by the female. Both parents assist with feeding the young, which remain in the nest for about 10 days (Bent 1963; Robinson 1995).

Clutch size ranges from 4-6 eggs (Bent 1963). The Louisiana Waterthrush is single-brooded throughout its range, but second (and even third) renestings are commonplace if the first nest is destroyed early in the season (Eaton 1958; Robinson 1995; Mulvihill *et al*. 2002). There are few data available on nesting success; Eaton (1958) reported that 70% of the eggs successfully fledged young in his New York study, and Robinson (1995) reported fledging success of 2.8 young per nest, including nests parasitized by Brown-headed Cowbirds (*Molothrus ater)*.

Louisiana Waterthrushes mature in one year and, like most small birds, generally have a short life span. No information is available on survival, but the average annual survival rate of North American Wood Warblers is about 60% (Roberts 1971). The longevity record for the Louisiana Waterthrush is about eight years (Klimkiewicz *et al*. 1983).

No information is available on age structure of the population. The reproductive rate and recruitment rate into the adult population appears to be sufficient to balance the mortality rate (Campbell 2001).

Parasitism/predation

Nests of the Louisiana Waterthrush are frequently parasitized by Brown-headed Cowbirds (Eaton 1958; Bent 1963; Terres 1980; Peck and James 1998). For example, 56%, 54% and 18% of nests were parasitized in New York (Eaton 1958), Illinois (Robinson 1995), and Ontario (Peck and James 1998), respectively.

Little information is available on predation. Adults are undoubtedly preyed upon by small raptors, while nest contents are preyed upon by a variety of snakes, small mammals, and jays (Robinson 1995).

Physiology

No information is available on nutrition, energetics, metabolism, or temperature regulation (Robinson 1995).

Migration/dispersal

The Louisiana Waterthrush is a long-distance migrant that typically arrives in southern Ontario much earlier than most other Wood Warblers. Usual dates in the province range from late April to early September (James 1991). By mid-August, most birds have migrated south (Walkinshaw 1957; Farrand 1983).

The only individual ever banded in Canada and subsequently recovered was banded at Long Point, Ontario on 27 April 1982 and recovered 11 days later, 206 km to the southwest at Point Pelee, Ontario. This potentially represents a spring over-shoot bird that was returning south, and undergoing “reverse migration” (Brewer *et al*. 2000). Such over-shoots probably occur fairly regularly in species whose primary breeding ranges lie south of Ontario.

No important areas of concentration of migrant Louisiana Waterthrushes are recognized in Canada or elsewhere, and the species is believed to migrate solitarily or in very small numbers (Robinson 1995). During spring migration, the species occurs regularly in small numbers along the north shore of Lake Erie (e.g. Point Pelee, Rondeau, Long Point).

Fledged young remain along natal streams for about a month, then wander progressively farther (up to 5 km) away, unattended by parents (Eaton 1958). Assuming that adults and fledged young occur within a stream corridor width of at least 50 m, then each waterthrush family uses up to 25 ha of habitat during the course of the breeding season.

Annual fidelity to breeding areas has been recognized, but its extent is poorly documented (Robinson 1995). Craig (1985) reported that "many adults returned to breed in subsequent years" in his Connecticut study, while Kennard (1975) reported a bird banded in Pennsylvania returning to the same area three years later. In Pennsylvania, Mulvihill *et al.* (2002) reported that up to 50% of females reoccupied territories from the previous year, “not infrequently with the same mate.”

Site-tenacity also likely occurs on the wintering grounds, but there is little information (Robinson 1995). One of two Louisiana Waterthrushes returned to the same area in Guatemala (Rogers *et al*. 1982), and one banded in Panama returned the following winter (Loftin 1977). The Northern Waterthrush displays a strong attachment to its winter territory (Schwartz 1964; Rogers *et al*. 1982), and this is presumably true of the Louisiana Waterthrush.

Wintering birds appear to actively defend feeding territories that are only about 25% the size of breeding territories (Eaton 1953; Schwartz 1964; Robinson 1995), suggesting that the species is relatively sedentary during the winter.

Interspecific interactions

Where sympatric, Louisiana Waterthrushes do not appear to interact much with Northern Waterthrushes, even when occupying the same breeding habitats and sharing overlapping territories (Craig 1984, 1985; Robinson 1995). This lack of interspecific aggression may stem from differences in diet (Craig 1987).

Diet

The Louisiana Waterthrush feeds mostly on aquatic and flying insects, and sometimes eats small mollusks, fish, crustaceans, and even amphibians (Eaton 1958; Bent 1963; Robinson 1995). The diet of both waterthrush species is quite atypical of North American passerines.

Aquatic foraging is commonplace, particularly early in the breeding season. Submerged and floating organisms are both eaten (Eaton 1958; Craig 1984). The following types of aquatic organisms have been reported in the Louisiana Waterthrush's summer diet: isopods, gastropods, Ephemeroptera nymphs, and Diptera larvae (especially chironomids), Trichoptera, Culicidae, and Dytiscidae (Eaton 1958; Craig 1984). Terrestrial organisms included chilopods, caterpillars, adult Culicidae, earthworms, and various emerging aquatic insects (primarily Plecoptera and Ephemeroptera).

Although the two species of waterthrush have similar diets and foraging ecologies (Craig 1984, 1985), the Louisiana Waterthrush typically selects larger prey items than the Northern Waterthrush and has a greater preference for Trichoperta larvae (Craig 1987). Its selection of larger prey may be related to its large bill size (Craig 1987).

Adaptability

The Louisiana Waterthrush spends most of its time on or near the ground, along the margins of streams and pools, and even wading in shallow water (Bent 1963; Robinson 1995). Although able to tolerate moderate levels of direct human disturbance, the Louisiana Waterthrush has several specializations that make it particularly susceptible to habitat perturbations, including deforestation, loss of canopy cover, fluctuating water levels, water pollution, and siltation.

POPULATION SIZES AND TRENDS

Search effort

Because of the relative inaccessibility of its riparian habitat and its early breeding season, the Louisiana Waterthrush is not particularly well surveyed by the roadside-based Breeding Bird Survey (BBS; Robinson 1995). Hence, specialized search effort is required to accurately reveal its presence and numbers. Breeding Bird Atlas surveys and associated site and regional inventories offer the best information on its distribution and numbers in Canada. Before the first Breeding Bird Atlases were conducted in Ontario and Québec in the early 1980s, its distribution was poorly known. A second Ontario atlas, which has presently completed five years of effort, provides the best information on trends in Canada. The two atlas periods in Ontario (1981-85 and 2001-05) involved comparable search effort: about 124,000 person hours were logged in the first atlas versus about 142,000 hours in the second atlas.

A recent survey was conducted in the Outaouais region of Québec, where there has been 14 sightings of Louisana Waterthrush since 1974. The survey involved several visits during the breeding season to the four historic sites and to ten additional sites with apparently suitable breeding habitat (Savignac 2005). During these surveys, a single male Louisana Waterthrush was observed singing at one of the historic sites (Falls Trail, Gatineau Park), but there was no evidence of breeding (Savignac 2005).

Abundance

The continental Louisiana Waterthrush population is estimated to be 130,000 pairs (Rich *et al.* 2003). However, it is more common and widely distributed in the eastern U.S. than it is in Canada. No more than about 195 pairs are estimated to occur in Canada (see below), representing <1% of the total population.

Using data from the first Ontario Breeding Bird Atlas, Eagles (1987) estimated the Ontario breeding population to be 50-100 pairs. However, he admitted that this species was easily overlooked. Indeed, more intensive surveys of natural areas in Elgin Co. and Haldimand-Norfolk R.M. clearly showed that breeding populations in these regions were larger than initially thought (McCracken 1987, 1991; Graham 1988; Naturalists of Elgin County 2004).

In the U.S., breeding density along suitable streamside habitat ranges from about 1-2+ pairs/km of stream (Eaton 1958; Robinson 1995). Similar densities occur in some parts of southwestern Ontario, particularly in Elgin and Norfolk counties (Dave Martin, pers. comm.; J. McCracken, pers. obs.). Together, these two counties are estimated to contain about 200 km of suitable ravine habitat, which could theoretically support 100-200 pairs of Louisiana Waterthrushes. Deciduous swamp forest habitat could likely support about 10 additional pairs. However, given that the species is apt to occur quite intermittently at many suitable sites, while others are perhaps never occupied, it is more likely that the Elgin/Norfolk region supports about 75-120 pairs in a given year (Table 1).

In total, a population estimate of 105-195 pairs is reasonable for Canada, based on the number of known occurrences, input from regional coordinators of the Ontario Breeding Bird Atlas, special surveys, and the amount of suitable habitat that is likely occupied in any given year (Table 1).

An alternative population estimate for Ontario was derived from Partners in Flight (PIF) figures given for Bird Conservation Region (BCR) 13, which includes southern Ontario, northern Ohio, northwestern Pennsylvania, and upper New York. BCR 13 is estimated to contain 1.3% of the continental population (http://www.bsc-eoc/PIF/PIF_BCR13PriorityBreedSpMay2004.pdf), which equals 1,690 pairs. Within BCR 13 portions of Ontario and adjacent states, the Louisiana Waterthrush was reported in about 250 breeding bird atlas squares. Of these, 17.5% are located in Ontario. Based upon this distributional proportion, 296 pairs would be estimated for Ontario (1,690 x 0.175), without making any downward adjustment to reflect intermittency of site occupancy. Assuming an annual site occupancy rate of about 75%,

yields an estimate of 222 pairs, which is very close to the upper end of the estimate provided in Table 1.

A preliminary population modelling analysis using VORTEX has been conducted, based on initial population estimates similar to those currently provided, and assumptions about various reproductive success and survivorship scenarios, and stochastic event simulations (Campbell 2001). A sensitivity analysis was part of the exercise. Immigration from the U.S. was not included in the models (see Rescue effect below), nor were climate models. Most simulations suggested that the Canadian population should persist for over 100 years. The worst-case scenario had an extinction risk of 36%. Thus, based upon this very preliminary PVA, it appears that the Canadian population is likely viable.

Table 1. Estimated size of current Louisiana Waterthrush breeding populations in various regions of Ontario.

County/Regional Municipality	Estimated No. Pairs 2005	
	Min.	Max.
Brant	0	4
Elgin	30	45
Frontenac	5	8
Grey	2	4
Norfolk	45	75
Halton-Peel-Dufferin	1	4
Hamilton-Wentworth-Haldimand	2	4
Hastings	0	1
Huron-Perth	0	1
Essex-Chatham-Kent	1	3
Lambton	5	8
Middlesex	5	11
Niagara	0	3
Northumberland	0	1
Oxford	6	13
Peterborough	1	2
Simcoe	1	4
Waterloo	1	4
Totals	105	195

[1]Based largely on estimates provided by regional coordinators of the second Ontario Breeding Bird Atlas and assuming an average annual site occupancy rate of about 75%. No estimate is provided for Quebec pending confirmation of breeding.

Fluctuations and trends

Documenting historical population changes for the Louisiana Waterthrush in Canada is difficult because of heightened ornithological coverage over the last several

decades, coupled with a general unfamiliarity with the species among the early naturalists. Nash (1908) considered the Louisiana Waterthrush a rare summer "visitor" in southern Ontario and did not indicate the possibility of breeding. The only nesting places known up to 1936 were at Rondeau Provincial Park, and in Middlesex and Wentworth counties (Baillie and Harrington 1937), but other nesting areas were apparently simply overlooked.

Its breeding range appears to have slowly expanded northward in the northeastern U.S. over the last century (Craig 1985; Andrle and Carroll 1988; Brewer *et al.* 1991). This range expansion may be attributed to recolonization of formerly held territory that was heavily lumbered in the 1800s and now being reforested (Brewer *et al.* 1991). Evidence for a range expansion in Canada is apparent only for the Kingston area (Eagles 1987; Ron Weir, pers. comm.), again potentially due to regrowth and increasing maturity of forest cover in that region.

Although it is reasonable to assume that the Louisiana Waterthrush was negatively affected by the historical clearing of forests and drainage of swamps, evidence for population declines is strongest only for the extreme southwestern part of Ontario, particularly the Essex and Chatham-Kent regions. Saunders (1924) noted that it was historically "fairly common in much of the country immediately north and north-east of the Point" [Point Pelee]. He went on to note that ... "In the breeding season, it is likely that one could collect a dozen birds of this species within twenty miles of the Point". This is certainly no longer true of its status in the vicinity of Point Pelee (e.g. see Oldham 1983). In the Chatham-Kent region, Ussher (1956, 1963) reported that the Louisiana Waterthrush formerly nested in the wet sloughs of Rondeau Provincial Park in the 1930s. Indeed, Baillie and Harrington (1937) reported it as being "fairly numerous" there in June 1933.

The Louisiana Waterthrush appears now to be virtually extirpated in the Essex and Chatham-Kent regions. Its decline can be easily associated with the tremendous loss in regional forest cover, coupled with intensive drainage of the forest swamps. The agricultural expansion also likely led to increased cowbird populations (Allen Woodliffe, pers. comm.). There is presently insufficient habitat to realistically expect a return of Louisiana Waterthrush to the Essex and Chatham-Kent regions, at least not in any biologically significant numbers.

The Louisiana Waterthrush has a long history of annual occurrence at some sites in Canada, while other sites are less frequently occupied and are not necessarily occupied every year. Sites may be periodically abandoned as a natural consequence of over-winter mortality of adults. Abandonment and subsequent recolonization of some sites is also probably in response to annual changes in habitat suitability. For example, several sites in Norfolk County were recently abandoned, following a succession of drought years (J. McCracken, pers. obs.).

Although the present-day population estimate of 105-195 pairs in Canada is less than the estimated 150-313 pairs previously provided by McCracken (1991), this does

not reflect an overall population decline, because the earlier estimate did not take into account the intermittent nature of site occupancy and tended to be more strongly based upon extrapolations from the amount of suitable habitat. In Ontario during the first Breeding Bird Atlas (1981-85), the species was reported from 40, 10x10 km squares (Eagles 1987). In the current atlas period (2001-2005), the species has been reported from 47 squares, several of which still require verification. Overall, the results from the two atlas time periods do not indicate a marked change in population size (or distribution) over the past 20 years.

In Canada, this species is too rarely encountered to be monitored by the Breeding Bird Survey. Based upon BBS data from the U.S. for the period 1966-2004, there has been a small but statistically significant annual average population increase of 0.8% per year ($p<0.05$; N=568 routes) across the U.S. (Sauer *et al.* 2005). Despite the overall increase, many regions appear to have been showing declines, including central and eastern portions of New York and Pennsylvania. These declines appear to be balanced by increases in Ohio, western Pennsylvania, and western New York (Sauer *et al.* 2005).

In summary, while some local populations of Louisiana Waterthrushes in extreme southwestern Ontario have declined due to habitat loss and degradation, these appear to have been largely historical in nature. Overall, the Canadian population appears to have remained essentially stable over the last two decades.

Rescue effect

Although there is no direct evidence of immigration from the U.S., some immigration almost certainly takes place, particularly from Louisiana Waterthrush breeding stations in nearby Michigan, Ohio, Pennsylvania, and New York. For two other rare species of forest birds at their northern breeding limits in Canada — Acadian Flycatcher (*Empidonax virescens*) and Prothonotary Warbler (*Protonotaria citrea*) — population modelling suggests that even a tiny amount of annual immigration from source populations in the U.S. is sufficient to maintain the Canadian population (Tischendorf 2003a, b).

A comparison of distributional changes from the first and second New York Breeding Bird Atlases shows some evidence for a northward population expansion in the eastern basin of Lake Ontario (see http://www.dec.state.ny.us/apps/bba/results/). Hence, what appears to be a recent expansion of Louisiana Waterthrushes in the Kingston region has probably been driven by immigration from upper New York rather than immigration from southwestern Ontario.

LIMITING FACTORS AND THREATS

In Canada, the Louisiana Waterthrush appears to be limited primarily by its natural breeding range limits (presumably imposed by climate), followed by regional differences in habitat supply and quality. Some types of threats are more apparent in some regions than others. For example, effects of increased urbanization are most intense in the

Hamilton-Toronto corridor, while loss of forest cover is most intense in parts of extreme southwestern Ontario.

Compromised food resources

Anything that affects the supply of aquatic insects in Louisana Waterthrush habitat is likely to have a negative impact on breeding populations. Probably the most important current threat for this species in Canada is fording of streams by off-road vehicles, which is a growing problem in the Norfolk Sand Plain (Don Sutherland, pers. comm.; J. McCracken, pers. obs.). This activity leads to increased siltation that can negatively impact food supplies.

Local population declines have also been attributed to logging which, amongst other things, thins forests and permits sunlight to penetrate streams. This, in turn can increase water temperatures and suppress aquatic insect life (Eaton 1988). Likewise, the species is also absent from streams where water quality has been compromised by agricultural or urban activities (Prosser and Brooks 1998).

In some regions, stream acidification can have strong impacts on food supplies (Mulvihill 1999 in Mulvihill *et al.* 2002). According to Robert Mulvihill, “a serious threat to the ecological integrity of the stream habitats preferred by waterthrushes in Pennsylvania, and throughout the Appalachian region, is acid discharge from countless abandoned coal mines and acid precipitation resulting from widespread air pollution.” The chemistry of thousands of miles of small headwater streams in that region has been changed from acid inputs, “often with devastating consequences for aquatic life” (www.Carnegiemuseums.org/cmag/bk_issue/1997/mayjun/feat7.htm). Coal mines are not present in Ontario, but any reduction in the size of regional populations of the Louisiana Waterthrush in adjacent states would be expected to have negative consequences on the Canadian population because of reduced immigration. Moreover, acid deposition remains an ongoing issue in southeastern Canada, and deposition loadings remain high within the Great Lakes basin (Environment Canada 2004).

Water supplies

In southwestern Ontario, swamp forest habitat remains under intense pressure from ongoing agricultural drainage via municipal drains. In addition, reducing stream flow for irrigation purposes, especially during drought conditions, likely has a negative impact on waterthrushes on the Norfolk Sand Plain (D. Sutherland, pers. comm.; J. McCracken, pers. obs.).

Adverse effects of both flooding and drought on this species have been reported (Kendeigh 1945; Eaton 1958). The Louisiana Waterthrush will likely be sensitive to climate change, especially at the northern periphery of its range. Most climate change scenarios in the Great Lakes basin predict lessening amounts of precipitation, increased evaporation of surface water, and reduced ground water supplies (e.g. Smith *et al*. 1998; Environment Canada 2001). Because this species is so highly dependent on the

availability of water, it seems likely that the lower water supplies that are predicted by climate change models would counterbalance any northward range expansion that might otherwise be expected to occur as a result of warmer temperatures.

Effects of logging and loss of “older growth” habitat features

Although an impact of logging on the Louisiana Waterthrush has not been directly demonstrated, it is probably negative, given the species' preference for mature, shaded forest cover (e.g. Noon *et al.* 1979; Buffington *et al.* 1997). Logging can also lead to increased siltation of streams and higher water temperatures (Environment Canada 2001), both of which are likely to negatively impact the species’ food supply.

Parasitism and nest predation

As noted in an earlier section, a relatively high incidence of cowbird parasitism can suppress waterthrush reproductive output and may be cause for concern. While cowbird populations across most of northeastern North America have been significantly declining in recent decades (Sauer *et al*. 2005), heightened levels of cowbird parasitism and nest predation by small mammals would be expected to occur in regions of Ontario that are experiencing increasing urbanization, industrial encroachment, rural estate development, and forest fragmentation.

SPECIAL SIGNIFICANCE OF THE SPECIES

Within its breeding (and likely its wintering) range, it is likely an excellent bio-indicator of the health of headwater, medium-gradient, coldwater streams (Prosser and Brooks 1998; Mulvihill *et al.* 2002), and large, intact, mature deciduous forested swamps (Buffington *et al.* 1997; J. McCracken, pers. obs.).

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

The Louisiana Waterthrush is presently designated as a species of “special concern” by COSEWIC and by the Ontario Ministry of Natural Resources. This designation does not afford it any special protection under Canada’s Species at Risk Act or Ontario’s Endangered Species Act. General protection is afforded through the Migratory Birds Convention Act. There is no other specific legislation aimed at protecting the Louisiana Waterthrush in any province or state, or on its wintering grounds. Nevertheless, regulations and policies which promote protection of its breeding and wintering habitats benefit the species. For example, the Natural Heritage component of Ontario’s Provincial Policy Statement (currently under review) supports conservation measures for Significant Wetlands, Significant Woodlands, Significant Valleylands, Significant Wildlife Habitat, and Significant Areas of Natural and Scientific Interest—all areas where Louisiana Waterthrushes may occur. In addition, the Ontario Ministry of Natural Resources has produced silvicultural guidelines for managing forests

in southern Ontario that are relevant to protection of Louisiana Waterthrush habitat (OMNR 2000).

Within the Partners In Flight (PIF) North American Landbird Conservation Plan (Rich *et al.* 2003), the Louisiana Waterthrush is regarded as one of 195 species of "continental importance," because it is regarded as a "stewardship species" (i.e. it has a high percent of its global population occurring within a single biome). It is not on the continental PIF Watch List (the list of species of greatest continental conservation concern). Although it is fairly common and widespread in the eastern U.S. and is ranked as G5 by NatureServe (2005), it is designated as being of "special concern" in Ontario, Michigan, Minnesota, and Wisconsin (Table 2).

Table 2. NatureServe ranks and official status designations for Ontario and the adjacent Great Lakes States.

Jurisdiction	Rank[1]	Designation
Illinois	S4	Not listed
Indiana	S4	Not listed
Michigan	S2S3	Special Concern
Minnesota	S3	Special Concern
New York	S5	Not Listed
Ohio	S5	Not Listed
Ontario	S3	Special Concern
Pennsylvania	S5	Not Listed
Wisconsin	S3	Special Concern

[1]From NatureServe (2005). The species has no formal rank or designation in Québec.

TECHNICAL SUMMARY

Seiurus motacilla
Louisiana Waterthrush Paruline hochequeue
Range of Occurrence in Canada: ON, QC

Extent and Area Information	
• *Extent of occurrence (EO)(*km^2*)* - based on the range envelope polygon described by occurrences reported during the second Ontario Breeding Bird Atlas (2001-04 data).	ca 35,500 km^2
• *Specify trend in EO*	Stable
• *Are there extreme fluctuations in EO?*	No
• *Area of occupancy (AO) (*km^2*)* - based on current estimated population of 105-195 pairs, each occupying territories of a maximum of 2 ha	2.3 to 4.5 km^2
• *Specify trend in AO*	Apparently stable over past 20 years
• *Are there extreme fluctuations in AO?*	No
• *Number of known or inferred current locations*	Not applicable
• *Specify trend in #*	Not applicable
• *Are there extreme fluctuations in number of locations?*	Not applicable
• *Specify trend in area, extent or quality of habitat*	Extent of habitat apparently stable over past 20 years, but habitat quality has probably declined
Population Information	
• *Generation time (average age of parents in the population)*	Likely 2-3 years
• *Number of mature individuals*	105-195 pairs (210-390 individuals)
• *Total population trend:*	Apparently stable
• *% decline over the last/next 10 years or 3 generations.*	Not applicable
• *Are there extreme fluctuations in number of mature individuals?*	No
• *Is the total population severely fragmented?*	No
• *Specify trend in number of populations*	Not applicable
• *Are there extreme fluctuations in number of populations?*	Not applicable
• List populations with number of mature individuals in each: Not applicable	
Threats (actual or imminent threats to populations or habitats)	
- i) reduced insect prey caused by factors that increase stream turbidity (e.g. off-road vehicles), water temperatures (e.g. logging), and water contamination (e.g. acid precipitation); - ii) reductions in water supply and/or the groundwater table that stem from agricultural drainage, excessive irrigation during drought years, and climate change; - iii) logging activities that result in loss of “older growth” features; - iv) increased numbers of nest parasites/predators associated with urban, industrial, and rural estate encroachment and associated habitat fragmentation.	
Rescue Effect (immigration from an outside source)	
• *Status of outside population(s)?* USA: Generally secure across most of its US range,	
• *Is immigration known or possible?*	Yes
• *Would immigrants be adapted to survive in Canada?*	Yes
• *Is there sufficient habitat for immigrants in Canada?*	Yes
• *Is rescue from outside populations likely?*	Yes

Quantitative Analysis	None
Current Status COSEWIC: Special Concern (2006) Ontario Ministry of Natural Resources: Special Concern	

Status and Reasons for Designation

Status: Special Concern	**Alpha-numeric code**: Met criterion for Threatened, D1, but designated Special Concern because the population in Canada has been stable over the last two decades and rescue effect from the United States is likely.
Reasons for Designation: This wood warbler breeds along clear, shaded, coldwater streams in southern Ontario and possibly southwestern Quebec. The Canadian population is small – probably less than 200 pairs – but has been stable over the last two decades, and immigration from populations in the United States probably occurs. Habitat degradation, particularly from ATVs, may be a threat at some sites.	
Applicability of Criteria **Criterion A**: (Declining Total Population): Does not meet criterion - population has been stable over the last 10 years. **Criterion B**: (Small Distribution, and Decline or Fluctuation): Does not meet criterion – Area of Occupancy is < 500 km^2, but no decline or fluctuation in distribution, habitat or numbers. **Criterion C**: (Small Total Population Size and Decline): Does not meet criterion - total maximum population less than 2,500, but no decline or fluctuation in numbers. **Criterion D**: (Very Small Population or Restricted Distribution): Meets criterion for Threatened D1 with fewer than 1,000 individuals. **Criterion E**: (Quantitative Analysis): None	

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