

Ontario Species at Risk Evaluation Report
for
Piping Plover (*Charadrius melodus*)

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

Assessed by COSSARO as ENDANGERED

May 2014

Final

Pluvier siffleur (*Charadrius melodus*)

Le pluvier siffleur est un petit oiseau de rivage qui niche sur les plages sablonneuses ou graveleuses, juste au-dessus de la ligne des hautes eaux. Une seule sous-espèce de pluvier siffleur, *Charadrius melodus circumcinctus*, est présente en Ontario, où elle niche principalement le long des côtes et des rives des grands plans d'eau, comme les Grands Lacs et le lac des Bois. Les estimations du dernier recensement, en 2011, portaient le total d'oiseaux nicheurs à 8 100 individus, pour une population mondiale de 12 000 à 13 000. L'espèce n'a jamais été courante en Ontario, où sa population est habituellement estimée à quelque 70 à 90 couples. Les perturbations de l'habitat (rivage) et l'agitation due aux activités récréatives constituaient auparavant les principales causes du déclin de l'espèce, auxquelles s'ajoutent une prédation accrue et des niveaux d'eau élevés ou une forte action des vagues, qui demeurent aujourd'hui les menaces les plus tenaces. La population nicheuse du sud de l'Ontario est disparue dans les années 1970, même s'il en reste une petite dans la région du lac des Bois. Des programmes de rétablissement nationaux et provinciaux sont en place, et des efforts de rétablissement plus intenses sont en cours au Canada et aux États-Unis. On a observé un retour de la nidification dans le sud de l'Ontario (Sauble Beach) en 2007, et depuis, de 4 à 7 couples ont niché chaque année dans les 4 sites observés au lac Huron. La population du lac des Bois demeure faible, avec 0 à 2 couples reproducteurs chaque année. Le pluvier siffleur est considéré comme vulnérable à l'échelle mondiale et en péril dans la majorité des territoires adjacents, compte tenu des faibles possibilités d'immigration de source externe. L'espèce satisfait aux critères de la catégorie « en voie de disparition », selon le critère D1 relatif à une population très petite ou limitée et le critère E1 relatif à une analyse quantitative qui indique une faible probabilité de persistance de la population en Ontario. Le pluvier siffleur (sous-espèce *circumcinctus*) est classé dans la catégorie des espèces en voie de disparition en Ontario.

Cette publication hautement spécialisée « Ontario Species at Risk evaluation report prepared under the Endangered Species Act, 2007 by the Committee on the Status of Species at Risk in Ontario », n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir des renseignements en français, veuillez communiquer avec le ministère des Richesses naturelles et des Forêts au recovery.planning@ontario.ca.

1.0 BACKGROUND INFORMATION

CURRENT DESIGNATIONS:

GRANK – *Charadrius melodus* **G3**; *Charadrius melodus circumcinctus* **G3T3** Last Reviewed 23/12/2004)(NatureServe 2014).

NRANK Canada – N3B. Last reviewed September 9 2011 (NatureServe 2014).

COSEWIC – **Endangered** (November 2013) (*Charadrius melodus circumcinctus*)(COSEWIC 2014)

SARA – **Endangered** (*Charadrius melodus circumcinctus*) (Schedule 1) (Environment Canada 2014)

ESA 2007 – **Endangered** (*Charadrius melodus*) (OMNR 2014a)

SRANK Ontario – **S1B** (*Charadrius melodus*), **SNRB** (*Charadrius melodus circumcinctus*)(NatureServe 2014)

1.1 PRIMARY DATA SOURCES

COSEWIC 2014. COSEWIC assessment and status report on the Piping Plover *Charadrius melodus*, *circumcinctus* subspecies (*Charadrius melodus circumcinctus*), *melodus* subspecies (*Charadrius melodus melodus*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiv + 39 pp.

Heyens, L., S. Robinson and K. St. Laurent. 2014. 2013 Ontario report. Prairie Piping Plover Recovery Team *Charadrius melodus circumcinctus*. Ontario Ministry of Natural Resources, Kenora ON. 31 pp.

Kirk, D.A. 2013. Recovery strategy for the Piping Plover (*Charadrius melodus*) in Ontario. Ontario Recovery Strategy Series, Ontario Ministry of Natural Resources, Peterborough ON. vi + 61 pp.

1.2 TECHNICAL SUMMARY

A summary of technical information for the species in Ontario is provided in Appendix 1.

2.0 ELIGIBILITY FOR ONTARIO STATUS ASSESSMENT

2.1 APPLICATION OF ELIGIBILITY CRITERIA

Taxonomic Distinctness: Yes

The Piping Plover is a recognized taxonomic entity. There are two recognized subspecies, the interior subspecies (*Charadrius melodus circumcinctus*) and the eastern subspecies (*Charadrius melodus melodus*), as confirmed by recent genetic studies (Miller et al. 2010). The interior subspecies breeds in inland North America,

including the plains and the Great Lakes region, which includes Ontario (COSEWIC 2013).

Designatable Units: No

There are two subspecies recognized by COSEWIC as two designatable units, however only one subspecies (*Charadrius melodus circumcinctus*) occurs in Ontario (COSEWIC 2013). Although the USFWS (2009) recognizes two “distinct population segments” (DPS), the North Great Plains DPS and the Great Lakes DPS, COSEWIC (2013) recognizes one DU in Ontario. There are considered to be two Ontario populations, the Prairie Canada Population and the Canadian Great Lakes Population (Environment Canada 2013). Kirk (2013) identified two Ontario subpopulations, Ontario Lake of the Woods and Ontario Great Lakes.

Although there are two disjunct populations within Ontario, they are considered to be part of the same interior population and subspecies (*Charadrius melodus circumcinctus*). COSSARO considered the Ontario population as one designatable unit and considered status at the species level (*Charadrius melodus*).

Native Status: Yes

The Piping Plover is a recognized native species in Ontario. Documented records in Ontario in the NHIC database date back to 1882 (OMNR NHIC data). Nash (1908) reported it as a “regular but not a common summer resident”.

Occurrence: Extant

The Piping Plover currently is known to occur in Ontario at four confirmed breeding locations in Lake of the Woods, and Lake Huron (Manitoulin Island, Sauble Beach, Wasaga Beach) (Kirk 2013). They were not historically common in Ontario, and an estimated historical population of 152-162 pairs may have been an overestimate (Toews et al. 2008); 70-90 pairs appears more realistic (Kirk 2013).

2.2 ELIGIBILITY RESULTS

Piping Plover (*Charadrius melodus*) is eligible for status assessment in Ontario.

3.0 ONTARIO STATUS BASED ON COSSARO CRITERIA

3.1 APPLICATION OF COSSARO CRITERIA FOR ONTARIO

Applicability of Criteria for Endangered or Threatened Status in Ontario

Criterion A – Decline in Total Number of Mature Individuals

Not Applicable

The population decline for this species is believed to have begun in the 1920s (Kirk 2013). Although the International Piping Plover Census has shown a 22.9% decline in the interior population from 1991-2011, and a 12.2% decline from 2001-2011, this mainly reflected trends in the larger prairie populations (COSEWIC 2013). The Piping Plover is increasing throughout its Great Lakes range; the population increased from 17 pairs in 1981 to 66 pairs in 2013. In 2013, 124 chicks were fledged from the Great Lakes population, the second highest recorded number (Heyens et al. 2014, USFWS 2014), as a result of intensive conservation efforts in the United States.

The small Ontario population has actually shown growth, from five adults in 1991 to a low of two adults in 2001 and 2006, but a total of 16 adults in 2011 (COSEWIC 2013); this growth was solely in the Ontario Great Lakes region, and was primarily due to intensive conservation efforts in Michigan. The Lake of the Woods population numbers have been sporadic but never exceeding 4 pairs since the late 1980s, with 0-2 pairs at the Windy Point site and 0-2 pairs at Sable Islands Provincial Nature Reserve (Kirk 2013). No nesting occurred on Lake of the Woods in 2013, and the last recorded nesting attempt was in 2010 (Heyens et al. 2014, OMNR data) The Lake Huron nesting population has seen a recent increase in breeding activity, with re-establishment of nesting activity in 2007 following almost four decades of local extirpation (last documented nesting in southern Ontario was in 1977), with from 1-7 documented pairs breeding at 4 sites (only 3 documented in any one year) (Kirk 2013).

Criterion B – Small Distribution Range and Decline or Fluctuation

Not Applicable

Population has a small area of distribution in Ontario, however there is no evidence of a continuing decline, and actual indications of a population increase. Meets area thresholds for B1 (extent of occurrence) and B2 (index of area of occupancy), and meets subthreshold “a” for severely fragmented population as it is known to occur at four locations - Lake of the Woods (2 sites), Manitoulin Island (1 site), southern Georgian Bay (1 site), and eastern Lake Huron (2 sites). Does not meet subthreshold “b” for extreme fluctuations – provincial population has fluctuated between 5-16 adults over past 20 years (1991-2011), although it has shown only an increase (from two to 16) over the past decade (2001-2011)(COSEWIC 2013). The low numbers combined with the risk of stochastic events leaves the population at high risk of local extirpation despite the apparent population increase. Heyens (2007) noted that the Piping Plover was “on the brink of extinction in the northwest of the province”, and it has not increased

since that time.

**Criterion C – Small and Declining Number of Mature Individuals
Not Applicable**

Population is small but not declining.

Criterion D – Very Small or Restricted Total Population

Endangered: D1 (fewer than 250 mature individuals)

See information under Criterion A for population numbers in Ontario.

Criterion E – Quantitative Analysis

Endangered: E1

Population viability models “indicated that the probability of Great Plains and Great Lakes Piping Plover populations persisting more than 100 years was low” (Kirk 2013). Plissner and Haig’s (2000) PVA suggested a probability of survival for 100 years of 0% for the Great Lakes population and 0% for the Manitoba and Lake of the Woods population. While the situation for the prairie population has changed little since this time, the Great Lakes population has shown some improvement in the past decade and a new PVA may yield different results.

3.2 SPECIAL CONCERN: No.

Exceeds the thresholds for Special Concern.

3.3 STATUS CATEGORY MODIFIERS

Rescue Effect: Yes (possible but unlikely).

COSEWIC (2013) noted that rescue effect was conceivable especially for the Great Lakes population, but unlikely to be significant given the poor status of adjacent populations. However there is some potential for rescue effect as demonstrated by the recent population re-establishment and increase in Lake Huron; almost all Piping Plovers observed in southern Ontario, both in migration and at breeding sites, have been colour-banded at sites on Lake Michigan in Michigan (D. Sutherland pers. comm.) and resulted from intensive management efforts. Rescue effect may be limited as the species is still ranked as SX (extirpated)(Ohio, Pennsylvania) or S1/S1B (critically imperilled)(Manitoba, Michigan, Minnesota, Québec and Wisconsin) in all adjacent jurisdictions except for New York¹ which was ranked as S3B(vulnerable)(NatureServe 2013). For the prairie population, the Piping Plover population on the Minnesota portion of Lake of the Woods declined from 40-50 individuals in the early 1980s to five adults and one breeding pair in 2003 (Toews et al. 2008), essentially negating any potential for

¹ In New York, Piping Plover nests primarily on the Atlantic coastline. Approximately 200 pairs nest on the Atlantic; a single nest was recorded on Lake Ontario in 1984 (New York State 2014).

rescue effect of the Lake of the Woods population on the Ontario side.

Despite some demonstrated potential for rescue effect, adjusting the status based upon rescue potential is not advisable given the very small population both in Ontario and adjacent jurisdictions, and the fact that continued recovery and even maintenance of the existing population is very dependent upon ongoing intensive conservation efforts (BirdLife International 2012). While Michigan is the original source of the birds which have recolonized southern Ontario, they are still considered critically imperilled in Michigan and continued immigration into Ontario is dependent on high levels of management to maintain high reproductive success.

High Conservation Responsibility: No

While Canada has a high conservation responsibility for the global population with over 50% of the global breeding distribution for the subspecies (COSEWIC 2013), Ontario has a very small proportion of the national Piping Plover distribution and population.

G RANK – *Charadrius melodus* **G3**; *Charadrius melodus circumcinctus* (Last Reviewed 23/12/2004) (NatureServe 2014)

There were an estimated 8000 Piping Plovers globally in 2006 (Gratto-Trebor and Abbott 2011), and in the most recent census in 2011 it was estimated that there were 8100 breeding birds in a global population of 12,000-13,000 (BirdLife International 2012).

3.4 DATA DEFICIENT: No

3.5 NOT AT RISK: No

3.6 SUMMARY OF STATUS EVALUATION

Piping Plover (*Charadrius melodus*) is classified as **Endangered** in Ontario.

Applicable Criteria: **Very Small or Restricted Total Population (D1) and Quantitative Analysis (E1).**

Classification Summary:

The Piping Plover (*Charadrius melodus*) is a small shorebird that nests on sandy or gravelly beaches just above the high water mark. Only one subspecies *Charadrius melodus circumcinctus* occurs in Ontario. In Ontario they nest primarily along the coasts and shorelines of large waterbodies such as the Great Lakes and Lake of the Woods. In the most recent census in 2011 it was estimated that there were 8100 breeding birds in a global population of 12,000-13,000. They were not historically common in Ontario, with the historical population estimated to be 70-90 pairs. The major causes of past declines were habitat (shoreline) disruption and recreational disturbance, augmented by increased predation and high water levels and/or wave action; these remain the most

significant threats today. The breeding population in southern Ontario was extirpated in the 1970s, although a small breeding population remained in Lake of the Woods. National and provincial recovery strategies are in place, and extensive recovery efforts have been underway in both Canada and the United States. Nesting was once again initiated in southern Ontario (Sauble Beach) in 2007, and since that time 4-7 pairs have nested annually at four sites in Lake Huron. The Lake of the Woods population has remained at low levels, with 0-2 pairs nesting annually. The Piping Plover is considered vulnerable globally, and is also considered imperilled in most adjacent jurisdictions, providing little potential for rescue effect. **The species meets criterion D1 for very small or restricted population and criterion E1 for quantitative analysis indicating low probability of persisting population in Ontario.** The Piping Plover (*circumcinctus* subspecies) is classified as **Endangered** in Ontario.

Statements relating to a status category modification:

Not applicable – limited rescue effect potential due to status of population in adjacent jurisdictions.

4.0 INFORMATION SOURCES

4.1 LITERATURE CITED

- BirdLife International 2012. *Charadrius melodus*. In: IUCN 2014. The IUCN Red List of Threatened Species. Version 2013.2. Available at <http://www.iucnredlist.org/details/full/22693811/0>. . Accessed on 23 May 2014.
- COSEWIC. 2014. COSEWIC assessment and status report on the Piping Plover *Charadrius melodus, circumcinctus* subspecies (*Charadrius melodus circumcinctus*), *melodus* subspecies (*Charadrius melodus melodus*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiv + 39 pp.
- COSEWIC. 2014. Wildlife species search. Plover, Piping / *Charadrius melodus*. COSEWIC Secretariat, Canadian Wildlife Service, Environment Canada, Gatineau QC. Available at http://www.cosepac.gc.ca/eng/sct1/searchdetail_e.cfm?id=686&StartRow=1&boxStatus=All&boxTaxonomic=All&location=All&change=All&board=All&commonName=piping%20plover&scienceName=&returnFlag=0&Page=1. Accessed May 21 2014.
- Davidson, P. 2013. Wasaga Beach Provincial Park Piping Plover (*Charadrius melodus*) program 2013 year end report. Wasaga Beach Provincial Park, Ontario Ministry of Natural Resources, Wasaga Beach ON. 30 pp.
- Environment Canada. 2013. Action plan for the Piping Plover (*Charadrius melodus*

circumcinctus) in Ontario. Species at Risk Act Action Plan series. Environment Canada, Ottawa ON. lii + 20 pp. Available at http://publications.gc.ca/collections/collection_2013/ec/CW69-21-3-2013-eng.pdf.

Environment Canada. 2014. Species profile Piping Plover *circumcinctus* subspecies. Species at Risk Public Registry. Environment Canada, Gatineau QC. Available at http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=686. Accessed May 21 2014.

Fisher, J. 2014. Beach Area 1 at Wasaga Beach Provincial Park. Form for sharing community knowledge information with COSSARO for upcoming species assessment, submitted April 22 2014.

Gratto-Trevor, C.L. and S. Abbott. 2011. Conservation of Piping Plover (*Charadrius melodus*) in North America: science, successes and challenges. Canadian Journal of Zoology 89: 401-418.

Heyens, L. 2007. Piping Plover. Pp. 214-215 in *Atlas of the Breeding Birds of Ontario, 2001-2005*. Edited by M.D. Cadman, D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier. Published by Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources and Ontario Nature. 706 pp.

Heyens, L., S. Robinson and K. St. Laurent. 2014. 2013 Ontario report. Prairie Piping Plover Recovery Team *Charadrius melodus circumcinctus*. Ontario Ministry of Natural Resources, Kenora ON. 31 pp.

Kirk, D.A. 2013. Recovery strategy for the Piping Plover (*Charadrius melodus*) in Ontario. Ontario Recovery Strategy Series, Ontario Ministry of Natural Resources, Peterborough ON. Vi + 61 pp.

McLean-Purdon, E. and Matthias Purdon. 2013. Sauble Beach Piping Plover summary report. Ontario Ministry of Natural Resources, Midhurst ON. 52 pp.

Miller, M.P., S.M. Haig, C.L. Gratto-Trevor and T.D. Mullins. 2010. Subspecies status and population genetic structure in Piping Plover (*Charadrius melodus*). Auk 127: 57-71.

Nash, C.W., 1908. Manual of vertebrates of Ontario. Legislative Assembly of Ontario, Toronto ON. 107 p.

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.3. NatureServe, Arlington, Virginia. Available at

<http://natureserve.org/> . Accessed: May 20 2014.

New York State. 2014. Piping Plover Fact Sheet, Piping Plover *Charadrius melodus*. New York State Department of Environmental Conservation, New York NY. 3 pp. Available at <http://www.dec.ny.gov/animals/7086.html?showprintstyles>. Accessed May 21 2014.

OMNR. 2013. 2013-2014 Species at Risk Stewardship Fund Piping Plover volunteer monitoring program, Project 16-12 BRSN final report. Ontario Ministry of Natural Resources, Midhurst ON. 37 pp.

OMNR. 2014a. Species at Risk in Ontario list. http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_BI_RDS_AT_RISK_EN.html. Last updated May 14 2013. Accessed May 21 2014.

OMNR. 2014b. Piping Plover. Species at Risk website, Ontario Ministry of Natural Resources, Peterborough ON. Available at http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_P_PNG_PLVR_EN.html . Accessed May 21 2014.

Plissner, J.H. and S.M. Haig. 2000. Viability of Piping Plover *Charadrius melodus* metapopulations. *Biological Conservation* 92: 163-173. Available at <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1569&context=usgsstaffpub>.

Toews, B.A., K.J. Toews and C.E.J. Cartwright. 2008. The successful nesting of the Piping Plover at Sauble Beach marks a return to the Canadian Great Lakes after 30 years. *Ontario Birds* 26(1): 16-49.

United States Fish & Wildlife Service (USFWS). 2009. Piping Plover (*Charadrius melodus*): 5-year review: summary and evaluation. United States Fish & Wildlife Service, Hadley, MA. Vi + 206 pp.

USFWS. 2014. Piping Plover – Great Lakes population. United States Fish & Wildlife Service, East Lansing Ecological services Field Office, East Lansing MI. Available at <http://www.fws.gov/midwest/EastLansing/te/pipl/index.html>. Accessed May 23 2014.

4.2 COMMUNITY AND ABORIGINAL TRADITIONAL KNOWLEDGE SOURCES

Fisher (2014) provided information on the 2013 nesting of Piping Plovers at Wasaga Beach Provincial Park on Georgian Bay, Lake Huron, including the 2013 year-end report (Davidson 2013). This report detailed Piping Plover nesting habitat, arrival and nesting chronology, the nest management program, external factors and pressures,

volunteer program, education and outreach efforts, and nesting success and management recommendations. With a 63% fledging success rate of eight eggs from two nests, “the 2013 season was the most successful season on record when comparing the number of eggs with the number of surviving fledglings” (Davidson 2013).

Similar reports are available on local nest monitoring efforts associated with the Sauble Beach nesting sites (McLean-Purdon and Purdon 2013, OMNR 2013), and the Lake of the Woods nesting sites.

4.3 ACKNOWLEDGEMENTS

Information and assistance were provided by several OMNR staff, including Melody Cairns, Laura Chait, Leo Heyens, Mike Oldham, Matthias Purdon, Chris Risley, Eric Snyder, Don Sutherland and Craig Todd.

APPENDIX 1: TECHNICAL SUMMARY FOR ONTARIO

Species: Piping Plover

Demographic Information	
<p>Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.</p>	3-4 Years (COSEWIC 2013a)
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	No – recent population increase along southern Lake Huron shoreline
Estimated percent of continuing decline in total number of mature individuals within 6 years.	NA (12.2% decline for <i>circumcinctus</i> subspecies in Canada, reflecting the majority of the population in western Canada) (COSEWIC 2013). Ontario populations have increased in the past decade, although Lake Huron population has fluctuated between 5-7 pairs over period 2009-2012, suggesting no recent increase in population.
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last 10 years.	<p>Lake of the Woods – fluctuating between 0-2 pairs (Kirk 2013) Southern Lake Huron – increase from 0 pairs to 5-7 pairs over the past decade (Kirk 2013) While the global population has increased substantially from 1991-2006, population trends for the prairie population in both the USA and Canada have been inconsistent (Gratto-Trevor and Abbott 2011). Considering all known nesting sites in Ontario over the past decade from Kirk’s (2013) summary, there is a maximum of 11 nesting sites, although not all were active in any one year: Sauble Beach – 2 Wasaga Beach – 4 Oliphant Beach – 1 Carter Bay – 1 Windy Point – 2 Sable Island – 1 (last nest in 2007)</p>
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next 10 years.	Unknown, no analysis conducted. Lake of the Woods population remains precarious; Lake Huron population has fluctuated between 5-7 pairs over period 2009-2012, suggesting no recent increase in population.
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 year period or over a time period including both the past and the future].	Unknown. COSEWIC (2014) noted that the “interior subspecies of this shorebird (i.e. <i>circumcinctus</i>) is projected to decline over the longer term, particularly if concerted conservation efforts are relaxed”.

Are the causes of the decline clearly reversible and understood and ceased?	The causes of the decline are well understood. Causes of decline are reversible in part with intensive management action (e.g. Davidson 2013, Environment Canada 2014, Kirk 2013, McLean-Purdon 2013); much of the habitat loss irreversible.
Are there extreme fluctuations in number of mature individuals?	Yes, particularly for Lake of the Woods population

Extent and Occupancy Information in Ontario	
<p>Estimated extent of occurrence</p> <p>The estimated extent of occurrence (connecting all locations to create a polygon) is 15,645 km² (D. Sutherland pers. comm.). This approach follows the accepted approach, but involves the inclusion of two widely disjunct populations in Lake Huron and Lake of the Woods</p>	15,645 km ² (D. Sutherland pers. comm.)
<p>Index of area of occupancy (IAO).</p> <p>Precise measures not available. Kirk (2013) reported on several studies that estimated Piping Plover density, which ranged from one nest per 93-800 m of beach. Two nesting areas in southern Ontario had mapped areas of Piping Plover activity along a beach approximately 1.1 km long, with an estimated maximum beach width at one site of 108 m (actual beach width at one nest site was 38 m). These beach length estimates are consistent with Kirk's (2013) maximum measures, and also with the federal Ontario Action Plan's criteria for occupied sites which was 500 m either side of a nest parallel to the shore (Environment Canada 2013). . These crude but likely overestimated measures would produce an AO of approximately 0.12 km² for each nesting site. Applying this rough measure to all 11 known nesting areas would produce an estimate of just over 1.3 km². Alternatively, using the average home range size of 2.9 ha (0.029 km²) calculated for the Great Lakes population (D. Sutherland pers. comm.), the estimated AO for the 11 nests would be 0.32 km². While the actual area of occupancy has not been calculated. It is clearly much less than 500 km².</p>	0.3-1.3 km ² .

Is the total population severely fragmented? Two very disjunct small populations (Lake of the Woods, Lake Huron)	Yes
Number of locations. -	5 locations (D. Sutherland pers. comm.)(see Figure 1): <ul style="list-style-type: none"> - Carter Bay Beach - Wasaga Beach - Sauble Beach - Oliphant Beach - Windy Point/Sable Island <p>5 extant locations, dependent upon interpretation. A “single threatening event” such as high water levels or large storm event could rapidly affect several sites at the same time e.g. Lake of the Woods or Lake Huron. If this were considered the “most serious plausible event”, the number of locations in Ontario would be reduced to two (i.e. Lake of the Woods or Lake Huron), however the Threats Generator has not been applied to this species and the threats have not been categorized and ranked. (Quoted phrases in parentheses from COSEWIC’s (2012) guidance for completing the threats calculator and assessment calculator and determining the number of locations).</p>
Number of NHIC Elemental Occurrences	5 extant EOs since 2000 (NHIC data) Also a number of historic EO locations – 1 (1990s), 19 (<1980)(Figure 2)
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	No
Is there an [observed, inferred, or projected] continuing decline in number of populations?	Uncertain – number of populations currently stable or increasing; all populations still precarious and very small
Is there an [observed, inferred, or projected] continuing decline in number of locations?	Uncertain – number of locations currently stable or increasing; all locations still precarious because of very small populations
Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	No
Are there extreme fluctuations in number of populations?	In part – Lake of the Woods population (0-2 pairs)
Are there extreme fluctuations in number of locations?	NA – small number of sites and not all sites surveyed every year

Are there extreme fluctuations in extent of occurrence?	No – potentially a gradual increase in Lake Huron
Are there extreme fluctuations in index of area of occupancy?	No – potentially a gradual increase in Lake Huron

Number of Mature Individuals In Each Population or Total Population	
Population (or Total Population)	N of Mature Individuals
Unknown	16

Quantitative Analysis (population viability analysis conducted)
Population viability models “indicated that the probability of Great Plains and Great Lakes Piping Plover populations persisting more than 100 years was low” (Kirk 2013). Plissner and Haig’s (2000) PVA suggested a probability of survival for 100 years of 0% for the Great Lakes population and 0% for the Manitoba and Lake of the Woods population. Other studies have noted that small changes in adult survival have a much greater influence on population status and trajectory than larger change in productivity (Gratto-Trevor and Abbott 2011). Plissner and Haig’s (2000) PVA indicated that the probability of persistence for 100 years was twice as high following an increase in adult survivorship as it was from a corresponding increase in juvenile survival. Kirk (2013) noted that various PVAs have low predictive accuracy for the Great Lakes populations, which may be related to erroneous juvenile survival rates due to some undetected breeding pairs; nonetheless, the overall message from the PVAs is one of considerable concern for long-term survival.

Threats
The Piping Plover continues to be vulnerable to threats from human disturbance (use of beaches and disturbance of nest sites), declines in habitat extent and quality, and high water levels and storm events (COSEWIC 2014, Environment Canada 2014, Gratto-Trevor and Abbott 2011, Heyens 2007, Kirk 2013).

Rescue Effect (immigration from outside Ontario)
No. Rescue effect is conceivable especially for the Great Lakes population, but unlikely to be significant given the poor status of adjacent populations (COSEWIC 2013), and only if continually supported by intensive management efforts (Birdlife International 2012).

Ontario’s Conservation Responsibility
Ontario has a very small proportion of the global range and population for the <i>circumcinctus</i> subspecies, and much less for the species. The 16 mature individuals estimated in the Ontario population (only five pairs nested in 2013 [Heyens et al. 2014]) would have represented 0.003% of the 2006 global population of the <i>circumcinctus</i> subspecies (4662 in the Great Plains region, 110 in the Great Lakes region [Birdlife International 2012]).

G-rank (see also section 3.3 Status Category Modifiers)
G3T3

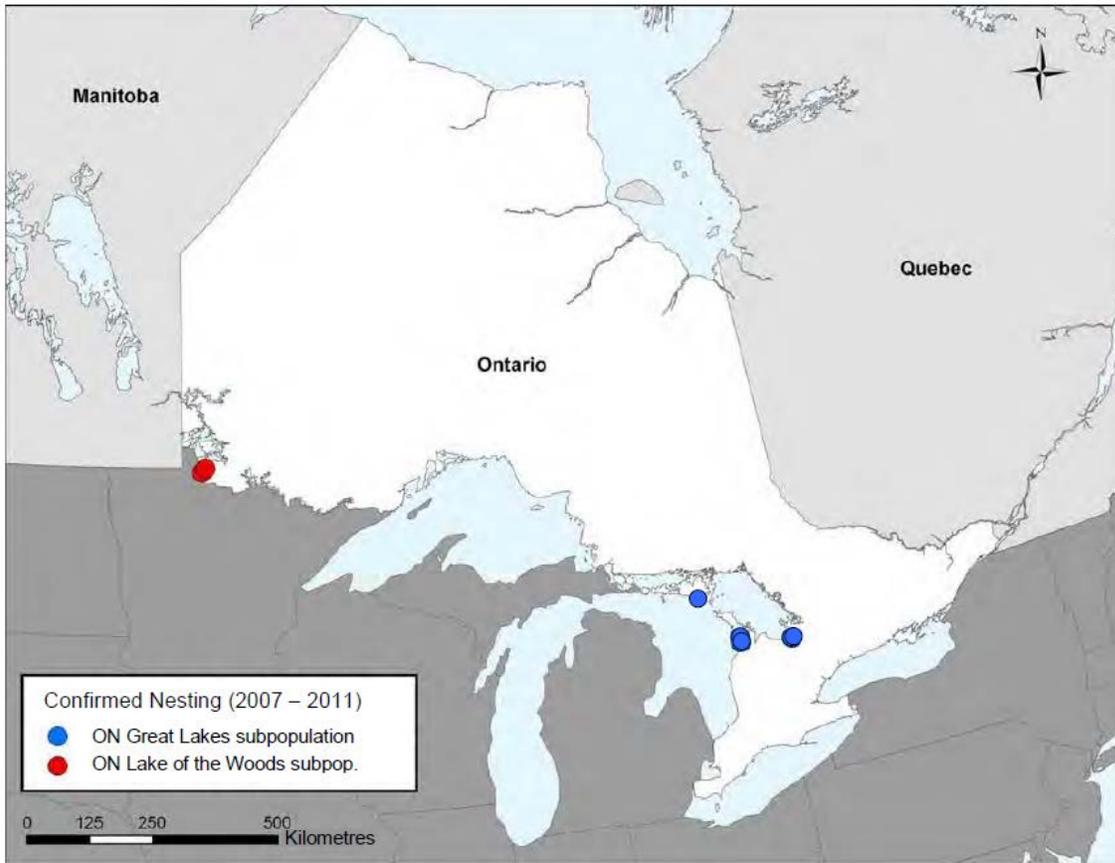
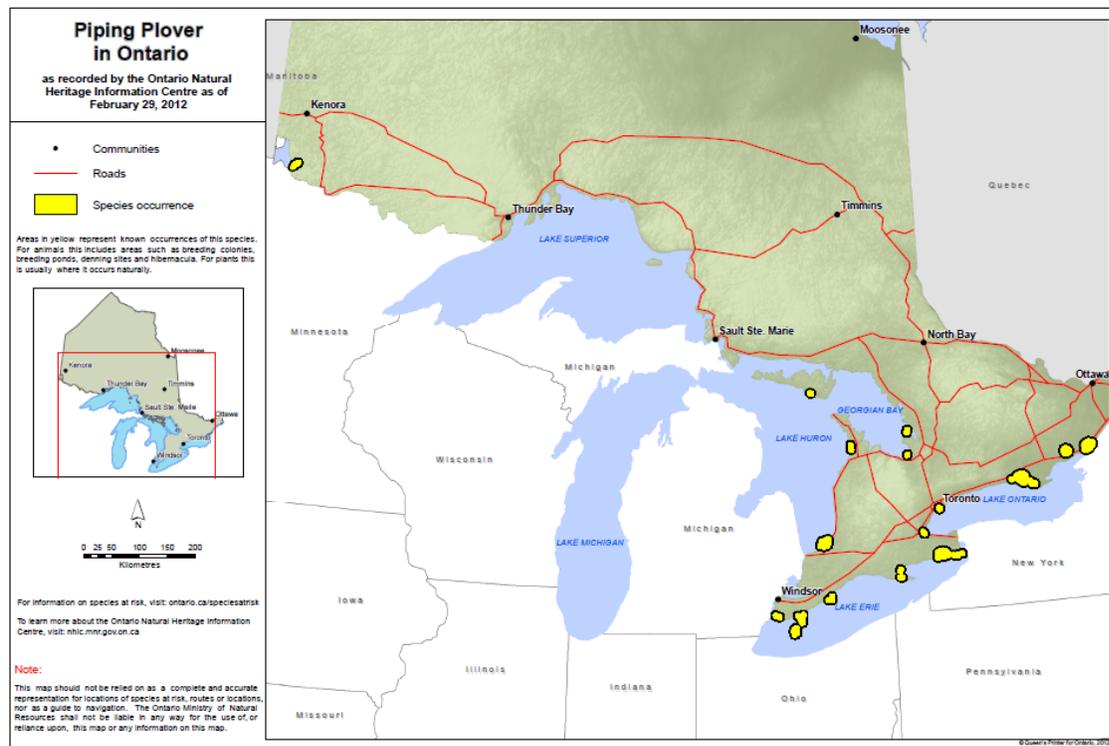


Figure 1. Locations of confirmed breeding of Piping Plover in Ontario (2007-2011) (Kirk 2013).



ontario.ca/speciesatrisk

Figure 2. Documented locations of extant and historic Piping Plover breeding records in Ontario from NHIC records (from OMNR 2014 b).