

COSSARO Candidate Species at Risk Evaluation
for
Cerulean Warbler (*Dendroica cerulea*)

Committee on the Status of Species at Risk in Ontario (COSSARO)

Assessed by COSSARO as THREATENED

February 2011

Final

La **paruline azurée** (*Dendroica cerulea*) est menacée en Ontario. On trouve cette paruline bleue et blanche dans le nord-est de l'Amérique du Nord, surtout dans les bassins de l'Ohio et du Mississippi ainsi que dans les montagnes de l'Allegheny. Elle se reproduit dans des zones de forêts de feuillus relativement étendues. Ses populations ont sans cesse diminué dans toute son aire de répartition, y compris dans le sud-ouest de l'Ontario. Au début des années 1960, la population de parulines azurées établie dans le sud-est de l'Ontario était relativement stable. Le classement aux fins de conservation démontre une diminution de la fécondité en plus d'un déclin général de l'aire de répartition et de la taille de la population. Même si le principal danger qui menace l'espèce est la disparition de l'habitat dans les aires d'hivernage, la disparition ou la fragmentation continue des habitats de reproduction sont également préoccupantes.

Cette publication hautement spécialisée (Cerulean Warbler COSSARO Evaluation) n'est disponible qu'en Anglais en vertu du Règlement 411/97 qui en exempte l'application de la Loi sur les services en français. Pour obtenir de l'aide en français, veuillez contacter le secrétariat de COSSARO par courrier électronique à l'adresse COSSAROsecretariat@ontario.ca.

PART 1: Current status and distribution

Current designations:

GRANK – G4 [[NatureServe Explorer](#) - status assigned, December 1996; website checked: 31 January 2011]

NRANK Canada – N3B [[NatureServe Explorer](#) - status assigned, December 2000; website checked: 31 January 2011]

COSEWIC – Endangered [[COSEWIC](#) - status assigned, November 2010 [uplisted from Special Concern in 1993, reaffirmed 2003]; website checked: 31 January 2011]

SARA – Special Concern [SARA, Schedule 1, January 2005]

General Status Canada – May be at Risk [[Wild Species Reports](#); status assigned, 2005; [uplisted from Sensitive, 2000]; website checked: 31 January 2011]

ESA 2007 – Special Concern [[Species at Risk](#); website checked: 31 January 2011; [O.Reg. 230/08](#); website checked: 31 January 2011]

SRANK – S3B [[NatureServe Explorer](#) - status assigned; website checked: 31 January 2011]

General Status Ontario – May be at Risk [[Wild Species Reports](#); status assigned, 2005; [uplisted from Sensitive, 2000; website checked: 31 January 2011]

Distribution and status outside Ontario:

The Cerulean Warbler is a bird of deciduous forests in eastern North America, breeding mainly from central Minnesota, northern Wisconsin, central Michigan, southern Ontario, New York, Connecticut, and Rhode Island south to Arkansas, central Mississippi, central Alabama, and eastern North Carolina (COSEWIC 2010, Dunn and Garrett 1997, Hamel 2000). Smaller numbers breed beyond this range from eastern South Dakota and Oklahoma east to southwestern Quebec, western Vermont, and western Massachusetts. The bulk of the population is found in the Ohio and Mississippi River drainages, west of the Appalachian Mountains (Dunn and Garrett 1997). There is some evidence that a northeastern range expansion has occurred, which may include the southeastern part of Ontario, where the species has occurred annually only since 1961 (Oliarnyk and Robertson 1996). It winters in a relatively narrow elevational belt (500-2000 m) on the eastern slopes of the Andes in northern South America, from Colombia and Venezuela south to Peru and northwestern Bolivia (COSEWIC 2010, Hamel 2000).

Eligibility criteria

Native Status

✓ **[yes]** The Cerulean Warbler has been present in southwestern Ontario as long as records have been kept; there is no evidence that the species is not native in Ontario. However, a range expansion into southeastern Ontario appears to have occurred in the 1960s (Oliarnyk and Robertson 1996).

Taxonomic Distinctness

✓ **[yes]** The Cerulean Warbler is clearly distinct from all other wood-warblers; there has never been any question of its taxonomic status as a species. Furthermore, it does not contain any infraspecific taxa.

Designatable Units

Genetic evidence supports the recognition of a single designatable unit (Veit et al. 2005).

Priority-setting criteria

Recent Arrival

✓ **[no]** The Cerulean Warbler has been present as a breeding species in southern Ontario for as long as records have been kept (viz. McIlwraith 1894).

Non-resident

✓ **[no]** The Cerulean Warbler is a neotropical migrant that is present in Ontario during each breeding season; it is not a vagrant.

Primary criteria (rarity and declines)

1. Global Rank

✓ **[Not in any category]. G4**

2. Global Decline

✓ **ENDANGERED.** The average range-wide decline based on Breeding Bird Survey data is 4.1%/year (C.I. = -5.5 to -2.8; p=0.001; n=249 routes) between 1966 and 2007, which represents an overall decline during this period of 82%. The trend during the 1966-1979 period was greater (-5.2%/year) than it has been from 1980-2007 (-2.9%/year) (Sauer *et al.* 2008). The magnitude of the decline over the past 40+ years is sufficient to meet this criterion at the Endangered level.

3. Northeastern North America Ranks

✓ **SPECIAL CONCERN.** The Cerulean Warbler is ranked as S1, S2, SH, or SX in 7 of 22 northeastern jurisdictions in which it occurs (32%).

4. Northeastern North America Decline

✓ **ENDANGERED.** The species is largely northeastern to midwestern in distribution. Much of the discussion under Primary Criterion 2 (Global Decline) applies here, as well. Although many areas within the range of the Cerulean Warbler have limited sample sizes for this species on BBS routes, the Eastern BBS region, with a sample size of 234 routes, shows trends very similar to those for the range as a whole (-4.2%/year over the 1966-2007 period) (Sauer *et al.* 2008).

5. Ontario Occurrences

✓ **[Not in any category].** There are 89 element occurrences contained in the NHIC database, of which 45 are extant; [Natural Heritage Information Centre](#); website checked: 31 January 2011. Furthermore, the Cerulean Warbler was found in 108 10 X 10 km squares during the first Breeding Bird Atlas (1981-1985) and 86 squares during the second Breeding Bird Atlas (2001-2005) (Cadman *et al.* 2007).

6. Ontario Decline

✓ **SPECIAL CONCERN.** The Breeding Bird Atlas evidence indicates a reduction of 20% in the actual number of 10 X 10 km squares occupied between 1981-1985 and 2001-2005. When these data are adjusted to account for differential search effort between the two atlases, a non-significant decline of 30% was calculated, with the largest declines occurring in the Carolinian region of southwestern Ontario (Francis 2007). In the southwestern part of Ontario, a significant decline of 47% occurred between atlases. There are inadequate data from BBS routes in Ontario to determine a trend. Data from population studies in the heart of the Ontario range, in the Frontenac Axis, suggest the existence of a relatively stable population there (see COSEWIC 2010).

7. Ontario's Conservation Responsibility

✓ **[Not in any category].** Ontario constitutes a small portion of the global range of the Cerulean Warbler, estimated at approximately 4%, and Ontario's proportion of the global population is even less, estimated at 0.2% (COSEWIC 2010).

Secondary criteria (threats and vulnerability)

1. Population Sustainability

✓ **THREATENED.** The current population estimate for Cerulean Warbler in Canada is 523-893 pairs (1046-1786 individuals), a substantial majority of which are in Ontario (COSEWIC 2010; there are estimated to be about 25 pairs in southwestern Quebec). Although the number of breeding pairs in the most intensively studied population in eastern Ontario has remained relatively constant, at about 300 pairs, the productivity of nests there may no longer be sufficient to sustain the population (COSEWIC 2010). There appears to have been a rather abrupt change in fecundity from the mid-1990s to

the late-1990s-early-2000s (Buehler *et al.* 2008, COSEWIC 2010, Oliarnyk and Robertson 1996). In the latter period, growth rates of all populations studied throughout the species' range, including the eastern Ontario population, were less than 1.0. The eastern Ontario population's growth rate was the highest of any of the five populations studied ($\lambda = 0.84 \pm 0.027$). Although constancy of site occupation in southeastern Ontario remains high, population growth rates have declined to a level where they are unsustainable, so this criterion is met at the Threatened level.

2. Lack of Regulatory Protection for Exploited Wild Populations

✓ **[Not in any category]**. This species is protected through several pieces of federal and provincial legislation in Ontario, including the Species at Risk Act, the Migratory Birds Convention Act, the provincial Endangered Species Act, 2007, and the Provincial Parks and Conservation Reserves Act (for populations within provincial protected areas, including those within Awenda, Frontenac and Charleston Lake Provincial Parks, among others).

3. Direct Threats

✓ **SPECIAL CONCERN**. Habitat loss on the wintering grounds has been identified as a primary threat, but habitat loss on the breeding grounds, through conversion of large mature forest blocks to agriculture, in whole or in part (fragmentation), particularly in southwestern Ontario, in the Carolinian region, may also have led to the declines observed between Breeding Bird Atlases there (COSEWIC 2010). Habitat fragmentation has been identified as a factor in declines; the Cerulean Warbler is considered to be an area-sensitive forest species (Hamel 2000). Intense storms, the frequency of which can be expected to increase in the future with climate change, have been documented as having negative effects on breeding productivity in the years immediately following those episodes (e.g., the eastern Ontario ice storm of 1998; COSEWIC 2010). New invasive pests of breeding trees, particularly oaks, could further degrade or eliminate habitat in the near future. Aerial impediments such as tall buildings, telecommunications towers, and wind towers, also take a toll on this and other nocturnal migrants (COSEWIC 2010). The proportion of populations which may be subject to these direct threats is unquantified, but is presumed to be less than 50% and more than 25%.

4. Specialized Life History or Habitat-use Characteristics

✓ **SPECIAL CONCERN**. The Cerulean Warbler requires relatively large tracts of continuous deciduous forest, but it also requires small gaps and perhaps other elements of heterogeneity within these tracts. In particular, at least in the southeastern Ontario population where studies have been most intensive, males require Bitternut Hickory (*Carya cordiformis*) trees as singing posts (Barg *et al.* 2006). These trees leaf out relatively late, and provide temporary canopy gaps where sound may travel more effectively during the main singing season. Other trees within the forest matrix that leaf out late, such as oaks, could provide similar singing posts elsewhere in its Ontario range (D. A. Sutherland, pers. comm., February 2011). Estimates of minimum size of

suitable tracts of forest vary widely in the literature, but the species is considered to be area-sensitive (see COSEWIC 2010). There are few, if any, other indicators of specialization in comparison with other area-sensitive wood-warblers, however.

COSSARO criteria met (primary/secondary)

ENDANGERED – [2/0]

THREATENED – [0/1]

SPECIAL CONCERN – [2/2]

Summary

Cerulean Warbler, *Dendroica cerulea*, is **Threatened** in Ontario. This blue-and-white wood-warbler of northeastern North America occurs mainly in the Ohio and Mississippi watersheds and the Allegheny Mountains. It breeds in relatively large tracts of deciduous forest. Populations of these birds have undergone continuing declines throughout most of its range, including southwestern Ontario. First established in the early 1960s, the population of Cerulean Warblers in southeastern Ontario has been relatively stable. The conservation classification reflects evidence of reduced fecundity in addition to overall declines in range and population size. The major threats to the species appear to be loss of habitat on the wintering range, but there also are concerns about the loss or further fragmentation of the breeding habitat.

Information Sources

http://www.cosepac.gc.ca/eng/sct1/searchform_e.cfm

http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080230_e.htm

<http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/246809.html>

<http://www.natureserve.org/explorer/>

http://nhic.mnr.gov.on.ca/nhic_.cfm

<http://www.wildspecies.ca/wildspecies2005/search.cfm?lang=e&sec=9>

Barg, J., D. M. Aiama, J. Jones, and R. J. Robertson. 2006. Within-territory habitat use and microhabitat selection by male Cerulean Warblers (*Dendroica cerulea*). *Auk* 123: 795-806.

Buehler, D. A., J. J. Giocomo, J. Jones, P. B. Hamel, C. M. Rogers, T. A. Beachy, D. W. Varble, C. P. Nicholson, K. L. Roth, J. J. Barg, R. J. Robertson, J. R. Robb, and K. Islam. 2008. Cerulean Warbler reproduction, survival, and models of population decline. *Journal of Wildlife Management* 72: 646-653.

- Cadman, M. D., D. A. Sutherland, G. G. Beck, D. Lepage, and A. R. Couturier (eds.). 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, Ontario. xxii + 706 pp.
- COSEWIC. 2010. COSEWIC status report on Cerulean Warbler, *Dendroica cerulea*, in Canada. Prepared for Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario. xi + 35 pp.
- Dunn, J. L. and K. L. Garrett. 1997. A Field Guide to Warblers of North America. Houghton Mifflin Co., Boston. x + 656 pp.
- Francis, C.M. 2007. Cerulean Warbler. Pp. 500-501 in M. D. Cadman, D. A. Sutherland, G. G. Beck, D. Lepage, and A. R. Couturier (eds.). Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, Ontario. xxii + 706 pp.
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- McIlwraith, T. 1894. The Birds of Ontario. William Briggs, Toronto.
- Oliarnyk, C. J. and R. J. Robertson. 1996. Breeding behavior and reproductive success of Cerulean Warblers in southeastern Ontario. Wilson Bulletin 108: 673-684.
- Sauer, J.R., J.E. Hines, and J. Fallon. 2008. The North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Version 5.15.2008. [USGS Patuxent Wildlife Research Center](#), Laurel, MD.
- Veit, M. L., R. J. Robertson, P. B. Hamel, and V. L. Friesen. 2005. Population genetic structure and dispersal across a fragmented landscape in cerulean warblers (*Dendroica cerulea*). Conservation Genetics 6: 159-174.

Appendix 1: Northeastern North America rank, status and decline

Jurisdiction	Rank
CT	S3B
DE	S1B
IL	S3
IN	S3B
IA	S2B, S3N
KY	S4S5B
LB	Not present
MA	S1B, S2N
MB	Not present
MD	S3S4B
ME	Not present
MI	S3
MN	S3B
NB	Not present
NF	Not present
NH	S3B
NJ	S3B, S3N
NS	Not present
NY	S4B
OH	S4
ON	S3B
PA	S4B
PE	Not present
QC	S2B
RI	S1B, S2N
VA	S3S4B
VT	S1B
WI	S2S3B
WV	S4B

Occurs as a native species in 22 of 29 northeastern jurisdictions

Rank or equivalent information available for 22 of 22 jurisdictions = (100%)

S1, S2, S3, or S4 in 7 of 22 = (32%)

PART 2: Ontario Evaluation Using COSEWIC Criteria

Regional (Ontario) COSEWIC Criteria Assessment

Criterion A – Declining Population

No (N/A). Although the population in Ontario appears to be declining, particularly in the Carolinian region, the magnitude of decline does not meet the thresholds for this criterion. The only trend information available comes from a comparison of the two Breeding Bird Atlases, which shows a non-significant decline of 30% over the 20-year period (16% over 10 years; COSEWIC 2010).

Criterion B – Small Distribution and Decline or Fluctuation

No (B2biii, iv). The extent of occurrence exceeds the thresholds for this criterion. The index of Area of Occupancy falls within the range for Threatened within this criterion, and there is a continuing decline in area of occupancy in the Carolinian region, but no other components of this criterion are met.

Criterion C – Small Population Size and Decline

Yes (END – C2aii). Ontario's population of Cerulean Warblers is estimated to be less than 2000 individuals, and more than 95% of Canada's birds occur in one population [Ontario]. Although not statistically significant, the decline between the two Breeding Bird Atlases has been 30% (estimated at 16% over the past 10 years; COSEWIC 2010). In southwestern Ontario, there was a significant decline of 47% between breeding bird atlases, and there is also a decline in fecundity in the core of its breeding range in Ontario, all suggesting an ongoing decline.

Criterion D – Very Small or Restricted

No (N/A). Population estimates and Area of Occupancy exceed the thresholds for this criterion.

Criterion E – Quantitative Analysis

No (N/A). No Population Viability Analyses has been conducted for Cerulean Warbler in Ontario. However, there is circumstantial evidence from Ontario that recruitment rates are too low to sustain the population, at least in certain years (COSEWIC 2010). No estimate of extirpation probability has been produced.

Rescue Effect

Yes. The Cerulean Warbler is strongly migratory, and the population appears to be panmictic, in the sense that there has been no genetic structuring found among the birds examined from various parts of its range. This is also reflected in its taxonomic uniformity, with no infraspecific taxa recognized. The possibility of a Rescue Effect is considered to be likely, but diminishing, because of declines in the American part of its range (COSEWIC, 2010).