COMMITTEE ON THE
STATUS OF ENDANGERED
WILDLIFE IN CANADA

OTTAWA, ONT. K1A 0H3
(819) 997-4991

COMITÉ SUR LE STATUT
DES ESPÈCES MENACÉES
DE DISPARITION AU
CANADA

OTTAWA (ONT.) K1A 0H3
(819) 997-4991

UPDATED STATUS REPORT ON THE LOUISIANA WATERTHRUSH *SEIURUS MOTACILLA* IN CANADA

BY

ANNETTE M. PAGE

STATUS ASSIGNED IN 1996
VULNERABLE

REASON: SMALL POPULATION BUT NO EVIDENCE OF POPULATION DECLINE SINCE THE PREVIOUS REPORT AND POSSIBLY INCREASING.

OCCURRENCE: ONTARIO

COSEWIC - A committee of representatives from federal, provincial and private agencies which assigns national status to species at risk in Canada.

CSEMDC - Un comité de représentants d'organismes fédéraux, provinciaux et privés qui attribue un statut national aux espèces canadiennes en péril.

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JUNE 1994

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SPECIES:	"Species" means an indigenous species, subspecies, variety or geographically defined population of wild fauna and flora.
VULNERABLE: (V)	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
THREATENED: (T)	A species likely to become endangered if limiting factors are not reversed.
ENDANGERED: (E)	A species facing imminent extirpation or extinction.
EXTIRPATED: (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
EXTINCT: (X)	A species that no longer exists.
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211 BURNHAMTHORPE ROAD WEST
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ABSTRACT

In Canada, the Louisiana Waterthrush breeds only in southern Ontario, primarily in the Carolinian Forest Region, where 63% of Atlas squares containing breeding evidence for this species were located. The species' centre of abundance lies within the Norfolk Sand Plain (eastern Elgin Co., southern Oxford Co., and western Haldimand-Norfolk R.M.), with secondary populations occurring locally along southern portions of the Niagara Escarpment (Niagara and Hamilton-Wentworth R.Ms, and Halton Co.), and outside of the Carolinian Region in Frontenac Co. The species may also breed very rarely and sporadically in southwestern Quebec; one report of possible breeding was reported to the Quebec Breeding Bird Atlas. The species was only reported on one Breeding Bird Survey route in Canada between 1967 and 1994. BBS data from 1966 to 1994 show essentially no change in Continental, United States, or Eastern North American populations of Louisiana Waterthrushes, but from 1980 to 1994, non-significant decreases were noted in these populations. The Nature Conservancy considers the Louisiana Waterthrush to be rare or uncommon in Ontario, and "Vulnerable" status was assigned to the species in that province in 1996.

Deforestation and forest fragmentation have occurred at an alarming rate throughout the species' Canadian breeding range since European settlement. Thirty of the counties south of the Canadian Shield in Ontario now have less than 25% of their landscapes forested, and most of the Carolinian Forest Region counties have far less than that. Also, many of the remaining forests in the species' breeding range are too small, or contain too little forest interior, to support viable breeding populations. The species is quite sensitive to changes in forest structure and age, and can apparently tolerate only low levels of habitat disturbance. It is probably particularly susceptible to losses in canopy cover, fluctuating water levels, water pollution, and siltation. Therefore, it is reasonable to believe that prior to settlement, when large tracts of undisturbed forest were still common in southern Ontario, the Louisiana Waterthrush was more abundant than it is now.

Evidence suggests that declines have occurred locally this century in extreme southwestern Ontario. The species has declined at Point Pelee National Park and Rondeau Provincial Park, and somewhat smaller declines have occurred in Oxford Co, along the Niagara Peninsula, and perhaps in Halton Co. These declines are the result of habitat loss and degradation, chiefly deforestation, forest fragmentation, drainage of swamps, and reservoir development. In addition, the species is vulnerable in Elgin Co. because of few available creeks, and elsewhere in the province because of very small populations and a low tolerance of habitat disturbance. Agricultural statistics collected through the Census of Canada from 1891 to 1981 provide one of the best sources of information on trends in area of land covered in forests, and show the following losses of woodlands on farms in the two core breeding areas: 35% in Elgin Co.; 56% in Haldimand-Norfolk R.M.; 60% in Hamilton-Wentworth R.M.; 60% in Oxford Co.; and 61% in Niagara R.M. Also, the St. Williams Forest/Backus Woods/Wilson Tract area, which is one of the only areas in the Carolinian Region large enough to still have functioning forest interior, has been dissected by small forest access roads and hiking trails, and further fragmentation could reduce or even eliminate forest interior conditions. Over 100 of the 150 to 300 pairs estimated to be breeding annually in Canada likely breed on the Norfolk Sand Plain, while four to seven pairs are estimated to be breeding annually along the Niagara Escarpment and in Dundas Valley, Hamilton-Wentworth R.M, so these areas are essential to the survival of the species in Canada.

Currently, the Louisiana Waterthrush is considered to be a rare and local summer resident in the Carolinian Forest Region of southern Ontario, as well as occasional and rare in the Kingston area of Frontenac Co. It occurs at the fringe of its range in Canada, and the breeding population is small; only 150 to just over 300 pairs are currently estimated to be breeding in the nation. However, there is little evidence to suggest that the species has declined in Canada since COSEWIC assigned a "Vulnerable" status to it in 1991. Therefore, it is recommended that the status of the Louisiana Waterthrush in Canada remain "Vulnerable."

DISTRIBUTION IN CANADA

In Canada, breeding populations of the Louisiana Waterthrush are confined to areas south of the Canadian Shield in Ontario, primarily on the Norfolk Sand Plain (eastern Elgin Co., southern Oxford Co., and western Haldimand-Norfolk R.M.), but smaller populations also occur locally along southern portions of the Niagara Escarpment (Niagara and Hamilton-Wentworth R.Ms., and Halton Co.) and in the Kingston region (Frontenac Co.) (McCracken 1991) (see Figure 1). The species may also possibly breed in southwestern Quebec (see below) (McCracken 1991). Ontario Breeding Bird Atlas (1981-1985) and Ontario Rare Breeding Bird Program (ORBBP) (1989-1991) data support the distribution described above; breeding was "confirmed" in Middlesex, Oxford, Waterloo, and Halton Cos., and Haldimand-Norfolk and Lennox-Addington-Frontenac R.Ms., and "probable" and "possible" breeding evidence were recorded in Kent, Lambton, Elgin, and Hastings Cos., and Hamilton-Wentworth and Niagara R.Ms. However, additional breeding records in Huron, Grey, York, Dufferin, Victoria, Peterborough and Northumberland Cos., and north of Kingston (Eagles 1987; ORBBP data; S. Blaney, D. Brenner, T. Lobb, and D. Sutherland pers. comm. 1995), indicate that the species occasionally breeds farther north than was previously believed. Due to a lack of historical information, it is unknown whether the Louisiana Waterthrush has expanded its range northward in the province, or, more likely, whether more extensive coverage during the Atlas, ORBBP and other intensive surveys simply revealed previously unknown breeding locations.

Altogether, the Louisiana Waterthrush was reported in only 40 (2%) of 1824 squares surveyed in southern Ontario during the Atlas, and breeding was "confirmed" in only 12 (30%) of these squares (Cadman et al. 1987). The species was recorded in an additional eight squares during the ORBBP, but breeding was not "confirmed." The majority (63%) of Atlas squares containing breeding evidence were located in the Carolinian Forest Region, while 35% were from the Southern Great Lakes Forest Region and the other 3% were from the Northern Great Lakes Forest Region.

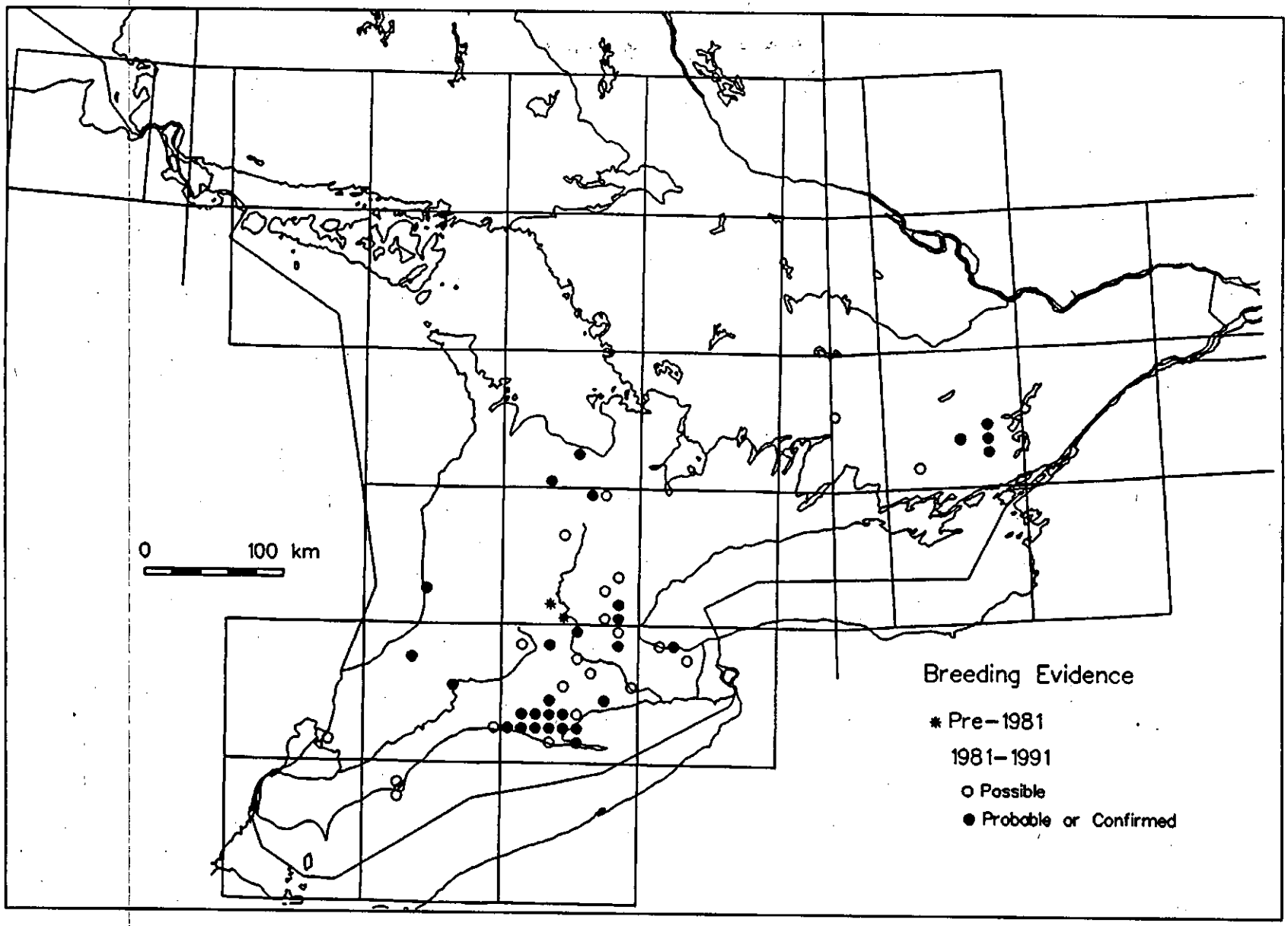

Figure 1 Symbols denote 10-km squares (within 100-km blocks) in which the Louisiana Waterthrush was reported to the Breeding Bird Atlas and the Ontario Rare Breeding Bird Program in Ontario.

Godfrey (1986) stated that in Canada, the species breeds locally in extreme southern Ontario at London, Hamilton, Websters Falls, and Kingston. However, several confirmed breeding locations in southern Ontario known prior to 1986 were omitted from Godfrey's (1986) account, including sites in Kent Co. (Rondeau Provincial Park), Oxford Co, Lambton Co., Essex Co. (Point Pelee), Halton Co., Frontenac Co. (north of Kingston), Niagara R.M., and Haldimand-Norfolk R.M. Since Godfrey's (1986) publication, several confirmed breeding sites have been found in Elgin and Middlesex Cos., and breeding was confirmed once in both Waterloo and Huron Cos. Since 1986, "possible" and "probable" breeding evidence have also been reported in Grey, York, Dufferin, Wellington, Victoria, Peterborough and Northumberland Cos.

During Quebec's Atlas project (1984-1989), the Louisiana Waterthrush was recorded in one (0.04%) of 2464 squares surveyed, and only "possible" breeding evidence was reported. Godfrey (1986) described the species as casual in western Quebec, but several summer records near Kingsmere (Yank and Aubry 1984 in McCracken 1991) suggest that it may be a very rare and sporadic breeder in southwestern Quebec (McCracken 1991). However, no Louisiana Waterthrush records have been reported to American Birds from Quebec in recent years (1990-1992).

Table 1. Summary of Louisiana Waterthrush records from the Atlas of the Breeding Birds of Ontario by Site Region.

Region	# of Squares	% of Squares *	% frequency by Region
1. Hudson Bay	0	0.0	0
2. Northern Boreal Forest	0	0.0	0
3. Boreal Forest	0	0.0	0
4. Southern Boreal Forest	0	0.0	0
5. Northern Great Lakes Forest	1	0.1	3
6. Southern Great Lakes Forest	14	2.2	35
7. Carolinian Forest	25	7.6	63

* Number of squares for which data were received during the breeding bird atlas:

Region 1 - 164 squares
Region 2 - 368 squares
Region 3 - 713 squares
Region 4 - 558 squares
Region 5 - 887 squares
Region 6 - 638 squares
Region 7 - 329 squares

POPULATION SIZE AND TREND

Globally, the Louisiana Waterthrush is demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery (Nature Conservancy). The species was not placed on American Birds' Blue List in any year of its publication (1972 until 1986 inclusive, with the exceptions of 1983, 1984, and 1985) (Page and Cadman 1994).

The Louisiana Waterthrush's typical breeding habitat consists of large tracts of mature forest occurring along steeply-sloped ravines adjacent to running water, making it relatively difficult to detect on Breeding Bird Survey (BBS) routes. In addition, its song is loud and distinctive, but is sometimes drowned out by running water. Even though the data may not represent accurately the size of the population, the trends demonstrated by BBS data are likely to be representative of population changes in roadside habitats. The species was only reported on one BBS route in Canada between 1967 and 1994. BBS data from 1966 to 1994 show essentially no change in the Continental, United States or Eastern North American populations. The species was reported on 430 routes (an average of 0.24 birds per route) throughout the Continent, 429 routes (an average of 0.25 birds per route) in the United States, and 380 routes (an average of 0.28 birds per route) in the Eastern United States. Between 1980 and 1994, however, non-significant declines were noted in the Continental (at a rate of 1.2% per year), eastern North American (at a rate of 1.1% per year), and United States (at a rate of 1.1% per year) populations (B. Peterjohn pers. comm. 1995). The average number of birds per route is extremely low for all data sets, reflecting the fact that the species is difficult to detect on roadside surveys.

United States

State Nature Conservancy ranks and official status designations (Table 2), as well as State Breeding Bird Atlas results (Table 3), indicate that although the Louisiana Waterthrush is apparently or demonstrably secure in much of the northeastern and northcentral United States, it is uncommon, imperiled, or local in a few of the states. For example, the species is considered to be rare or uncommon in Delaware, Minnesota, and Wisconsin, imperiled to rare or uncommon in Michigan, and imperiled and very vulnerable to extirpation in Maine. In addition, the Louisiana Waterthrush has been officially designated as a "Species of Special Concern" in Minnesota, where it is at the western limit of its breeding range, and in Michigan. The species was recorded in less than 10% of all squares or townships surveyed in each of Illinois, Michigan, Massachusetts, and Maine during their Atlas projects, but of these, all except Michigan had a relatively high percentage (33% or more) of "confirmed" breeding records, suggesting that breeding populations in these states are locally distributed. Based on Atlas results, the Nature Conservancy Rank for Illinois (non-breeding only) is questionable.

Table 2. Available State Nature Conservancy Ranks and Official Status Designations for the Northeastern and Northcentral United States.*

State	Rank	Designation
Connecticut**	S5B, SZN	Not Listed
Delaware**	S3B	
Illinois**	SZN	Not Listed
Indiana	S4	Not Listed
Iowa	S?	
Kentucky	S4S5	Not Listed
Massachusetts	S5	Not Listed
Maryland	S5	Not Listed
Maine	S2	Not Listed
Michigan	S2S3***	Special Concern***
Minnesota	S3	Special Concern
New Hampshire	S5	Not Listed
New Jersey	S4	Not Listed
New York	S5	Not Listed
Ohio	S?	Not Listed
Pennsylvania	S5	Not Listed
Rhode Island**	S4B, SZN	
Virginia	S5	Not Listed
Vermont	S5	Not Listed
Wisconsin**	S3B, SZN	Not Listed
West Virginia	S5	Not Listed

* Ranks as of 1993; Designations as of 1990.
** B refers to breeding status; N refers to non-breeding status.
*** Michigan Natural Features Inventory pers. comm. 1995

S2 = Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
S3 = Rare or uncommon in state (21 to 100 occurrences).
S4 = Widespread, abundant, and apparently secure in state, with many occurrences, but is of long-term concern.
S5 = Demonstrably widespread, abundant, and secure in state and essentially ineradicable under present conditions.
SZ = Not of practical conservation concern in state because there are no definable occurrences, although the taxon is native and appears regularly in the state; typically applies to migrants.
S? = Unranked.

Table 3. Breeding Bird Atlas Data Summaries for the Northeastern and Northcentral United States.

State	Years of Survey	# of blocks surveyed	# and % of blocks with breeding records				
			poss.	prob.	conf.	total	(%)
Conn.	1982-86	597	87	133	107	327	54.7
Del.	1983-87	222	50	28	11	89	40.1
Ill.	1986-90	1011	33	24	30	87	8.6
Ky.	1985-91	727	130	71	32	233	32.0
Me.*	1978-83	706	3	4	5	12	1.7
Md.	1983-87	1256	193	252	133	578	46.0
Mass.	1974-78	1116	13	54	36	103	9.2
Mich.**	1983-88	1896	31	31	6	68	3.6
N.H.	1981-86	178	15	14	18	47	26.4
N.Y.	1980-85	5323	364	335	356	1055	19.8
Ohio	1982-87	969	55	185	69	309	31.9
Ohio***	1982-87	764	48	170	48	266	34.8
Penn.	1983-89	4928	581	538	263	1382	28.0
R.I.	1982-88	165	13	10	7	30	18.2
Vt.	1976-81	179	14	11	21	46	25.7
W. Va.	1984-89	502	119	105	71	295	58.8

* = first confirmed in 1980
** = based on townships
*** = priority blocks

States adjacent to Ontario

Prior to settlement, the Louisiana Waterthrush was probably abundant throughout the southern Lower Peninsula of Michigan (Covert 1881, and Gibbs 1885 in Brewer 1991), but a sharp decline is known to have occurred prior to 1890 (Brewer 1991), and by the early 1980s the species had become an uncommon and local summer resident in the southern half of the Lower Peninsula (Payne 1983). Vast deforestation and stream degradation, together with more recent wetland destruction and riparian development, have probably caused serious declines (Hull 1991). During Michigan's Atlas project (1983-1988), the species was found in 68 (3.6%) of 1896 townships surveyed, all in the southern Lower Peninsula (Brewer et al. 1991). Atlas results confirm that the Louisiana Waterthrush is still uncommon and locally distributed in the state, and have led to the species being placed on Michigan's list of species of special concern (Michigan Natural Features Inventory pers. comm. 1995). In addition, the Nature Conservancy considers the species to be imperiled to rare or uncommon in the state (Michigan Natural Features Inventory pers. comm. 1995).

In Ohio, the Louisiana Waterthrush is an uncommon to locally common breeder, except in much of the west and northwest where it is absent (Thompson 1983; Peterjohn and Rice 1991). In the mid-1930s, the species was considered to be uncommon to rare and local in much of northeastern and middle eastern Ohio, but common to abundant in the southern counties (Hicks 1935). However, many squares in the northeast and middle east contained the species during Ohio's Atlas project (1982-1987), reflecting a slow northward spread of the species' breeding distribution in Ohio during the 20th century (Peterjohn and Rice 1991). The Louisiana Waterthrush's current breeding distribution reflects the distribution of small high gradient streams, which are widely distributed along the Unglaciated Plateau (Peterjohn and Rice 1991). The species was recorded in 82% of all priority blocks covered in the Unglaciated Plateau (Peterjohn and Rice 1991). Throughout the state, the species was recorded in 266 (35%) of 764 priority blocks surveyed (Peterjohn and Rice 1991).

The Louisiana Waterthrushes' early history in New York is unclear (Eaton 1988). It is assumed that a large reduction in numbers occurred between 1840 and 1920 in the Allegheny River Valley as a result of extensive lumbering of the region (Eaton 1981 in Eaton 1988). The species had not recovered from this decline when the birds of Allegheny State Park were studied from 1921 to 1940 (Saunders 1942 in Eaton 1988). However, the species appears to have responded to the regrowth of the forest and clearing of the streams; in the early 1980s, it was found nesting along most of the wooded streams of Cataraugus County along the drainage basin of the Allegheny River (Eaton 1981 in Eaton 1988). Currently, the Louisiana Waterthrush is a fairly common to common species in southwestern New York, found along wooded, swift-flowing streams. Its distribution distinctly follows the major river systems in the state (Eaton 1988). Atlas surveys found the species to be well distributed across the Appalachian Plateau and the Mohawk Valley, and it was even recorded in the Central Adirondacks. It breeds as far up the Lake Champlain Valley as Plattsburgh, Clinton Co., and it also breeds in Nassau and Suffolk Cos. on Long Island, north of the terminal moraine (Eaton 1988). During New York's Atlas project (1980-1985), the Louisiana Waterthrush was recorded in 1055 (20%) of 5323 blocks surveyed, and breeding was "confirmed" in 356 of the 1055 blocks (Andrle and Carroll 1988).

Canada

The Louisiana Waterthrush is currently listed as "Vulnerable" in Canada by COSEWIC (McCracken 1991). In 1994, the Ontario Rare Breeding Bird Program (ORBBP) recommended "Threatened" status for the species in Ontario (Page and Cadman 1994), but in 1996, the Committee on the Status of Species at Risk in Ontario (COSSARO) assigned a status of "Vulnerable" to the Louisiana Waterthrush in Ontario (I. Bowman, OMNR, pers. comm. 1996). The Nature Conservancy considers the species to be rare or uncommon (21 to 100 occurrences) in Ontario, and critically imperiled in Quebec because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the province (D. Sutherland pers. comm. 1995).

Southern Ontario represents the northern limit of the Louisiana Waterthrush's breeding range in North America. Early ornithologists described the species as rare or occasional in southern Ontario as far east as Toronto (Chamberlain 1887; Nash 1908; Taverner 1922). MacClement (1915) believed that it was most common along the north shore of Lake Erie in suitable habitat, and Baillie and Harrington (1937) stated that the species occurred in small numbers north to Middlesex and east to Frontenac Cos. However, limited historical data due to the difficulty in accessing the species' breeding range may factor into these statements more than the species' actual abundance. It is reasonable to believe that prior to settlement, when large tracts of undisturbed forest were still common in southern Ontario, the species was more abundant than it is now. This also appears to be the case in Michigan (Brewer 1991). At present, the Louisiana Waterthrush is considered to be a rare and local summer resident in the Carolinian Forest Region of southern Ontario, as well as occasional and rare in the Kingston area of Frontenac Co. (James 1991). Due to the relatively large amount of suitable habitat in the area, the Louisiana Waterthrush's centre of abundance in the province lies within the Norfolk Sand Plain (east Elgin Co., south Oxford Co., and west Haldimand-Norfolk R.M.), with secondary populations occurring locally along southern portions of the Niagara Escarpment (Niagara and Hamilton-Wentworth R.Ms, and Halton Co.) and the Kingston area (Frontenac Co.) (McCracken 1991).

Breeding was first confirmed in Ontario in 1895 when a nest with eggs was found at Aylmer, Elgin Co., and on June 2, 1933 the second nest was found in the province at Rondeau Provincial Park, Kent Co. (Baillie and Harrington 1937). In 1935 and 1936 breeding was confirmed in Middlesex Co., and in 1937 a nest with young was discovered at Websters Falls, Wentworth Co. (Baillie and Harrington 1937). Baillie and Harrington (1937) stated that "the only known nesting places in the province at present are at Rondeau Park and in Middlesex and Wentworth Counties," but undoubtedly many more went undetected. In fact, a nest with eggs (and later young) was found in Oxford Co. in 1946 (ONRS data), and another nest with eggs was found in Euphemia Twp., Lambton Co., in 1947 (ONRS data). In the mid to late 1950s, breeding was "confirmed" every year along the bank of the Forty Mile Creek in Niagara R.M., but no birds have been observed in the area since a lot of trash was dumped over the side of the canyon (G. Meyers, ORBBP). Nests were found in 1968 at Point Pelee, Essex Co. (Kelley 1978), and in Hamilton-Wentworth R.M. in 1971 and 1972 (Eagles and McCauley 1982; ONRS data). More recently, seven new breeding sites were discovered during extensive Natural Area surveys in Elgin Co. in 1986, and six confirmed breeding pairs were found in Middlesex Co. the same year (Weir 1986). Further studies along Big Otter Creek in Oxford Co. recorded over 30 nesting pairs in 1990 (Weir 1990), and D. Sutherland (pers. comm. 1995) states that there is at least one pair breeding along all of the tributaries of Big Otter Creek. In 1990, breeding was also "confirmed" at Shep's Subdivision, Waterloo Co. (T. Cheskey, ORBBP). In 1979, four pairs with young were recorded at Cedar Springs, Halton Co. (Eagles and McCauley 1982), and the species occurred in the area of Hilton Falls, Halton Co. in the early 1980s, but it hasn't been seen in that area since the mid-1980s (D. Brewer pers. comm.). One singing male was recorded along Number 17 Sideroad near Speyside, Halton Co., in 1993 (M. Austen pers. comm. 1993). Rob Dobos (pers. comm. 1995) estimates that four to seven pairs breed annually in Hamilton-Wentworth R.M., along the Niagara Escarpment and in the Dundas Valley.

The largest Louisiana Waterthrush population in Ontario is likely located in Haldimand-Norfolk R.M. (primarily on the Norfolk Sand Plain), where 75 to 125 pairs are estimated to breed annually (McCracken 1987, 1991; J. McCracken pers. comm. 1995). The Louisiana Waterthrush was first reported in the area at Turkey Point in May 1925, and was found summering at Turkey Point and Backus Woods in the 1940s (McCracken 1987). On June 19, 1984, a nest with young was found at Courtland Swamp, and a nest with eggs was found in 1985 at Delhi-Big Creek Valley. In 1986, a nest with young was located along Dedrick Creek in Backus Woods (McCracken 1987), and in 1988 adults with fledged young were reported from the same area (D. Graham, ORBBP). Prior to the Natural Areas Inventory (NAI) Survey conducted in 1985-1986, the Louisiana Waterthrush was regarded as regionally rare, but during the survey it was found to be quite widespread; the greatest numbers were found in St. Williams Forest, Venison Creek Valley, and Deer Creek Valley (McCracken 1987). The results of the NAI survey indicate that the species had been previously overlooked in Haldimand-Norfolk R.M., and consequently its status was changed from regionally rare to uncommon and fairly local (McCracken 1987). The results of the NAI survey also support the fact that the Louisiana Waterthrush can be easily overlooked in an area when it is not breeding in very high densities. Mary Gartshore (in Weir 1986) described the species as common along watercourse ravines in the Long Point area.

A small Louisiana Waterthrush population also breeds in the Kingston region, where the species was first observed on May 2, 1927, but was not seen again until September 1, 1951 (Quilliam 1965). At that time, the species was considered to be an accidental visitor in the region (Quilliam 1965, 1973). Sightings have increased since 1974 (Sprague and Weir 1984), and in 1975 and 1977 the first breeding season records were reported (Weir 1989). From 1980 onward, summer records (primarily from Canoe and Desert Lakes, Snug Harbour, and the Otter Lake Sanctuary) have been annual, and the first confirmed nesting occurred at Canoe Lake, Frontenac Co. in June 1981 (Weir 1989). During the Breeding Bird Atlas, five pairs were found breeding in the Kingston area (Cadman et al. 1987), and in 1992 three pairs were known to successfully fledge young (Ridout 1992). The Louisiana Waterthrush is now considered to be a rare summer resident in the Kingston region (Weir 1989). Ron Weir (pers. comm. in Eagles 1987) believes the increase in Kingston records to be the result of a northeastward range expansion that took place in the mid 1970s to mid 1980s.

Atlas and ORBBP data, together with more recent information, suggest that range expansions may have occurred in other parts of Ontario. However, these records from outside the primary breeding range (including those noted in the Kingston region) may be largely due to the increased field work associated with the Atlas (especially on the Niagara Escarpment) and other surveys, and may not represent an actual change in the species' distribution in Ontario (Eagles 1987). Breeding was "confirmed" during the Atlas and/or ORBBP in the Bayfield River valley along Lake Huron, Huron Co., as well as north of Kingston. "Possible" and "probable" breeding evidence were reported from ravines in the Niagara Escarpment in Grey and Dufferin Cos. (Eagles 1987), which indicates that the species occurs in small numbers along streams in central areas of the escarpment. As well, "probable" breeding was reported from several previously unknown locations between Cambridge and Long Point (Eagles 1987). More recent records from outside the species' primary breeding range

include: a nest with four eggs found in the Maitland River Valley, Huron Co., on June 20, 1993 (J. Miles had banded this species previously at the banding station up the river) (T. Lobb pers. comm. 1995); one singing male south of Owen Sound "a few years ago" (S. Blaney pers. comm. 1995); a singing male recorded in Peterborough Co. at the Bracken Bridge Woodland Biodiversity Study plot (on the Ouse River, just east of Westwood) on May 17, 1994 (D. Brenner pers. comm. 1995); one singing male recorded in a mature sugar maple, beech, and eastern hemlock forest near Bethany, Victoria Co. on May 31, 1994 during LPBO's Woodland Biodiversity Study (D. Brenner and M. Austen pers. comm. 1995); one individual in Canning's Falls, Dufferin Co., in spring 1995 (D. Sutherland pers. comm. 1995); one individual in a silver maple swamp in York Region in spring 1995 (D. Sutherland pers. comm. 1995); and two singing males recorded in suitable habitat at Murray Hills, Northumberland Co., near Trenton in spring 1995 (one recorded during the first week of May, and the same one in the same location, plus a second one, around May 15) (S. Blaney pers. comm. 1995). In addition, a singing male was recorded several times from May 25, 1995 until June 2 or 3, 1995 in suitable habitat (a ravine in a mature beech forest) in Peter's Woods, which is a Provincial Nature Reserve in Northumberland Co., just east of Highway 45 between Baltimore and Fenella (D. Sutherland pers. comm. 1995). It is quite likely that the individual in Peter's Woods nested in 1995, and Sutherland (pers. comm. 1995) believes that there may be more breeding pairs on the south slope of the Oak Ridges Moraine, but the area has never been surveyed.

Evidence suggests that declines have occurred locally in extreme southwestern Ontario (McCracken 1991). Numbers have declined at Point Pelee, Essex Co., since the early 1920s when Saunders (1924 in McCracken 1991) considered the Louisiana Waterthrush to be fairly common there and stated that breeding populations were largest in the Pelee area. He also stated that during the breeding season, a dozen birds could likely be collected within 20 miles of the Point. McCracken (1991) estimated that zero to one pairs breed annually in Essex Co., but Tom Hince (pers. comm. 1995) states that no Louisiana Waterthrushes breed in the Pelee area, and that the habitat in the area is not suitable for this species. At Rondeau Provincial Park, the species was recorded as being "fairly numerous" in June 1933 (Baillie and Harrington 1937), but only one square containing "possible" breeding evidence was reported to the Atlas (Cadman et al. 1987), and McCracken (1991) estimated that only one or two pairs breed annually in all of Kent Co. In 1991, a total of 10 Louisiana Waterthrushes were recorded at Rondeau during a Forest Bird Monitoring Program survey (Bowles and Gartshore 1992), but none were found during the survey in 1993 (Gartshore 1994). Allen Woodliffe (pers. comm. 1995) did not record any during his brief survey of the park during a heat wave in mid-June 1995, but he did not survey the FBMP transects. The Louisiana Waterthrush is now considered to be incidental at Rondeau (A. Woodliffe pers. comm. 1995). Don Bucknell (pers. comm. 1991) stated that numbers in Oxford Co. slowly declined between 1950 and 1980, and in Niagara R.M. the species has declined in numbers since 1950 (G. Bellerby pers. comm. 1991). These declines are a result of habitat loss and degradation, chiefly deforestation, forest fragmentation, drainage of swamps, and reservoir development (McCracken 1991). The species is probably particularly susceptible to losses in canopy cover, fluctuating water levels, water pollution, and siltation (McCracken 1991). At Point Pelee, declines could easily be associated with a loss in forest cover (McCracken 1991), and a forest "clean up" program at Rondeau during the Depression years may be responsible for declines there.

A provincial population estimate of 50 to 100 pairs was estimated using Atlas data (Cadman et al. 1987). However, intensive surveys of natural areas in Elgin Co. (1986) and Haldimand-Norfolk R.M. (1985-1986) indicated that over 100 pairs likely breed in those two regions alone, and McCracken (1991) estimated the annual breeding population in Ontario to be between 150 and just over 300 pairs. There is no direct evidence to suggest that the population size has changed significantly since McCracken's (1991) estimate was made.

HABITAT

Habitat preferences

The Louisiana Waterthrush's preferred breeding habitat consists of large tracts of mature, deciduous and deciduous-mixed forest occurring along steeply-sloped ravines adjacent to running water (especially clear, cold streams) (McCracken 1991). The presence of water and canopy cover are essential (McCracken 1991). Less commonly, it may use mature, deciduous swamp forest with standing pools of open water, which is the preferred breeding habitat of the Northern Waterthrush (Eagles 1987; McCracken 1991). The species nests amongst the roots of windfalls, live trees and bushes, in niches of cliffs and banks, and in and under mossy logs (Walkinshaw 1957 in McCracken 1991). Nests are generally well concealed by roots and hanging vegetation and are usually 0.5 m to 4 m above the water level (Bull 1974 in McCracken 1991).

The Louisiana Waterthrush is probably quite sensitive to changes in forest structure and age, and can apparently tolerate only low levels of habitat disturbance (McCracken 1991). Any changes which dramatically alter water levels, impact the aquatic insect community, reduce canopy cover to less than 75%, set back the successional stage of the forest, or fragment it are likely to have a negative impact on breeding populations (McCracken 1991).

Trend in quantity and quality of critical habitat

Prior to European settlement, much of southern Ontario was forested both on the shield and off, and much of that forest was probably mature. In the Carolinian Region, forests were primarily deciduous, with cedar and tamarack swamps in some low-lying areas. Perhaps up to 10% of the forest consisted of forest openings, providing habitat for "edge" species. Since settlement, the amount of forest cover in the Carolinian Forest Region of Ontario has been drastically reduced, individual forests have become smaller and fragmented, the amount of forest interior has declined, and the amount of "edge" habitat has increased, at least relative to forest interior. As a result, suitable Louisiana Waterthrush breeding habitat has undoubtedly been reduced in the province. In fact, many remaining forests may be too small to sustain viable Louisiana Waterthrush breeding populations, although further studies need to be done before this can be said with confidence.

Studies in existing mature hardwood forests reveal that southern Ontario's forests would have been generally stable with a low rate of natural disturbance. Large scale disturbances, such as catastrophic wildfire, were relatively rare, with perhaps 1000 years between stand destructions (Lorimer 1989). Stand destructions would be more frequent in areas of shallow sandy soils such as the Oak Ridges Moraine. About 20% of the forested landscape would consist of young stands originating after catastrophic disturbances, and 80% would be old or mature affected primarily by partial stand destruction and a high frequency of small gap disturbances (Lorimer 1989). Small disturbances resulted from disease, insect infestations, creeping fires, drought, and blowdowns, and could change the species composition of the forest without complete stand replacement. Over a long period of small scale disturbance, mature forest would be patchy and uneven aged, with a fine-grained mosaic of generation stages (Noss 1991). About 70% of the stand area would be occupied by mature or large trees, with less than 10% in gaps at any one time.

The Louisiana Waterthrush typically occurs at elevations greater than 300 m and in regions above the 6° C mean yearly isotherm (McCracken 1991), meaning that its distribution in Ontario is somewhat limited. The Norfolk Sand Plain and southern portions of the Niagara Escarpment, which support the most important Louisiana Waterthrush populations in Ontario, contain a relatively large amount of suitable habitat and are essential to the survival of the species in Ontario (McCracken 1991). Although there has been some loss of preferred breeding habitat (i.e. ravines), the loss of swamp forest, particularly in extreme southwestern Ontario, has probably been most significant (McCracken 1991). However, quality of preferred habitat has probably declined significantly in many areas due to forest fragmentation, stream pollution, and siltation (McCracken 1991). Forest fragmentation is of particular concern, because the Louisiana Waterthrush is an "area-sensitive" species (Robbins 1979 in McCracken 1991), requiring at least 100 ha. of contiguous forest cover in order to sustain a viable breeding population (McCracken 1991). There are no data currently available on how many forests of this size remain within the species' breeding range in Ontario, but there are undoubtedly fewer than historically.

Although the following information is general only (specific information on the Louisiana Waterthrush is lacking), much of it is still applicable to this species and suggests that the amount of suitable habitat for the Louisiana Waterthrush has decreased greatly with the clearing of forests in southern Ontario. Whereas the presettlement forest was extensive and mature, today's remaining woodlands are primarily small and young. The available information confirms the overall loss of forest south of the Canadian Shield. Thirty of the counties south of the Shield now have less than 25% of their landscapes forested, and most of the Carolinian Forest Region counties have far less than that: Essex and Kent Cos. have less than 5% forest cover remaining (Riley and Mohr, in prep.). Eastern Elgin Co. and western Haldimand-Norfolk R.M., which contain the largest number of breeding Louisiana Waterthrushes (over 100 of the estimated 150 to just over 300 pairs breeding annually in Canada) and whose forests are essential to the survival of the species in Canada, support 16-25% forest cover (Gartshore 1988). The Louisiana Waterthrush is not found in upland forest habitat, which has experienced the greatest losses in forest cover; rather, it breeds in deeply incised, forested stream valleys, which still tend to be highly forested (J. McCracken pers. comm. 1995). However, even if wooded ravines themselves are not logged, some remaining forest patches may be too small to support viable Louisiana Waterthrush breeding populations, and may allow Brown-headed Cowbirds easy access to the species' nests. Therefore, the general information discussed above may still apply to the Louisiana Waterthrush.

Agricultural statistics collected through the Census of Canada provide one of the best sources of information on trends in area of land covered in forest (Table 4). It is important to note that by 1891, when statistics were first collected, much of southern Ontario's forest had already been removed. The area of woodland on reporting farms in the Carolinian Forest Region at that time averaged 19.4% per county. This percentage dropped quickly to only 8.2% in 1911, and then stayed at approximately that level until 1971 when it dropped to 7.4%, and 1981 when it dropped further to 6.6%. The loss of woodland on farms in the Carolinian Forest Region from 1891 to 1981 averaged 63% per county (Table 4), and was highest in Essex and Kent Cos. which lost 93% and 85% of their woodlands on farms, respectively (Table 4). Losses in other counties with important known Louisiana Waterthrush breeding sites are somewhat smaller, but still significant (35% in Elgin Co., 56% in Haldimand-Norfolk R.M., 60% in Hamilton-Wentworth R.M., 60% in Oxford Co., and 61% in Niagara R.M.) (Table 4). Clearly, the woodlands of the Carolinian Forest Region, and particularly those of the extreme southwest, have been and continue to be severely depleted by human activity.

Table 4. Comparison of the percent of woodland on farms in the Carolinian Forest Region in 1891 and 1981 (From Census of Canada Agricultural data).

County	% in 1891	% in 1981	% lost
Brant	22.4	6.8	70
Elgin	14.7	9.5	35
Essex	23.8	1.7	93
Haldimand-Norfolk	25.4	11.1	56
Halton	22.1	11.6	48
Hamilton-Wentworth	16.9	6.7	60
Kent	15.2	2.3	85
Lambton	24.0	7.6	68
Middlesex	15.5	6.4	59
Niagara	17.5	6.8	61
Oxford	15.2	6.1	60

As well as habitat loss, habitat degradation (in the form of forest fragmentation) has occurred at an alarming rate in southern Ontario, especially in the Carolinian Forest Region. Hounsell (1991) described southern Ontario as "an agriculturally-dominated landscape" and "a vast area of extensive forest fragmentation." Many conservation biologists believe that "habitat fragmentation is the most serious threat to biological diversity and is the primary cause of the present extinction crisis" (Noss 1987 in Riley and Mohr, in prep.). Because the Louisiana Waterthrush is an area-sensitive, forest interior species, it requires at least 100 ha of contiguous forest cover with sufficient forest interior in order to sustain a viable breeding population. A recent study by Cheryl Pearce (1993) found that 95% of the remaining forest patches in her 60 km x 60 km (360,000 ha) study area (Lake Erie shoreline north to Woodstock in the west and the Six Nations Reserve in the east) are less than 24 ha in area, while 99% of the remaining forest patches are less than 100 ha in area. Only six of the

remaining 11,064 patches are greater than 1000 ha. In addition, most of the forest patches in the study area are very elongated with highly convoluted margins (i.e. high edge/area ratios), and could be considered forest corridors rather than forest patches. Most of the remaining patches could have no functional forest interior at all (the actual amount depends on the edge width criterion used): using a 0-100 m edge zone, 8,882 of the 11,064 patches (80%) would have no functional forest interior remaining, and if a 0-300 m edge zone was used, 9,547 patches (86%) would have no functional forest interior. Many authors (cited in Pearce 1993) have suggested that true forest interior habitat could be more than 60 m to 600 m from the non-forest/forest margin for animals ("faunal edge"). One area which is large enough to still have functioning forest interior is the St. Williams Forest/Backus Woods/Wilson Tract area, which forms a large, almost continuous forest cover. However, these woods have been dissected by small forest access roads and hiking trails, and further fragmentation could reduce or even eliminate interior conditions (Pearce 1993). It is important to mention that the area studied by Pearce (1993) is the most heavily forested area remaining in the Carolinian Region. The area of forest interior in other parts of the Carolinian Region is far lower, with some areas, such as Essex and Kent Cos., having essentially no forest interior remaining.

Widespread fragmentation and clearing of forest habitat in both the breeding and wintering range has led to declines in many area-sensitive, forest-dwelling neotropical migrant species throughout eastern North America (Robbins et al. 1989; Hounsell 1991). BBS data from 1966 to 1988 showed essentially no change in Louisiana Waterthrush populations in North America, the United States, or Eastern North America. However, because of the its specific habitat requirements, the species is difficult to detect on roadside surveys such as the BBS. Since the Louisiana Waterthrush is an area-sensitive, forest-dwelling neotropical migrant, factors contributing to overall decline in this group of bird species (such as loss of habitat heterogeneity, potential barriers to dispersal between woodlots, area-dependent biotic interactions with predators, brood parasites such as the Brown-headed Cowbird, and interspecific competition) still detrimentally affect the Louisiana Waterthrush and have undoubtedly led to local declines in numbers. The factors mentioned above become more common and/or effective as forest size declines, or forest edge become more prevalent (Ambuel and Temple 1983 and Wilcove 1985 in Hounsell 1991), and will have a negative effect on the annual reproductive success rate of species such as the Louisiana Waterthrush. Large woodlots dominated by edge (possessing a high edge-to-area ratio) are also of little value to these species (Hounsell 1991). Pearce (1993) stated that "the fragmentation of forest cover into small isolated patches, and the reduction in functioning forest interior, leave the forest more susceptible to blowdown, drought, disease, and insect infestations, and invasions through the edge zones by small predators such as raccoons, blue jays, and cats, and cowbirds. These stresses, combined with increased competition for a shrinking habitat, may account for 80% to 100% of the lack of nesting success of neotropical migrant songbirds, even in forests of 1,000 to 2,000 ha." Species that are area-sensitive or sensitive to habitat edges, have low annual reproductive rates, or nest in conspicuous places, are most apt to decline as woodland patches become smaller and forest edge increases (Ambuel and Temple 1983 and Temple 1986 in Hounsell 1991). Ecological generalists and edge inhabiting species, on the other hand, benefit (Temple 1986 in Hounsell 1991).

Hounsell (1991) has proposed a method of categorizing landscapes into those with high, medium, and low conservation value, as defined: "landscapes with high conservation value have a high percent forest cover; high degree of neighbourhood and connectivity, facilitating the efficient

colonization of discrete forest patches; component patches are typically large with forest interior effectively buffered from edge effects, with occasional extensive tracts acting as a colonizing source area. As the percent forest cover declines within the landscape and component patches become either more edge-dominated and/or smaller and more isolated, the conservation value will decrease to the point of virtually no value, at which point, regional extirpations of species can be expected." From Hounsell's perspective, much of the Carolinian forest in Ontario is of low or medium low conservation value, which happen to correspond to areas denuded or partially denuded of large forest tracts. However, because of the scarcity of woodlots throughout the Carolinian region, it is essential that all woodlots be protected at all costs, not just those with 'high' conservation value. In fact, the need to protect woodlots with 'low' conservation value (i.e. in Essex and Kent Cos. in extreme southwestern Ontario) is more urgent than anywhere, as these woodlots are all that remain in the area.

EVALUATION AND PROPOSED STATUS

The Louisiana Waterthrush breeds only in the eastern United States where it is fairly common and widespread, and in southern Ontario where it is a rare and local breeder. Overall, populations are essentially stable and the Nature Conservancy considers it to be demonstrably secure globally. The species has never been Blue Listed.

In Canada and Ontario, the Louisiana Waterthrush has been officially designated as "Vulnerable" by COSEWIC and COSSARO, respectively, and the Nature Conservancy considers it to be rare or uncommon in Ontario. The species occurs at the fringe of its range in Canada, and the population is small; only 150 to just over 300 pairs are currently estimated to be breeding annually in the nation. Habitat loss and degradation have led to declines in Louisiana Waterthrush numbers at Point Pelee National Park and Rondeau Provincial Park, along the Niagara Peninsula, in Oxford Co., and perhaps in Halton Co. The species is vulnerable in Elgin Co. where there are few available creeks, and elsewhere in the province because of very small populations and a low tolerance of habitat disturbance. The species is quite sensitive to changes in forest structure and age, and can apparently tolerate only low levels of habitat disturbance. It is probably particularly susceptible to losses in canopy cover, fluctuating water levels, water pollution, and siltation. Despite indications of habitat loss throughout its' breeding range in Canada, there is no direct evidence to suggest that the Louisiana Waterthrush population has declined since COSEWIC assigned the species a "Vulnerable" status in 1991. Therefore, it is recommended that the status of the Louisiana Waterthrush in Canada remain "Vulnerable."

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