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 PROTHONOTARY WARBLER *PROTONOTARIA CITREA* IN CANADA

BY

ANNETTE M. PAGE

STATUS ASSIGNED IN 1996
ENDANGERED

REASON: SIGNIFICANT RANGE-WIDE DECLINE IN NORTH AMERICA; DRASTIC DECLINE IN ONTARIO - ESTIMATE OF ONLY 13 PAIRS AT TWO SITES. THREATENED BY LOGGING AND DEVELOPMENT AND COMPETITION WITH OTHER BIRD SPECIES.

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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ABSTRACT

In Canada, the Prothonotary Warbler's former breeding range was restricted to a few counties in southwestern Ontario. The majority of breeding sites were located on sand spits along Lake Erie (i.e. Point Pelee, Rondeau, Long Point, and Point Abino). However, the species is currently believed to breed in Ontario only at Rondeau Provincial Park and the Long Point area, with occasional breeding possible at Dundas Marsh. The species was not reported on Breeding Bird Survey routes in Canada between 1967 and 1994. Breeding Bird Survey data from 1966 to 1994, and from 1980 to 1994, showed a significant decline in the Continental, United States, and Eastern North American populations. The Nature Conservancy considers the species to be demonstrably secure globally, but imperiled in Canada and Ontario because of rarity, or because of some factor(s) making it very vulnerable to extirpation throughout Canada and Ontario. The species is currently listed as "Vulnerable" in Canada, and as "Endangered" in Ontario.

During Ontario's Breeding Bird Atlas project, fewer than 80 pairs of Prothonotary Warblers were estimated to be breeding annually in the province. The species was designated as Vulnerable in Canada in 1984 based on local population declines over the previous 50 years as a result of habitat loss and disturbance. Since the original COSEWIC report was written in 1981, the Prothonotary Warbler has declined drastically throughout Ontario, most notably at Rondeau Provincial Park and the Long Point area, which are the only two remaining Prothonotary Warbler breeding locations in Canada. Twenty to 25 pairs were estimated to be breeding annually at Long Point in 1985-1986, but the current breeding population is believed to be anywhere from zero to six pairs (all at Hahn Marsh). Only four to five (maybe as many as six or seven) pairs are currently estimated to be breeding annually at Rondeau Provincial Park, as compared to historical numbers of 100 breeding pairs in the park. The cause(s) of these declines are largely unknown, but may be partially due to habitat loss. However, most of the sites in the Long Point area still appear to be suitable for the species.

The Prothonotary Warbler population in the province is extremely localized, which makes it vulnerable to natural changes in habitat; long-term (greater than a five-year duration) shifts in lake levels could easily decimate the species in Canada, and a "well-placed" and "well-timed" tornado could also wipe out the Canadian population. In addition, its proclivity for nesting in very shallow tree-cavities makes the species vulnerable to Brown-headed Cowbird parasitism and competition with House Wrens and Tree Swallows. Because of the recent drastic declines in the breeding population and the fact that the reasons for the decline are largely unknown, the extremely localized distribution (Rondeau Provincial Park, Long Point, and possibly occasionally Dundas Marsh) and size of the population (maximum of 13 pairs) in Canada, and the vulnerability of the species to natural changes in habitat, it is recommended that the status of the Prothonotary Warbler be upgraded from "Vulnerable" to "Endangered" in Canada.

DISTRIBUTION IN CANADA

During the Breeding Bird Atlas project (1981-1985), the Prothonotary Warbler's breeding range in Canada was restricted to a few counties in southwestern Ontario, but the species is now known to breed only at Rondeau Provincial Park in Kent Co., the Hahn Marsh at Long Point, and occasionally Dundas Marsh in Hamilton-Wentworth R.M (R. Dobos, J. McCracken and D. Sutherland pers. comm. 1995). Figure 1 shows the breeding distribution of the Prothonotary Warbler in Canada, based on data from the Breeding Bird Atlas and the Ontario Rare Breeding Bird Program (ORBBP). During the Atlas project, the Prothonotary Warbler was reported in only 15 (0.8%) of 1824 squares surveyed in southern Ontario. Breeding was confirmed in 11 (73%) of the 15 squares: Point Pelee, Essex Co. (one square); Rondeau Provincial Park, Kent Co. (four squares); the Long Point area (five squares); and Pinery Provincial Park (one square). Probable breeding evidence was recorded in one (7%) square in Huron Co., and possible breeding evidence was recorded in three (20%) squares: one square in Bruce Co. and two squares in Hamilton-Wentworth R.M. (Cadman et al. 1987). Since the Atlas prject, breeding evidence has been reported in Skunk's Misery (Middlesex Co.), Bluff Point on Long Point (Haldimand-Norfolk R.M.), Moffat's Creek (Waterloo R.M.), Dundas Marsh (Hamilton-Wentworth R.M.), Point Abino, and one square in Oxford Co (ORBBP data; McCracken 1987a). In addition, two historical sites were reported to the ORBBP from north of King City, York Co. and east of Leamington, Essex Co. (Fig. 1). Since the Atlas project, breeding has only been confirmed at Big Creek, Long Point, and Dundas Marsh, but probable breeding was reported at Rondeau (Kent Co.), Skunk's Misery (Middlesex Co.), and Backus Woods (Haldimand-Norfolk) (ORBBP). However, no breeding birds have been found in any of these areas in the last few years, with the exception of Rondeau.

The majority of breeding sites for the species in Ontario have been located on sand spits along Lake Erie (i.e., Point Pelee, Rondeau, Long Point, and Point Abino), but other sites have fairly recently been located further inland (Fig. 1). During the Atlas project, the majority of Prothonotary Warbler sites (87%) were located in the Carolinian Forest Region, with the remainder being reported in the Southern Great Lakes Forest Region (Table 1).

The species is casual in New Brunswick and Nova Scotia, and it has also been recorded in Quebec and Saskatchewan (Godfrey 1986).

POPULATION SIZE AND TREND

Globally, the Prothonotary Warbler is demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery (Nature Conservancy). The species has never been placed on American Birds' Blue List (published from 1972 to 1986 inclusive, with the exceptions of 1983, 1984, and 1985).

Breeding Bird Survey (BBS) results suggest that the Prothonotary Warbler is found in low numbers throughout its range, but because the species is restricted to wooded wetland areas, it is underrepresented by BBS results (Robbins et al. 1986). Even though the data may not represent

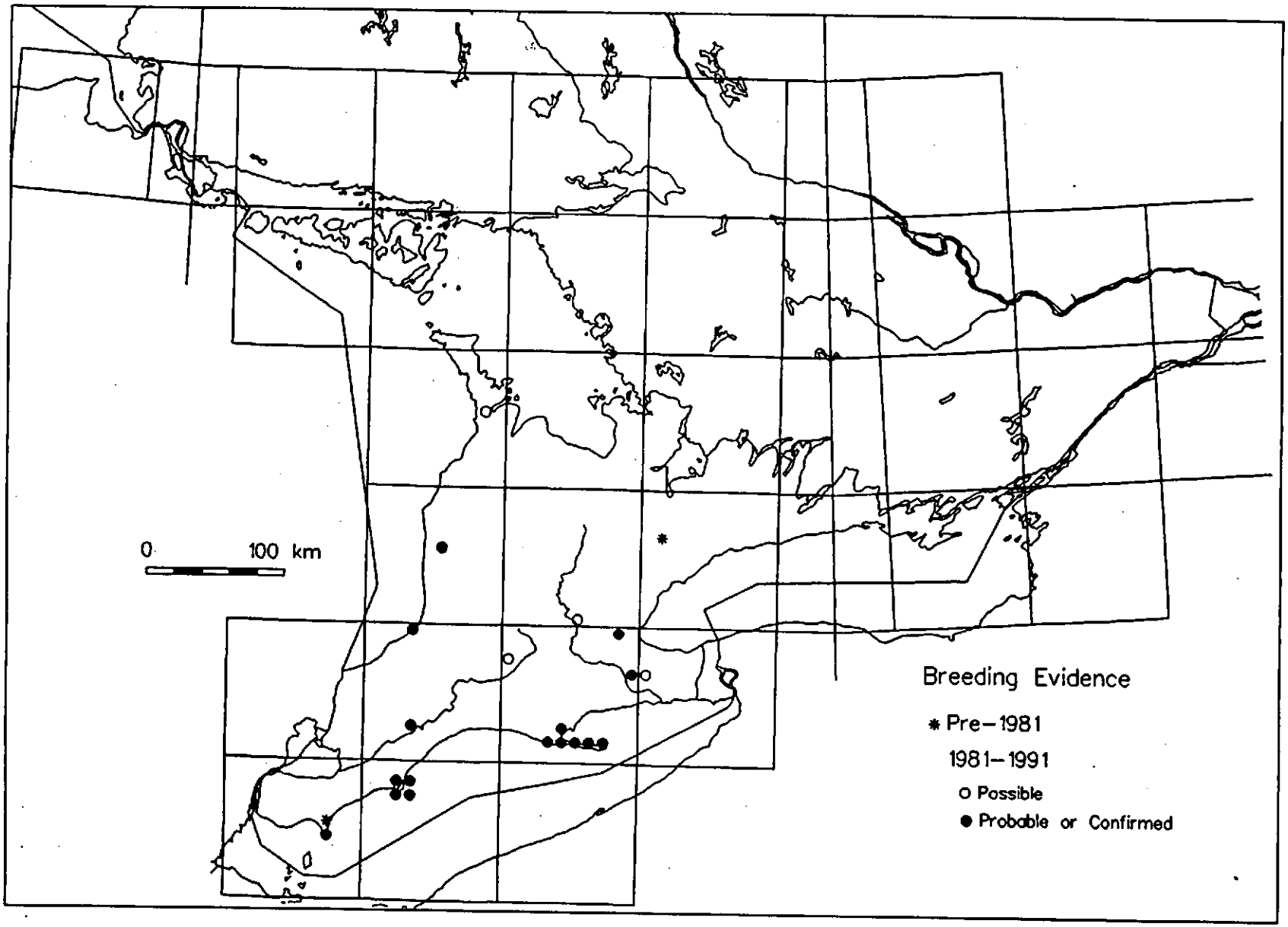

Figure 1. Symbols denote 10-km squares (within 100-km blocks) in which the Prothonotary Warbler was reported to the Breeding Bird Atlas and the Ontario Rare Breeding Bird Program in Ontario.

Table 1. Summary of Prothonotary Warbler 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	0.0
2. Northern Boreal Forest	0	0.0	0.0
3. Boreal Forest	0	0.0	0.0
4. Southern Boreal Forest	0	0.0	0.0
5. Northern Great Lakes Forest	0	0.0	0.0
6. Southern Great Lakes Forest	2	0.3	13.3
7. Carolinian Forest	13	4.0	86.7

* 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

accurately the size of the population, the trends demonstrated by BBS data are likely to be representative of population changes in roadside habitats. The Prothonotary Warbler was not reported on Breeding Bird Survey (BBS) routes in Canada or Ontario from 1967 through 1994, reflecting its rarity and limited range in the country. Between 1980 and 1994, populations declined significantly (both $p<0.01$) in eastern North America (at a rate of 2.6% per year) and the United States (at a rate of 2.3% per year), but between 1966 and 1979, non-significant increases were noted in these populations (B. Peterjohn pers. comm. 1995). This suggests that the Prothonotary Warbler has recently undergone a significant decline in numbers throughout its breeding range. Overall between 1966 and 1994, the population declined significantly in Eastern North America (at a rate of 1.6% per year; $p<0.10$), Central North America (at a rate of 2.9% per year; $p<0.01$), and the United States (at a rate of 1.6% per year; $p<0.05$) (B. Peterjohn pers. comm. 1995). The species was reported on 369 routes throughout the United States (an average of 1.06 birds per route), 277 routes in the eastern U.S. (an average of 1.00 birds per route), and 92 routes in the central U.S. (an average of 1.16 birds per route).

United States

Breeding Prothonotary Warblers occur in low numbers in many of the northeastern and northcentral states, particularly at the northern edge of the breeding range, and they are absent from several states (Table 2). The species is ranked as critically imperiled or imperiled in Rhode Island, New York and Pennsylvania, and as rare or uncommon in Massachusetts, New Jersey, Wisconsin, West Virginia, Ohio, and Michigan (Ohio and Michigan have it bordering between "rare or uncommon" and "apparently secure in the state") (Table 2). The species is considered to be apparently or demonstrably secure in many northcentral states (Illinois, Indiana, Iowa, Kentucky, Maryland, and Virginia), as well as in Delaware. The Prothonotary Warbler is not officially designated as endangered or threatened in any of the states listed in Table 2, but based on low numbers found during the Michigan Breeding Bird Atlas (1983-1988), the species has been recommended for special concern status in that state (Walkinshaw 1991).

Breeding Bird Atlas data (Table 3) indicate that the Prothonotary Warbler is common in some states northeastern and northcentral states (e.g., Delaware, Maryland and Kentucky where it was reported in 42%, 25% and 19% of blocks surveyed, respectively); uncommon or rare (found in less than 11% of blocks surveyed) in others (Illinois, Ohio, Michigan, West Virginia, Pennsylvania, New York, and Connecticut); and absent in others (Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) (Table 3). Overall, the species appears to be uncommon in the northeastern and northcentral states, where it is at the northern edge of its breeding range.

Michigan's lower peninsula is part of the Prothonotary Warbler's northernmost range. The historical breeding range of the species in Michigan extended as far north as Newaygo (Ford 1927) and Macomb Cos. (AOU 1957; Payne 1983), just north of 43° latitude. The species' current range in the state is very similar, although few records were reported in southeastern Michigan, in the vicinity of Macomb Co. Most records of breeding Prothonotary Warblers in Ontario are south of 43° latitude (as is the case in New York), with some exceptions (e.g., Pinery Provincial Park and Bruce Co.). Walkinshaw (1991) reported fair numbers of birds in Michigan, but also noted declines in several historic breeding areas. The species is recommended for special concern status in the state (Walkinshaw 1991).

In New York, Prothonotary Warblers seem to have extended their range northward, but the species is still regarded as a rare, local breeding bird in the state (Eaton 1988). Eaton (1914 in Eaton 1988) referred to the species as an accidental visitant to New York, but a nesting attempt was first reported in the state in 1910 when a male was seen building a nest near Ithaca (Tompkins Co.) (Allen 1911). The first nesting was recorded in 1931 at Oak Orchard Swamp (Beardslee and Mitchell 1965), where a "colony" still flourished as of 1985 (Eaton 1985). In 1948, the species was confirmed breeding at Montezuma National Wildlife Refuge (Parkes 1952) where it has nested for almost 40 years (Benning 1983). During the New York Breeding Bird Atlas (1980-1985), the species was confirmed at these two historical sites, a new location along Delta Lake north of Rome (Oneida Co.), on Long Island, and near Wyandanch (Suffolk Co.) (Andrle and Carroll 1988).

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

State	Rank	Designation
Connecticut**	SPB, SZN	Not Listed
Delaware**	S4B	
Illinois	S5	Not Listed
Indiana	S4	Not Listed
Iowa	S4?	
Kentucky	S4S5	Not Listed
Massachusetts	S3	Not Listed
Maryland	S5	Not Listed
Maine		Not Listed
Michigan	S3S4	Not Listed
Minnesota	S?	Not Listed
New Hampshire		Not Listed
New Jersey	S3	Not Listed
New York	S2	Not Listed
Ohio	S3S4	Not Listed
Pennsylvania	S2	Not Listed
Rhode Island**	S1B, S1N	
Virginia	S4	Not Listed
Vermont		Not Listed
Wisconsin**	S3B, SZN	Not Listed
West Virginia	S3	Not Listed

* Ranks as of 1993; Designations as of 1990.

** B refers to breeding status; N refers to non-breeding status.

S1 = Critically imperiled in state 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 state.

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 (on the order of 21 to 100 occurrences).

S4 = Widespread, abundant, and apparently secure in state, with many occurrences, but it is of long-term concern.

S5 = Demonstrably widespread, abundant, and secure in state and essentially ineradicable under present conditions.

SP = Potential that species occurs in the state but no occurrences reported.

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.	1982-1986	597	0	1	0	1	0.2
Del.	1983-1987	222	34	38	22	94	42.3
Ill.	1986-1990	1011	41	26	42	109	10.8
Ky.	1985-1991	727	66	45	30	141	19.4
Me.	1978-1983	706	0	0	0	0	0.0
Md.	1983-1987	1256	79	153	82	314	25.0
Mass.	1974-1978	1116	0	0	0	0	0.0
Mich.*	1983-1988	1896	38	16	20	74	3.9
N.H.	1981-1986	178	0	0	0	0	0.0
N.Y.	1980-1985	5323	8	7	7	22	0.4
Ohio	1982-1987	969	19	46	40	105	10.8
Ohio**	1982-1987	764	10	32	20	62	8.1
Penn.	1983-1989	4928	22	14	8	44	0.9
R.I.	1982-1988	165	0	0	0	0	0.0
Vt.	1976-1981	179	0	0	0	0	0.0
W. Va.	1984-1989	502	5	4	7	16	3.2

* = based on townships
** = priority blocks

The species is a locally distributed summer resident in Ohio (Peterjohn and Rice 1991). During the Ohio Breeding Bird Atlas (1982-1987), Prothonotary Warblers were recorded in 49 counties, indicating a fairly uniform statewide distribution (Peterjohn and Rice 1991). Pairs were scarcest in the intensively farmed northwestern and west-central counties and along the unglaciated Allegheny Plateau (Peterjohn and Rice 1991). The statewide population may total as many as 500-750 pairs (Peterjohn and Rice 1991). Prothonotary Warbler numbers declined at many sites in Ohio during the 1930s, a trend that continued into the 1950s (Clark and Sipe 1970; Trautman 1940), particularly along the "canal lakes" where current populations are fractions of their former abundance (Peterjohn and Rice 1991). Habitat destruction is suggested as the cause of the decline (Peterjohn and Rice 1991). In the last century, the range of the species had expanded and it still appeared to be

expanding during the Atlas (Peterjohn and Rice 1991). Declining numbers of birds at some areas, and expansion of the species' range into other areas, makes it difficult to evaluate the net change in the population in Ohio (and elsewhere). However, the wetland habitats generally preferred by the species have diminished in this state (and others), suggesting that expansions into new nesting areas may only be indicative of birds attempting to relocate in marginal habitats, following habitat alterations in former nesting areas.

Canada

The Prothonotary Warbler has declined drastically in Canada this century, and in particular in the last 15 years (D. Sutherland pers. comm. 1995). The species is currently listed as "Vulnerable" in Canada by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (McCracken 1981), and as "Endangered" in Ontario by the Committee on the Status of Species at Risk in Ontario (COSSARO) (Dr. R.D. James, Royal Ontario Museum, pers. comm. 1996). The Nature Conservancy considers the Prothonotary Warbler to be imperiled in Canada and Ontario 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 throughout Canada and Ontario. James (1991) described the species as a rare to locally uncommon summer resident in the Deciduous Forest Region of Ontario, and as a rare migrant in the province. In Nova Scotia and Quebec, the Prothonotary Warbler is considered to be accidental or casual (Nature Conservancy).

In Canada, the Prothonotary Warbler has traditionally bred in only a few counties in southewestern Ontario, but it is now believed to breed only at Rondeau Provincial Park, Kent Co. (D. Sutherland pers. comm. 1995), the Long Point area (J. McCracken pers. comm. 1995), and perhaps occasionally Dundas Marsh, Hamilton-Wentworth R.M. (R. Dobos pers. comm. 1995). The species is believed by some to have expanded its range into southern Ontario during the present century (Snyder 1957; Baillie 1967; Eaton 1988), but there is no strong evidence for this (McCracken 1987a). It is quite possible that the species occurred in Ontario prior to settlement, given the patchiness of swamp forests in the Carolinian Forest Region following European settlement, the inaccessibility of wooded swamps, and the limited coverage of the province in the past century (McCracken 1987a). By the time ornithologists were collecting data on avian distributions in the province, many of the wooded swamps may have been logged and drained, sharply restricting the nesting habitat for Prothonotary Warblers in southern Ontario (also see page 11 account for Rondeau Provincial Park).

The oldest Prothonotary Warbler record for Ontario is that of a specimen taken near Hamilton in May 1888 (McIlwraith 1894). Young (in Macoun 1900) mentioned a nest found eight miles north of Gananoque in June 1896. In 1929, the species was first reported breeding in Ontario at Rondeau Provincial Park (Saunders in Snyder 1951). By the 1940s, Prothonotary Warblers had become established in Essex, Kent, Norfolk, and Wentworth Cos. (Baillie in Snyder 1951), and Brooman (1954) reported two Elgin Co. records, one in 1941 and another in 1953. In the 1960s, the Prothonotary Warbler was reported to be an "uncommon summer resident" in Kent (Rondeau Provincial Park) and Essex (Point Pelee) Cos. (Kelley et al. 1963). Godfrey (1966) reported that the species bred in Rondeau Provincial Park, at Port Rowan, Turkey Point, Point Abino and Hamilton.

By the late 1970s, James et al. (1976) reported Prothonotary Warblers as "uncommon local summer residents" in the south (northeast to Hamilton). In the early 1980s, Prothonotary Warblers nested mainly along the north shore of Lake Erie at Point Pelee, Wheatley, Rondeau, and Long Point (McCracken et al. 1981). In 1981, the Prothonotary Warbler was designated as nationally rare by COSEWIC based on local population declines over the previous 50 years as a result of habitat loss and disturbance; documentation of an on-going decline in Canada was poor (McCracken 1981). During the Ontario Breeding Bird Atlas (1981-1985), Prothonotary Warblers were reported in 15 (0.8%) of 1824 squares surveyed in southern Ontario, with breeding confirmed in 11 (73%) of those squares (Cadman et al. 1987). During the Atlas, population increases were noted at a few sites, notably Long Point (Haldimand-Norfolk Co.), and breeding was confirmed for the first time at Pinery Provincial Park (McCracken 1987a). McCracken (1981, 1987a) estimated the maximum breeding population in Canada to be about 50 pairs, and certainly fewer than 80 pairs, based on known breeding areas for Prothonotary Warblers in the nation. He concluded that, "All things considered, its population is relatively stable." (McCracken 1981, 1987a). However, declines have since occurred throughout the province, but most notably at two of the most important breeding sites in Canada, Rondeau Provincial Park and Long Point (see below). Currently, no more than 13 pairs are estimated to be breeding annually in Canada (J. McCracken and D. Sutherland pers. comm. 1995).

In 1981, McCracken identified 10 breeding stations in Ontario for Prothonotary Warblers (Point Pelee, Wheatley, Rondeau Provincial Park, Long Point, Turkey Point, Point Abino, Hamilton, Lobo, Orwell, and Pinery Provincial Park). None of these sites, with the exceptions of Rondeau, Long Point, and possibly Hamiton on occasion, are now considered to be active. These and other breeding sites located during the Atlas and the ORBBP are summarized below.

Known breeding sites for Prothonotary Warblers in Canada

Point Pelee, Essex County

Prothonotary Warblers were first reported breeding at Point Pelee in 1955 (Baillie 1955), and since then the species has probably occurred there fairly regularly (McCracken 1981). No more than one nest a year has been reported, and McCracken (1981) stated that it is unlikely that more than three pairs ever breed at Pelee with any regularity. Stirrett (1973) noted the Prothonotary Warbler as an "uncommon and regular transient" through Point Pelee National Park. In 1982, Alan Wormington surveyed Point Pelee and found five pairs. A nest was built in 1985 in a stump near the viewing platform on DeLaurier Trail and breeding was confirmed. No records of Prothonotary Warblers at Point Pelee were reported to the ORBBP, and Tom Hince (pers. comm. 1995) stated that the species has not bred in known, accessible areas of the park (i.e. DeLaurier Trail) since 1989, possibly not since the mid-1980s. However, much of the suitable breeding habitat in the park is off trails and inaccessible (without considerable effort), so it hasn't been checked recently by park staff. Tom Hince (pers. comm. 1995) states that two to five pairs may breed in this inaccessible area, based on the amount of available suitable habitat, but Don Sutherland (pers. comm. 1995) states that the Prothonotary Warbler is gone as a breeding species from Point Pelee. The species also formerly bred sporadically in the northeast corner of Hillman Marsh (formerly "Stein's Marsh"), outside of park boundaries, but it hasn't been present there for a couple of years, even in the spring (T. Hince pers. comm. 1995), and the species no longer breeds there, either (D. Sutherland pers. comm. 1995).

Wheatley, Kent County

The species is a rare, somewhat irregular nesting species in this area. The first nest was reported in 1976 (ONRS), but no nests have been reported from within Wheatley Provincial Park since then (McCracken 1981). A nest with young was reported 6 km south of Wheatley in Hillman Marsh at Elmdale sometime prior to 1985 (year of nesting unknown) (Cadman et al. 1987). Al Woodliffe (pers. comm. 1995) states that there are one or two spots at Wheatley Provincial Park where breeding is remotely possible, but overall the habitat is not very suitable for breeding Prothonotary Warblers, and he has heard of no evidence to indicate that the species still breeds there.

Rondeau Provincial Park, Kent County

The largest decline in Canada has occurred at Rondeau Provincial Park, and this area is believed to be one of only two (possibly three) remaining breeding locations for the species in the nation (R. Dobos, J. McCracken and D. Sutherland pers. comm. 1995). In 1929, the Prothonotary Warbler was first documented as breeding in Ontario at Rondeau Provincial Park (Saunders in Snyder 1951). Prothonotary Warblers were probably well-established breeders at Rondeau long before their discovery because by 1930 (only one year after a breeding population was discovered) Rondeau contained as many as 100 pairs (F.H. Emery as reported by G. North pers. comm. in McCracken 1981). This estimate was corroborated by Baillie's (1967) estimate of 100 pairs present in June 1933. Rondeau Provincial Park was the only known breeding station for this species in Canada from 1929 to 1939. North and Baillie noted that the population was drastically reduced in the mid-1930s following a "cleaning-up" program that involved the removal of most of the dead stumps (nesting sites) (McCracken 1981). After this program, there were far fewer Prothonotary Warblers at Rondeau, but the species began to occur in the Long Point region, perhaps indicating a dispersal from Rondeau (McCracken 1981). In the late 1960s, Baillie (1967) stated that Prothonotary Warblers were present at Rondeau in only "a small fraction of their 1933 numbers."

Since Baillie's (1967) statement, the population at Rondeau made a limited comeback, but then severely declined again. The 1981 breeding population was estimated to be between 20 and 25 pairs, and five nests were located (A. Woodliffe pers. comm. in McCracken 1981). In the mid-1980s, 40 to 50 pairs were estimated to breed in the park, based on transect counts, by Al Woodliffe (pers. comm. in McCracken 1987a), but this may have been an optimistic estimate (J. McCracken pers. comm. 1995). In the last three to four years, the Prothonotary Warbler has undergone a further, drastic decline. Baseline Forest Bird Monitoring Program surveys conducted in the park in 1991 and 1993 support this; in 1991, a total of 70 Prothonotary Warblers were recorded during the survey (Bowles and Gartshore 1992), but in 1993, only 22 were recorded (Gartshore 1994). Al Woodliffe (pers. comm. 1995) observed four to five pairs scattered throughout the park in usual areas during a two to three day survey in mid-June, 1995, but he did not survey the extensive suitable habitat away from these areas, because the survey was conducted during a heat spell. Don Sutherland (pers. comm. 1995) estimates the current breeding population at Rondeau to be only four to five pairs (perhaps six to seven), which is drastically smaller than the historical population. Rondeau is designated as a "Natural Environment Park" and is managed by the Ontario Ministry of Natural Resources (McCracken 1981).

Pinery Provincial Park, Lambton County

One nest with five young was found in 1982 by Alf Rider. In 1983, a pair was observed, in 1984 one nest was located, and in 1985 a singing male was heard (T. Crabe pers. comm.; ORBBP). No birds were reported from there during the ORBBP, and the species no longer breeds in the park (D. Sutherland pers. comm. 1995).

Long Point, Haldimand-Norfolk Regional Municipality

The Prothonotary Warbler has undergone a large recent decline in the Long Point region, as well. This area formerly supported the second largest concentration of breeding Prothonotary Warblers in Canada (McCracken 1981), but the species is now believed to nest only at the Hahn Marsh (R. Knapton and D. Sutherland pers. comm. 1995). No birds have been recorded in traditional breeding areas in the last two to three years, and there been fewer records during spring migration, as well (R. Knapton, J. McCracken and D. Sutherland pers. comm. 1995). Extensive logging occurred recently at one site, but the reasons for the declines in the other areas are unknown, since the habitat there still looks suitable for the species (R. Knapton and D. Sutherland pers. comm. 1995). Jon McCracken (pers. comm. 1995) states that some of the declines may be due to habitat destruction related to high lake levels, which are killing back the trees.

The Prothonotary Warbler was first reported in the area along Big Creek north of Port Royal (Big Creek Prothonotary Woods) in June 1936, and a nest was found there in 1939 and 1963 (G. North *in litt* in McCracken 1987b). However, a breeding population could conceivably have been present in the region prior to the 1930s (McCracken 1987a). More recently, two to four pairs were believed to probably nest regularly along a 4 km stretch of the creek, both north and occasionally south of Port Royal (McCracken 1982 in McCracken 1987b); four nests in total were found between 1978 and 1982; three singing males, including fledged young, were recorded in 1985; at least two pairs nested in 1986; a pair was seen in 1988; two nests were found in nest boxes in 1989; and at least one pair was found in 1990-1992 (McCracken 1981, 1987b; ORBBP data). In addition, a nest was found near the mouth of Big Creek prior to 1985 (year of nesting unknown). Anywhere from two to five pairs nested annually at Big Creek, but a large portion of the suitable breeding habitat in the area was recently logged, and no Prothonotary Warblers have been recorded from there in the last few years (R. Knapton and D. Sutherland pers. comm. 1995).

The largest and most regular breeding population of Prothonotary Warblers in the Long Point area occurred in the Hahn Woods (Big Creek National Wildlife Area) at the base of the Point (established in the mid-1930s) (McCracken 1981). This area has been owned by the Canadian Wildlife Service since the early 1970s. Between 1978 and 1982, six pairs nested annually in the Hahn Woods, and in 1985, a brief visit to the area found one nest and at least five singing males (McCracken 1981, 1987b). In 1988, a nests with eggs was reported to the ORBBP. The Hahn Woods has not been checked in the last few years, so J. McCracken (pers. comm. 1995) estimates that anywhere from zero to six pairs may breed annually in the area.

Beginning around 1979, the Prothonotary Warbler began to occur at other sites in the Long Point area, including: Courtright Ridge and Squires Ridge, where nests were found in 1982, 1985 (at least six pairs believed to be nesting) and 1991, and five singing males were reported in June 1984, but the species is no longer nesting in either area; Backus Woods, where two broods of fledged young were found in 1985, and males were recorded on the same three territories through June 1986; Bluff Point, where a nest with young was found in 1991; and Young Tract, where a nest was discovered in both 1983 and 1985 (McCracken 1987b; ORBBP data). In addition, a singing male has been reported on one occasion at each of the following locations: 6 km northeast of Young Tract in 1985; and east of Long Point at North Cayuga Slough Forest in 1983, and Caistor-Canborough Slough Forest in 1983 (McCracken 1987b). Based on 1985 and 1986 data, the Long Point area supported 20-25 pairs of Prothonotary Warblers (McCracken 1987a, b), but breeding has not been reported from the area in the last few years, and currently only zero to six pairs are believed to be breeding annually in the Long Point area (J. McCracken pers. comm. 1995).

Turkey Point, Haldimand-Norfolk Regional Municipality

A small breeding population occurred with some regularity at Turkey Point prior to 1979 (McCracken 1987b). The area was subsequently developed into a marina/trailer park and the habitat was destroyed (McCracken et al. 1981).

Point Abino, Niagara Regional Municipality

Speirs (1956) reported Prothonotary Warblers breeding at Point Abino. In 1986, a pair was rediscovered at Point Abino (McCracken 1987a), but none have been reported from there recently (ORBBP data; D. Sutherland pers. comm. 1995).

Lobo, Middlesex County

Prior to 1970, a small breeding population occurred at Lobo with some regularity, but the species was extirpated from this area in 1970 (McCracken 1981).

Embro, Middlesex County

A male, believed to be a wanderer, was found in mid-July, 1984, 5 km southwest of Embro (S. Rose pers. comm. 1985; Cadman et al 1987). Habitat in the area was believed to be suitable for the species, based on birds breeding in similar habitat at Big Creek, near Long Point, but breeding has never been confirmed in the area.

Dundas Marsh, Hamilton-Wentworth R.M.

Three nests were found in the Dundas Marsh area at Hamilton in 1954 (Baillie 1954). There were no further reports from this area until 1986 and 1987, when birds were rediscovered at Hamilton (McCracken 1987a; Weir 1987). During early July 1987, two adults and three young were reported at Dundas Marsh (Weir 1987), and a lone male was observed in suitable habitat on July 3, 1990 (Weir 1990) and August 18, 1991 (ORBBP). Rob Dobos (pers. comm. 1995) states that the Prothonotary Warbler is not reported from the Dundas Marsh every year, but he believes that one pair probably breeds every year or every other year in the marsh.

Orwell, Elgin Co.

A nest was found at Orwell in 1954 (Baillie 1954), but no birds have been reported from there since that time.

Non-breeding records

Prothonotary Warblers have been reported from several other locations in Ontario, including Isaac Lake, Bruce Co. (May 1982 and May 1990) (Cadman et al. 1987; ORBBP); North Bay (by the early 1950s) (Baillie in James et al. 1976); Quetico Provincial Park, Rainy River District (April 27 - May 3, 1976) (James 1984; Speirs 1985); Moosonee, Cochrane District (October 3, 1989) (Wormington and Curry 1990); Kingston (Weir 1989); and Ottawa (McCracken 1981), and it may breed rarely and irregularly in some of these areas (McCracken 1981). Because breeding has not been confirmed in these northerly and easterly locations, it is more probable that these records are of wandering birds, and that recent reports of the species further north (i.e., to Moosonee) reflect increased birding effort.

Early in the century, Fleming (in Macoun and Macoun 1909) stated that the species had been seen "at least once" at Toronto. Fleming (1930) also reported a specimen that was taken near Pottageville, York Co. Saunders and Dale (1933) reported one 1920 record from Middlesex Co. Snyder (1951) reported that the "most remote occurrences" were from the base of the Bruce Peninsula and at Port Hope. Sadler (1983) reported two spring records (1962 and 1964) from Peterborough Co. and the Kawarthas. Prothonotary Warblers were reported during May in Simcoe Co. in 1930, 1959, and 1966 (Devitt 1967), and in 1974 in the Oshawa-Lake Scugog region (Durham and Victoria Co.) (Tozer and Richards 1974). There are also records from the Niagara Frontier region dated 1929, 1931, 1952 and 1956. The species was also included on the Muskoka/Parry Sound list "on the basis of two sight records" from the 1970s (Mills 1981). Other Prothonotary Warbler records include a singing male at King 15 Sideroad, west of Keele Street in 1971 (York Co.); and a singing male at Moffatt's Creek (Waterloo) in 1990 (ORBBP).

SITE OCCUPANCY

The Prothonotary Warbler is noted for its site-tenacity and usually returns to breed in the same area, often at the same nest site, year after year (McCracken 1987a). The species has bred at Long Point and Rondeau for a minimum of 50 and 60 years, respectively.

Eaton (1988) stated that in New York, Prothonotary Warblers nest in an area one year but disappear the next, which might be expected for a species that is on the edge of its breeding range. However, Jon McCracken (pers. comm. 1993) states that this is true only in sites that support very few (i.e., one to three) pairs, and in Eaton (1988) it was obvious that at least two active sites in New York had been occupied since the mid-1900s, indicating strong site-tenacity, at least in preferred sites. Moreover, Walkinshaw (1991) mentioned a bird-house that was occupied by Prothonotary Warblers for 15 years. Jon McCracken (pers. comm. 1993) states that site-tenacity is strong, and long-term sites regularly support more than three pairs.

Prothonotary Warblers usually nest in "clumps", probably as a result of the localized nature of their preferred habitat and a strong site-tenacity. This highly localized nature of groups of Prothonotary Warblers makes them more sensitive to habitat loss or disturbance, particularly when treed swamps are already scarce in southern Ontario.

HABITAT

Habitat preferences

Generally, the Prothonotary Warbler is found in wooded swamps where standing water remains throughout the breeding season, but it will also nest in wooded borders of ponds and reservoirs, quiet backwaters along large rivers, floodplain forest, and the shrubby margins of wetlands (Peterjohn and Rice 1991). Prothonotary Warblers usually nest in fairly open areas in extensively flooded tracts of silver maple-red maple swamp, buttonbush swamp, and black willow-maple-ash floodplains (McCracken 1987a). Swamps occupied by Prothonotary Warblers in Ontario are in a late stage of succession from marsh to terrestrial deciduous forest; this transitional state is quite rare in Ontario and is often found in association with sand-spit formation (e.g., Point Pelee, Rondeau, Long Point, Turkey Point, and Point Abino) (McCracken 1981). Tree cavities are used as nest sites and nests are made largely out of mosses (McCracken 1987a). Features critical to nesting sites include dead deciduous trees, mosses, standing or flowing water with some canopy cover, and the presence of small, shallow cavities for nesting sites situated at low heights (less than three metres) in rotting dead trees (McCracken 1981).

Trend in quality and quantity of critical habitat

The decline of Prothonotary Warblers in the mid-1930s at Rondeau represents the most dramatic decline of the species in Ontario and indicates the importance of dead tree stumps to the species. Likewise, the small breeding populations at Lobo and Turkey Point were extirpated in 1970 and 1978, respectively, following development of woodlands (McCracken 1981). Although the populations in these two areas were small, this was still a significant loss because birds had occurred at these latter two sites fairly regularly, and may have represented some genetic integrity (J. McCracken pers. comm. 1993).

In the United States, significant reduction and disturbance of Prothonotary Warbler habitats have occurred in some of the most important breeding areas due to channelization of river systems which destroy the flood plain forests and associated wetlands (southeastern states) (Goodwin and Niering 1974), timber harvest in swamp forests (bottomlands of Mississippi Basin and along the Atlantic Coastal plain) (Goodwin and Niering 1974), oil extraction in swamps and bayous (Louisiana) (Goodwin and Niering 1974), clearing of land for agriculture (bottomland forest in the Mississippi Delta) (Horwitz 1978), and conversion to croplands (wet bottomlands of the Mississippi Delta in Arkansas, Mississippi, and Louisiana) (Horwitz 1978).

In Ontario, the major factors responsible for the decline of Prothonotary Warblers from the 1930s to the early 1980s also appear to be habitat loss and habitat disturbance (McCracken 1981), but the reasons for the more recent declines are largely unknown (R. Knapton, J. McCracken and D. Sutherland pers. comm. 1995). McCracken (1981) estimated that about 700-800 ha of suitable habitat was occupied by Prothonotary Warblers in southern Ontario; approximately 85% of this land is owned by government agencies (e.g., Parks Canada, Canadian Wildlife Service, Ontario Ministry of Natural Resources) with the remainder being privately-owned. McCracken (1981) noted that an additional 1000 ha of land had the potential to support the species. The small amount of habitat and its gradual loss through natural succession in the province are possible long-term problems (McCracken 1981). Prothonotary Warblers are also sensitive to long-term significant increases or decreases in water levels which would render habitat unsuitable for the species (McCracken 1981). Some recent declines at Long Point may be a result of habitat loss related to high lake levels, which are killing back the trees (J. McCracken pers. comm. 1995). The decline at Big Creek is known to be the result of extensive logging in recent years (R. Knapton and D. Sutherland pers. comm. 1995).

LIMITING FACTORS

The primary factor limiting the Prothonotary Warbler population in Ontario is lack of suitable habitat, followed by interspecific competition for nest sites with House Wrens and Tree Swallows (other cavity nesters). Parasitism by Brown-headed cowbirds is also a definite problem (McCracken 1981). Cowbirds seldom parasitize nests in nest boxes, but nest boxes will attract House Wrens (Walkinshaw 1991). Consequently, nest boxes must be correctly designed and placed, but if this is done they can be extremely beneficial to the Prothonotary Warbler; nest boxes have been erected

in the Hahn Woods, and Prothonotary Warblers have nested in them with some success (J. McCracken pers. comm. 1993). Predators and flooding are other potential causes of egg or nestling loss (Walkinshaw 1991), but J. McCracken (pers. comm. 1993) states that predation does not limit the Prothonotary Warbler any more than it does any other species. The current extremely small size and localized distribution of the population in Canada is also a serious problem.

EVALUATION AND PROPOSED STATUS

The Prothonotary Warbler is widespread in the eastern United States, with lower numbers throughout states at the northern limits of its range. Breeding Bird Survey data indicate that the species declined significantly in eastern North America and the United States between 1980 and 1994. In Canada, the species is currently believed to breed only at Rondeau Provincial Park and the Long Point area (with perhaps one pair every year or every other year in Dundas Marsh). Fewer than 80 pairs were estimated to be breeding during the Atlas (McCracken 1987a), and since then, drastic declines have occurred throughout Ontario; only four to 13 pairs are currently estimated to be breeding in the province. The most severe declines have occurred at Rondeau and Long Point, which formerly supported the largest and most regular breeding populations in Canada. McCracken (1981) stated that both of these areas are reasonably well-protected due to their status as a Provincial Park and National Wildlife Area, respectively. However, large declines have been noted in both areas since the original COSEWIC status was assigned in 1981; a maximum of seven pairs are currently estimated to be breeding at Rondeau, and zero to six pairs are believed to breed at Long Point.

As of the early 1980s, about 85% of the Ontario population bred on publicly-owned land (McCracken 1981), and parks and wildlife areas should provide the species with a degree of protection. Outside of the parks, development pressures are threatening nesting areas for the species. It is extremely important to continue to protect breeding sites that are currently occupied (or that were formerly occupied, but still appear to be suitable) from destruction or alteration because there is very little other suitable habitat remaining in southern Ontario for the species. If these breeding sites become unsuitable for the species, then the species will likely become extirpated in the province and, therefore, in Canada. The importance of areas with suitable habitat, and the scarcity of such areas in the province, is indicated by the species being rediscovered in two former nesting sites in 1986: Point Abino and Hamilton (Dundas Marsh) (McCracken 1987a).

Prothonotary Warblers underwent declines at Rondeau (from 100 pairs in the 1930s to about one-third of that in the 1940s), but made a comeback to approximately 40 or 50 pairs during the Atlas. Since then, however, the species has declined again at Rondeau, and only four to five (perhaps six to seven) pairs are currently estimated to be breeding in the park. A slow increase in Prothonotary Warblers was believed to have occurred between 1950 and 1980 in the Long Point area, perhaps due to a limited provision of nestboxes, limited control of cowbird parasitism, and/or increased water levels (J. McCracken pers. comm. 1991, 1993). However, numbers have definitely declined dramatically at Long Point in recent years; in 1985 and 1986, 20 to 25 pairs were estimated to be breeding annually in the area, but a maximum of of six pairs (and maybe none) are currently

believed to be breeding there (J. McCracken pers. comm. 1995). The reasons for the decline in the Long Point area are largely unknown, since most of the sites still appear to be suitable for the species, but it may be due in part to high lake levels which are destroying suitable breeding habitat (J. McCracken pers. comm. 1995), and logging practices (R. Knapton and D. Sutherland pers. comm. 1995). In 1982, five pairs were reported in Point Pelee National Park, Essex Co. during the only thorough search of suitable habitat in the park (A. Wormington pers. comm.), and a pair nested in this same area in 1985. No other records of nesting Prothonotary Warblers in Point Pelee National Park have been reported, and the species has not nested in the park since 1989, possibly since the mid-1980s (T. Hince pers. comm. 1995). Don Sutherland (pers. comm. 1995) states that the species no longer breeds at Pelee. Other pairs have been reported in suitable habitat or even breeding for a year at various other locations across Ontario, but no other long-term breeding sites have become established.

It is possible that this species was more widespread and present in larger numbers in Ontario prior to European settlement, but there is no documentation of Prothonotary Warblers in the province until the late 1880s. The Canadian population has declined drastically since the original COSEWIC status was assigned in 1981, from fewer than 80 breeding pairs during the Atlas project to a maximum of 13 pairs at the present time. In addition, the population is extremely localized (Rondeau Provincial Park, Long Point, and perhaps occasional breeding at Dundas Marsh). The species' proclivity for nesting in very shallow tree-cavities makes it vulnerable to cowbird parasitism and competition with House Wrens and Tree Swallows. The species has proven to be sensitive to habitat changes (e.g., loss of dead tree stumps in Rondeau, and logging at Big Creek), but most of the known breeding sites are publicly-owned and located in parks or wildlife areas, so there is no immediate direct human-induced threat to the species' survival in Ontario. Although the two main areas of former concentration in Ontario (Rondeau Provincial Park and Long Point) should be well protected from development pressures, they are equally susceptible to habitat changes brought about by changing lake levels, which are probably the result of a combination of human and natural factors. The species can probably easily withstand short-term (less than a five-year duration), abrupt shifts in the level of Lake Erie, but long-term (more than a five-year duration) shifts in lake levels could easily decimate the species in Ontario (J. McCracken pers. comm. 1993). In addition, a "well-placed" and "well-timed" tornado or hurricane could essentially wipe out the Canadian breeding population. J. McCracken (pers. comm. 1995) is very concerned about the future of the Prothonotary Warbler in Ontario, and he is thinking of setting up a Recovery Team for the species in 1996. In addition, the species was recently designated as endangered in Ontario by COSSARO (Dr. R.D. James, R. Ont. Museum, pers. comm. 1996). A thorough survey must be conducted in 1996, in order to fully understand the species' situation in the province (J. McCracken pers. comm. 1995).

Because of the extremely localized distribution of the species and the small population size in Canada, as well as drastic declines throughout its range in Canada and the United States in recent years for which the cause(s) are unknown, and the vulnerability of the species to natural changes in habitat, it is recommended that the status of the Prothonotary Warbler be upgraded from "Vulnerable" to "Endangered" in Canada.

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