

**Ontario Species at Risk Evaluation Report
for
Red-necked Phalarope (*Phalaropus lobatus*)**

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

Assessed by COSSARO as Special Concern

May, 2015

FINAL

Phalarope à bec étroit (*Phalaropus lobatus*)

Le phalarope à bec étroit (*Phalaropus lobatus*) est un petit oiseau de rivage qui se reproduit dans les régions côtières arctiques et subarctiques. Il préfère les aires de reproduction qui sont dominées par une végétation graminéoïde ou aquatique émergente et il a tendance à éviter les habitats où la végétation et les arbustes se font rares. En Ontario, il se reproduit le long des côtes de la baie d'Hudson et de la baie James. Des diminutions des populations de cette espèce sont signalées dans des zones de migration et de reproduction en dehors de l'Ontario, mais elles ne sont pas bien comprises. Il n'y a pas de données disponibles ou de tendances connues concernant les populations de l'Ontario. Le changement climatique peut être une menace pour l'espèce, mais les effets néfastes particuliers sur les habitats et les proies sont mal compris et ils peuvent être contrecarrés par les températures plus chaudes qui améliorent la survie des juvéniles. La dégradation de l'habitat causée par l'alimentation des populations de petites oies des neiges qui sont en croissance rapide en Ontario a été signalée dans des régions qui chevauchent l'aire de répartition du phalarope à bec étroit dans la province. Des renseignements supplémentaires s'avèrent nécessaires afin de déterminer l'étendue de la dégradation de l'habitat ainsi que ses effets sur les populations de phalaropes à bec étroit qui sont en âge de se reproduire en Ontario. Dans l'ensemble, il faut beaucoup plus d'information sur la taille, l'étendue, les tendances et les menaces des populations ainsi que sur la qualité des habitats, mais la perte d'habitat documentée, qui est causée par l'alimentation de la petite oie des neiges, et les diminutions observées, qui sont associées à une dégradation de l'habitat similaire en dehors de la province, font du phalarope à bec étroit une espèce préoccupante en Ontario.

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Executive summary

Red-necked Phalaropes (*Phalaropus lobatus*) are small shorebirds that breed in Arctic and Sub-Arctic coastal areas. They prefer breeding areas dominated by graminoid or emergent aquatic vegetation and tend to avoid sparsely vegetated or shrubby habitats. In Ontario, they breed along the coast of Hudson Bay and James Bay. Population declines for this species in migratory and breeding areas outside Ontario are reported, but not well understood. Population data and trends are not available for Ontario. Climate change may be a threat to the species, but specific negative effects on habitat and prey are poorly understood and may be countered by warmer temperatures that improve juvenile survival. Habitat degradation resulting from foraging activity by rapidly increasing Lesser Snow Geese populations in Ontario was reported in areas overlapping with the Red-necked Phalarope's range in the province. More information is required to determine the extent of habitat degradation and what effect it has had on breeding populations of Red-necked Phalaropes in Ontario. Overall, much more information on population size, extent, trends, threats, and habitat quality is required; however, documented habitat loss from Lesser Snow Geese foraging activity and observed declines associated with similar habitat degradation outside the province make this a Special Concern species in Ontario.

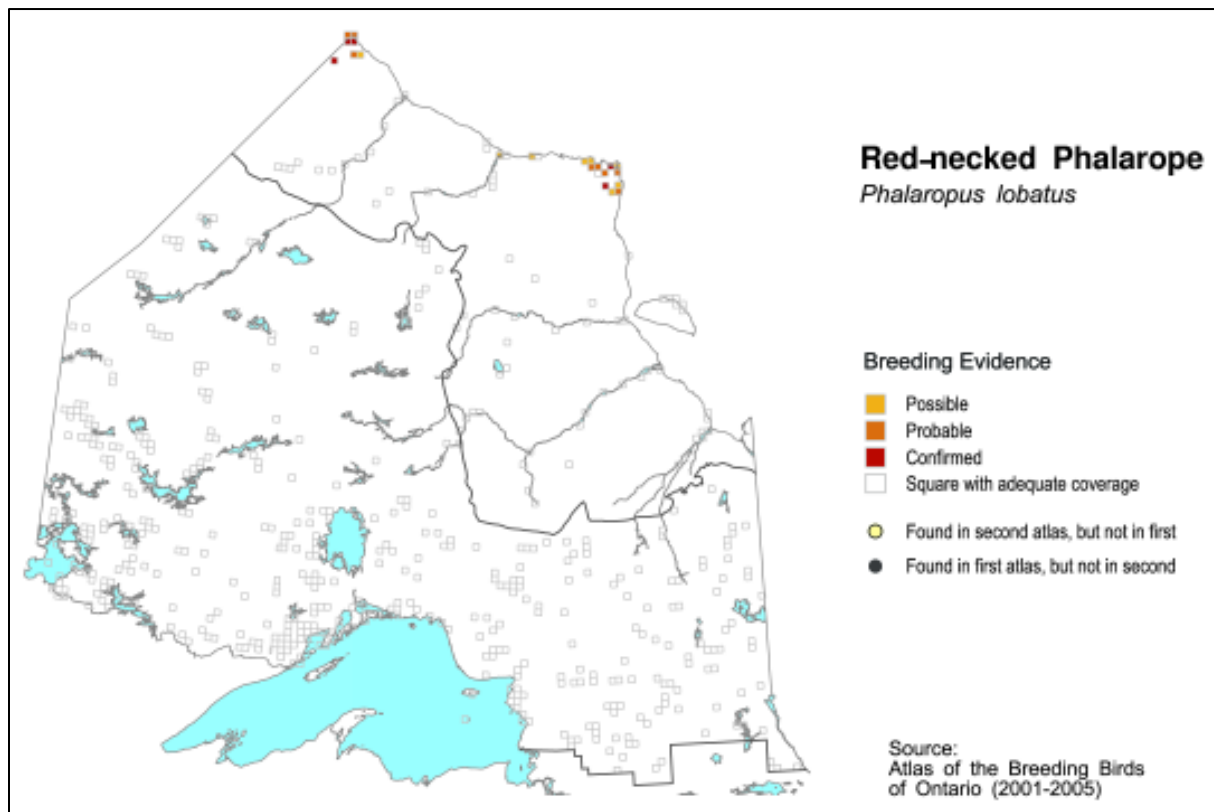
1. Background information

1.1. Current designations

- G-RANK: G4G5 (NatureServe, accessed 12/05/2015)
- N-RANK Canada: N4N5B
- COSEWIC: Special Concern (November 2014)
- SARA: no status
- ESA 2007: not listed
- S-RANK: S3S4B

1.2. Distribution in Ontario

Figure 1. Location of breeding evidence of Red-necked Phalaropes in Ontario (Nol and Beveridge 2007).



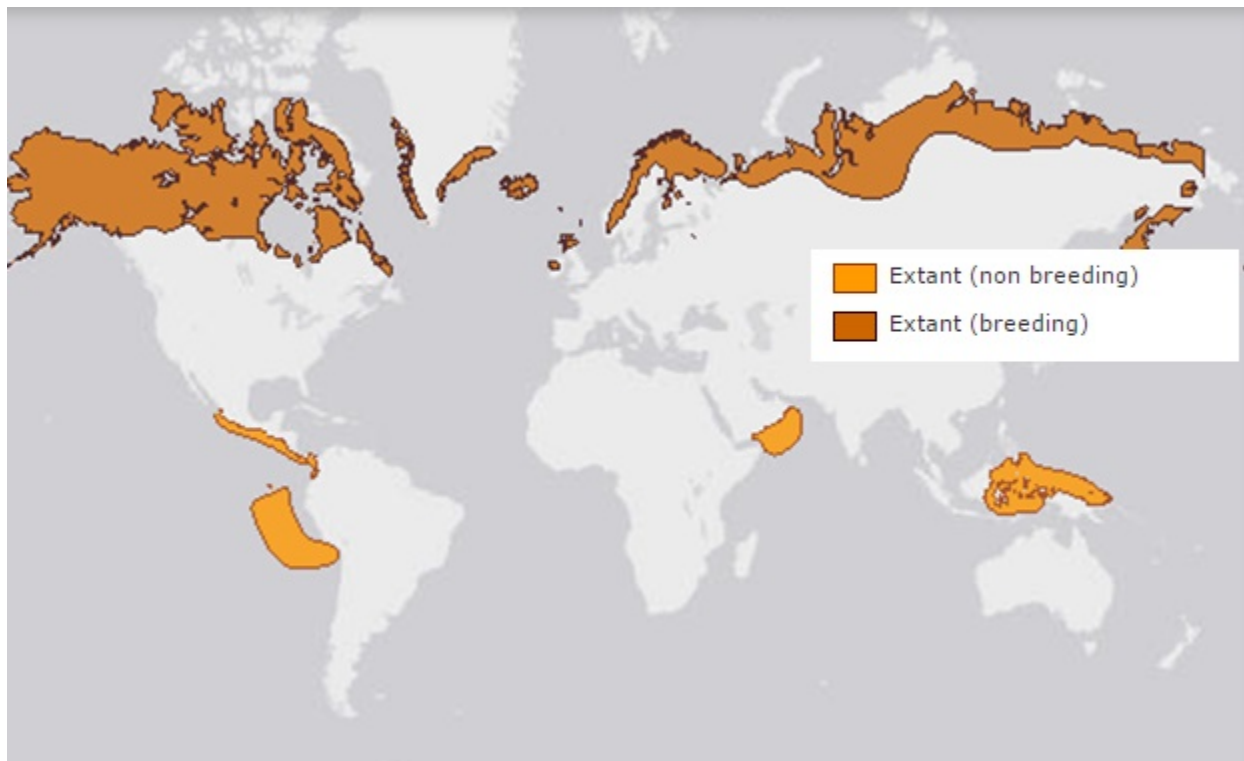
Red-necked Phalaropes breed in the far north of the province. The Atlas of Breeding Birds in Ontario indicates confirmed breeding activity near the eastern (Cape Henrietta Maria) and western-most (Pen Islands) ends of Ontario's Hudson's Bay coast (Nol and Beveridge 2007) (Figure 1). Distribution appears to be discontinuous in Ontario (Nol and Beveridge 2007). Expert opinion suggests that Red-necked Phalarope breeding territory in Ontario may consist of the entire shore of Hudson's Bay, which is not well covered by surveying activity for the Breeding Bird Atlas. Ontario's Natural Heritage

Information Centre has documented two Element Occurrences (EO) for this species in Ontario. The two EOs presumably reflect the species' Ontario Breeding Bird Atlas distribution along the eastern and western shores of Hudson Bay. The two locations would likely be affected in similar ways by climate change, but localized differences in intensity of habitat alteration by Lesser Snow Geese (*Anser caerulescens caerulescens*) (see section 1.5 Direct Threats) may exist between the two locations in Ontario.

1.3. Distribution and status outside Ontario

Red-necked Phalaropes breed across the circumpolar sub-Arctic with records from Greenland, Spitsbergen, Iceland, Faeroe Islands, Scotland, Ireland, Norway, Sweden, Finland, Estonia, Russia and Alaska (Figure 2). They occur in every province and territory in Canada as either breeding populations and/or migrants. Most Red-necked Phalaropes that breed in North America overwinter offshore of Panama and Peru, though they are known to overwinter along the length of the Pacific coast from Mexico to Chile (Figure 2).

Figure 2. Global breeding and non-breeding range of Red-necked Phalaropes (BirdLife International and NatureServe 2014).



Global population trends for this species appear to be decreasing, but do not meet the threshold for Vulnerable status in the IUCN Red List (i.e. >30% decline over ten years or three generations) (BirdLife International 2012). In North America, survey effort throughout the Red-necked Phalarope's range is sparse, making trend data difficult to determine. However, localized reporting in Manitoba and the Yukon reveal widespread observations of decline (COSEWIC 2014). The most notable evidence of decline

outside of Ontario is from migration monitoring in the Bay of Fundy, where aerial line transect surveys during the late 1980s revealed 1-2 million migrants with daily abundances of 5000 – 20 000 Red-necked Phalaropes/ km² to daily abundances of 539 birds/ km² [+/- SE 156] and 559 birds/km² [+/- SE 149] on the two peak days in 2010 (COSEWIC 2014). Declines in the Bay of Fundy region had occurred by the late 1980s and trend data for the last three generations (~12 years) is unknown, but is not likely as extreme as the declines observed between the 1970s and 1990s.

1.4. Ontario conservation responsibility

Population estimates for Ontario are unavailable. The proportion of the global range of Red-necked Phalarope within Ontario is minimal: although not quantified, it is certainly less than 25% of the aerial extent of the species' global breeding range.

1.5. Direct threats

Little is known about the direct threats to the Red-necked Phalarope. The paucity of information related to this species' migration, over-wintering biology, and ability to adapt to threats makes it difficult to determine the scope and severity of threats in Ontario.

Climate change is likely the greatest threat to the species in Canada, with potential adverse effects on the abundance, timing and composition of prey, as well as to habitat structure (COSEWIC 2014). Increased cover of shrubby vegetation at grass-sedge wetland breeding sites has been observed and is attributed to climate change. Red-necked Phalaropes tend to breed in areas dominated by graminoid and emergent aquatic vegetation while avoiding open muddy areas and shrubby growth (Walpole et al. 2008). Therefore increased shrub cover may result in decreased availability of suitable nesting sites.

With altered temperature and moisture regimes, early drying of ponds could impact prey availability at breeding sites, but Gratto-Trevor (1997) suggests that some drying and salination of temporary pools could be favourable for shorebird foraging success. Changes in the timing of arthropod emergence may also impact migration behaviour and breeding success, though Gratto-Trevor (1997) indicate that Red-necked Phalaropes eat a varied diet of both fresh-water and marine invertebrates along their migration routes and could adapt to changes in prey species composition. McKinnon et al (2003) found in Dunlin (*Calidris alpina*), another arctic shorebird, increased air temperature may offset the costs of decreased prey availability associated with climate change by reducing the thermoregulatory energy requirements of growing chicks. Thus, a climate-related shift in prey species composition and abundance may not necessarily be deleterious to these shorebirds. Additional information is necessary to determine whether potential benefits from climate change outweigh the potential risks to this species.

Habitat degradation by Lesser Snow Geese foraging may be a threat to Red-necked Phalaropes in Ontario. Abraham and Jefferies (1997) assessed the status of habitat at selected Lesser Snow Goose breeding and staging sites in Ontario (see Figure 3 for location names):

- Along the west coast of James Bay, only localized damage to vegetation was reported in salt marshes, with greater damage north of the Attawapiskat River.
- At Cape Henrietta Maria, severe damage to intertidal salt marshland from goose grubbing and grazing was observed as far south as Hook Point.
- Westward from Cape Henrietta Maria to the Sutton River, the coastal zone is dominated by degraded habitat caused by overabundant goose populations.
- Immediately west of the Sutton River, conditions were relatively intact, though in 1997 indications of increased grubbing activity were becoming apparent.
- In inland areas 8-10 km from the coast, moderate to heavy grazing of fresh-water *Carex aquatilis* sedge meadows was observed.
- On the Hudson Bay Coast west of the Sutton River to the Manitoba border, small salt marshes landward of coastal barrier beaches were heavily grazed and grubbed by Canada Geese (*Branta canadensis*) and Lesser Snow Geese. Small but dense colonies of Lesser Snow Geese were reported in the larger salt marshes east of the Winisk River, though the vegetation at the Pen Islands was reported to be in good condition in 1997.

Figure 3. Mapping showing geographical locations of referenced place names (Armstrong 2013).



Exclosure experiments in heavily degraded hypersaline (due to increased evaporation with reduced vegetative cover) sites showed that it takes at least 15 years for sward re-development to begin (Abraham and Jefferies 1997, Jefferies *et al.* 2003). Recovery of less damaged sites was rapid in the absence of geese, but unlikely in areas with continued presence of geese. New plant communities in degraded sites are unlikely to resemble original vegetation assemblages, especially because they will likely be missing seral stages (Abraham *et al.* 1998). Extensive grubbing by Snow Geese can

result in “near-irreversible changes in sediments of intertidal marshes”, including summer hypersalinity, sediment compaction and loss of soil nitrogen and organic matter (Abraham et al. 2005). With several years of use by high densities of nesting geese (>1000 nests/km²) intertidal and freshwater vegetation cannot be sustained (Abraham et al. 2005).

The Red-necked Phalarope nests in wetlands or vegetation near other sources of fresh water, selecting areas dominated by grasses, sedges, emergent aquatic vegetation and open water, and avoiding areas of bare ground and dense shrubbery (COSEWIC 2014). The COSEWIC threats classification table suggested that Snow Goose impacts (“problematic native species”) may be a low threat to the Red-necked Phalarope at the national level because “Snow Goose range overlaps only in a fraction of the breeding range“(COSEWIC 2014). However the impact may be much greater in Ontario where there is a high degree of overlap between goose and phalarope nesting habitat (Figure 4 and 5). Numbers of Snow Geese were very high in Ontario in the late 1990s, when densities at Cape Henrietta Maria were recorded to be 130 000 pairs with a density of 1155

Figure 4. Breeding distribution of Snow Goose (Bird Studies Canada 2015).

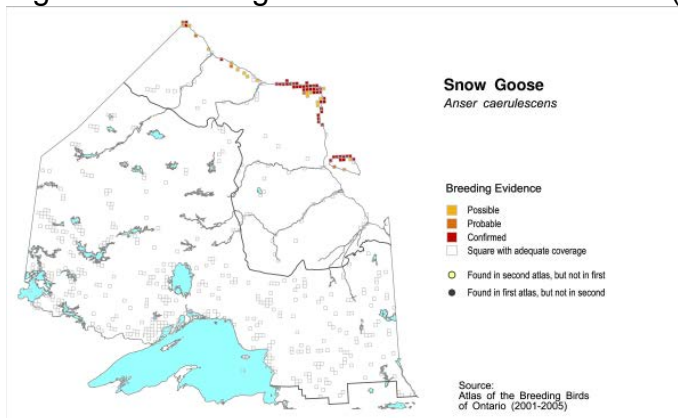
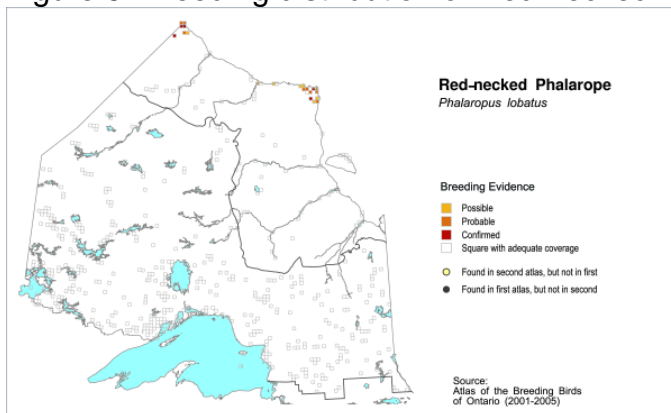


Figure 5. Breeding distribution of Red-necked Phalarope (Bird Studies Canada 2015).



adults/km². Density of adult Snow Geese at West Pen Island at this time was estimated to be 2302/km² (Abraham 2006). Peak numbers of nesting pairs of Snow Geese at Cape Henrietta Maria surpassed 180 000 pairs in the late 1990s and mid 2000s but

have since fallen to just over 100 000 pairs as of 2013 (R. Brook, personal communication). Gratto-Trevor (1994, from COSEWIC 2014) suggested that the direct impacts of habitat alteration from Snow Geese may have contributed to the declines in Red-necked Phalaropes nesting at La Perouse Bay, Manitoba. Snow Geese no longer nest in significant numbers at the La Perouse Bay colony due to habitat degradation (Abraham et al. 2005), and it is reasonable to infer that this habitat change may also have affected other species nesting in similar habitat. Recovery of vegetation in highly degraded areas with sustained foraging by Snow Geese is slow: Some highly degraded sites in La Perouse Bay, Manitoba had not recovered after 20 years (Jefferies et al. 2003). After 36 years of monitoring highly degraded sites affected by Snow Geese on Akimiski Island, Nunavut, vegetation showed very little recovery decades after the Snow Goose population had declined (Kotanen and Abraham 2013). The effects of such habitat degradation is associated with declines in breeding birds: nesting populations of Savannah Sparrow (*Passerculus sandwichensis*) declined by 77% over 25 years at one La Perouse Bay study site, accompanying a 63% loss in vegetative cover, and “similar declines of some shorebird species have occurred at these sites” (Abraham et al. 2005).

Red-necked Phalaropes are long distance migrants covering over 6 000 km between their breeding grounds in North America to their overwintering sites along the Pacific coastal areas from Mexico to Chile (COSEWIC 2014). Little is known about their migratory routes and staging areas though changes in prey availability and habitat quality related to climate change is a possible threat.

Although little industrial activity presently occurs near their northern breeding sites in Ontario, threats from industry may affect Red-necked Phalaropes from contaminants dispersed by air and water currents, as high levels of mercury, DDT and PCBs have been detected in other species of arctic shorebirds. Threats from oil spills, urban development and ingestion of plastics may affect Red-necked Phalaropes in their overwintering and migratory locations.

1.6. Specialized life history or habitat use characteristics

Male Red-necked Phalaropes provide all parental care for the eggs and young without the assistance of the female (Schamel et al. 2004). While the male searches for prey, the nest may be exposed to the elements for lengthy periods of time, making the eggs or chicks more vulnerable to extreme weather and predation. As with many shorebirds, the northern location for breeding limits the time available for re-nesting should the first clutch be unsuccessful.

2. Eligibility for Ontario status assessment

2.1. Eligibility conditions

2.1.1. Taxonomic distinctness

Yes. Red-necked Phalarope is recognized as a distinct species within the shorebird suborder Scolopaci (Gibson and Baker, 2012)

2.1.2. Designatable units

No. There is no evidence for more than one designatable unit in Ontario (COSEWIC 2014).

2.1.3. Native status

Yes. The first breeding record of Red-necked Phalaropes in Ontario was from 1947 at Little Cape, 80 km west of Cape Henrietta Maria (Hussell 1987). Presumably the species had been in the province long before then but was only recorded in the mid-20th century due to the remoteness of its breeding territory in Ontario.

2.1.4. Occurrence

Extant. Red-necked Phalaropes were reported in Ontario in 2005 as part of the surveying effort for the Atlas of the Breeding Birds of Ontario 2001-2005 (Bird Studies Canada et al. 2006).

2.2. ELIGIBILITY RESULTS

Red-necked Phalarope (*Phalaropus lobatus*) is eligible for status assessment in Ontario.

3. Ontario status assessment

3.1. Application of endangered/threatened status in Ontario

3.1.1. Criterion A – Decline in total number of mature individuals

Insufficient information. Population estimates and trend data for Ontario are unavailable, although Breeding Bird Atlas data suggest a decreasing range. While declines in breeding populations and migratory observations outside of Ontario are reported, the causes are not well understood and cannot be inferred to be occurring to the same extent in Ontario. Indications of decline in habitat quality were reported for Ontario (see Direct Threats). Significant habitat change is occurring as a result of extensive grazing from extremely abundant Snow Goose populations (Abraham et al. 2005). More research would help to ascertain the degree and causes of suspected decline.

3.1.2. Criterion B – Small distribution range and decline or fluctuation

Insufficient information. The population is fragmented into two discontinuous populations. Although the species was seen in more 10 x 10 km atlas squares in the second Breeding Bird Atlas than the first one (21 vs 18 respectively), its occurrence was more geographically concentrated (Figure 4) and the probability of observation declined by a non-significant 56% (Nol and Beveridge 2007) (Figure 6 and 7). Nol and Beveridge (2007) believed that the species was more widespread than indicated by atlas results. Other than the Atlas of the Breeding Birds of Ontario, indices of the distribution of Red-necked Phalarope are unavailable for Ontario. It is found in only two locations. Extent of occurrence based on the 2001-2005 Breeding Bird Atlas data is estimated to be greater than 20 000 km².

Figure 6. Breeding records from 1980 to 1984, showing 100 x 100 km² atlas blocks.

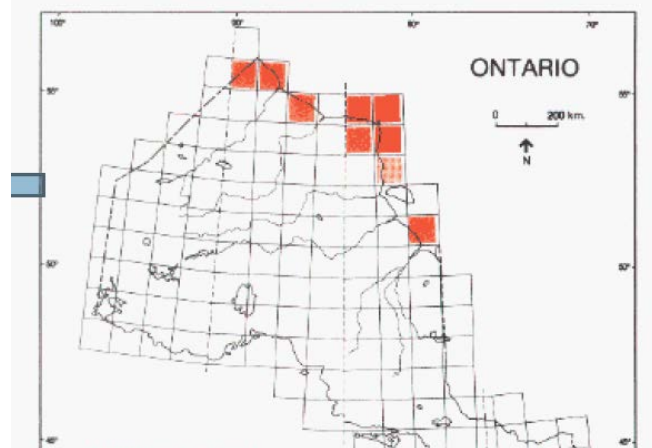
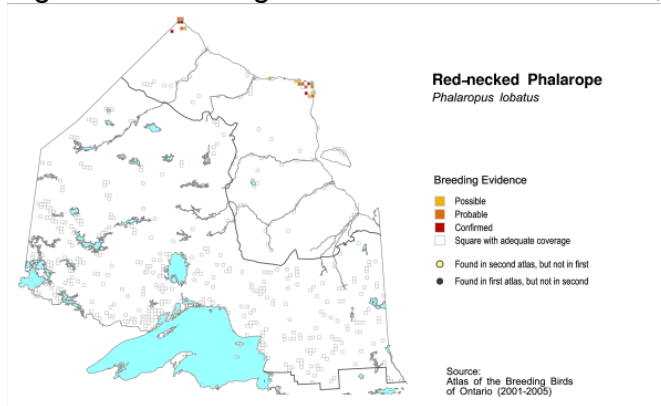


Figure 7. Breeding records from 2001 to 2005, showing 10 x 10 km² atlas squares.



3.1.3. Criterion C – Small and declining number of mature individuals

Insufficient information. Population estimates and trend data for this species in Ontario are unavailable. There has been a notable decline in the number of staging birds observed at the Bay of Fundy, which is “presumed to include individuals from the eastern Canadian Arctic” (COSEWIC 2014).

3.1.4. Criterion D – Very small or restricted total population

Insufficient information. Population estimates for this species are unavailable and area of occupancy likely exceeds the threshold for this criterion.

3.1.5. Criterion E – Quantitative analysis

Insufficient information. A quantitative analysis of the population has not been conducted.

3.2. Application of Special Concern in Ontario

Yes. Population has shown decreased geographical extent and a large (56%) but non-significant decline in the probability of observation between the two breeding bird atlases. Elsewhere in the Canadian range there has been a 40-year decline at a major migration staging area (COSEWIC 2014), and an estimated short-term decline of 10-30% globally (NatureServe 2015). The relationship between this staging area population and the larger national population is unknown although it is presumed to include birds from the eastern Canadian Arctic (COSEWIC 2014), but similar pressures and threats are likely acting upon it during the nonbreeding season. Decline in habitat quality due to high densities of Snow Geese has been reported in areas coinciding with the breeding range of Red-necked Phalaropes in Ontario. Although Snow Geese densities have decreased since their peak levels in 1997 (Abraham 2006), recovery of vegetation in areas with sustained foraging by Snow Geese is slow, with little recovery reported in highly degraded areas even after three decades (Kotanen and Abraham 2013).

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Does not apply. The global rank for this species is G4 and Ontario represents much less than 25% of the Red-necked Phalarope's breeding range.

3.3.2. Rescue effect

Red-necked Phalaropes do breed north, west and east of the Ontario range. However, the degree of breeding site fidelity for this species is variable, and rates are unknown for breeding sites in and near Ontario.

3.4. Other status categories

3.4.1. Data deficient

Does not apply. Red-necked Phalaropes are poorly monitored due to the remoteness of their breeding habitats. Data on the Red-necked Phalarope in Ontario are severely lacking. Some systematic data for the species is available in the Atlas of the Breeding Birds of Ontario, in which survey coverage for the far north of the province is sparse. Declines in Red-necked Phalarope numbers are reported for other jurisdictions in Canada. While the causes of the declines are not well understood, habitat degradation due to Snow Geese has been reported for areas of the province where Red-necked Phalaropes breed. Sufficient evidence exists that the effects of high densities of Snow Geese (recorded over 1000 pairs/km²) in the late 1990s likely have long-term impacts on habitat quality for the Red-necked Phalaropes in Ontario.

3.4.2. Extinct or extirpated

Does not apply. Red-necked Phalaropes were reported in 2005 for the Atlas of the Breeding Birds of Ontario (Bird Studies Canada *et al.*, 2006).

3.4.3. Not at risk

Does not apply.

4. Summary of Ontario status

Red-necked Phalarope (*Phalaropus lobatus*) is classified as Special Concern in Ontario.

5. Information sources

Abraham, K., L. Jefferies, K. Ross, and O. Leafloor. 1998. Snow geese in Polar Bear Provincial Park: Implications of a trophic cascade. Proceedings of the Parks Research Forum for Ontario (K. VanOsch ed.), pp. 153-160. Ontario Parks, Peterborough, Ontario.

Abraham, K.F., R.L. Jefferies and R.T. Alisauskas. 2005. The dynamics of landscape change and snow geese in mid-continent North America. *Global Change Biology* 11 (6): 841-855

Armstrong, T. (E.R.) 2013. Management Plan for the Beluga (*Delphinapterus leucas*) in Ontario. Ontario Management Plan Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough ON. vi + 58 p.

[Bird Studies Canada](#). 2015. Atlas of the breeding birds of Ontario. Second atlas (2001-2005), bird maps. Accessed on May 20 2015.

[Bird Studies Canada](#), Environment Canada's Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists and Ontario Ministry of Natural Resources. 2006. Ontario Breeding Bird Atlas, [website accessed May 17, 2015].

[BirdLife International 2012](#). *Phalaropus lobatus*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. [website accessed on 12 May 2015].

BirdLife International and NatureServe 2014. Bird Species Distribution Maps of the World. 2012. *Phalaropus lobatus*. The IUCN Red List of Threatened Species. Version 2014.3

[COSEWIC](#). 2014. In Press. COSEWIC assessment and status report on the Red-necked Phalarope *Phalaropus lobatus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 52 pp.

Hussell, D.J.T. 1987. Red-necked Phalarope. In Cadman, M.D., P.F.J. Eagles, and F.M. Helleiner (Eds) Atlas of the breeding birds of Ontario. University of Waterloo Press, Waterloo, ON.

Gibson, R. and A. Baker. 2012. Multiple gene sequences resolve phylogenetic relationships in the shorebird suborder Scolopaci (Aves: Charadriiformes). *Molecular Phylogenetics and Evolution* 64:66-72.

Gratto-Trevor, C.L. 1994a. Monitoring shorebird populations in the Arctic. *Bird Trends* 3:10-12. Canadian Wildlife Service, Ottawa ON.

Gratto-Trevor, C.L. 1997. Climate change: proposed effects on shorebird habitat, prey and numbers in the outer Mackenzie Delta. *In* Mackenzie Basin Impact Final Report, S.J. Cohen (ed.). Environment Canada, Downsview, Canada.

Kotanen, P.M. and K. F. Abraham (2013). Decadal changes in vegetation of a subarctic salt marsh used by lesser snow and Canada geese. *Plant Ecology* 214:409-422.

Nol, E. and B. Beveridge. 2007. Red-necked Phalarope. Pp 254-255 *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.

[NatureServe 2015](#). Red-necked Phalarope. *Phalaropus lobatus*. NatureServe Explorer. [website accessed on May 20 2015].

Schamel, D., D. M. Tracy, D. B. Lank, and D. F. Westneat. 2004. Mate guarding, copulation strategies and paternity in the sex-role reversed, socially polyandrous red-necked phalarope *Phalaropus lobatus*. Behavioral Ecology and Sociobiology. 57(2): 110-118.

Walpole, B., E. Nol, and V. Johnston. 2008. Breeding habitat preference and nest success of Red-necked Phalaropes on Niglintgak Island. Canadian Journal of Zoology 86:1346-1357.

Appendix 1: Technical summary for Ontario

Species: Red-necked Phalarope (*Phalaropus lobatus*)

Demographic information

Demographic attribute	Value
Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.	4 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Unknown
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Unknown
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over any 10 years, or 3 generations, over a time period including both the past and the future.	Unknown
Are the causes of the decline a. clearly reversible and b. understood and c. ceased?	a. Unknown b. No c. Unknown
Are there extreme fluctuations in number of mature individuals?	Unknown

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence.	Approx. 31,200 km ²
Index of area of occupancy (IAO).	Found in 21 of the 10 x 10 km Breeding Bird Atlas squares: estimated IAO = 2100 km ²
Is the total population severely fragmented? (i.e. is >50% of its total area of occupancy is in habitat patches that are (a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?)	a. Unknown b. No Ontario's population does occur in two discontinuous areas adjacent to eastern and western Hudson Bay

Number of locations (<i>as defined by COSEWIC</i>).	One or two: One, considering both sub-populations in Ontario would be equally threatened by climate change; two, if threats by habitat alteration from snow geese affect each sub-population to different degrees.
Number of NHIC Element Occurrences	Two
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes – the occurrence in the second Breeding Bird Atlas is more geographically concentrated than the first atlas
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Unknown
Is there an observed, inferred, or projected continuing decline in number of populations?	Unknown
Is there an observed, inferred, or projected continuing decline in number of locations?	Unknown
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes. Decline in quality of habitat was reported due to foraging activity of snow geese. The effects are expected to persist over 15 years, especially with continued use by snow geese.
Are there extreme fluctuations in number of populations?	Unknown, but not likely.
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	Unknown
Are there extreme fluctuations in index of area of occupancy?	Unknown

Number of mature individuals in each sub-population or total population (if known)

Unknown.

Quantitative analysis (populations viability analysis conducted)

Probability of extinction in the wild is unknown.

Rescue effect

Rescue effect attribute	Likelihood
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Probably
Would immigrants be adapted to survive in Ontario?	Probably
Is there sufficient suitable habitat for immigrants in Ontario?	Unknown. Long term effects of habitat degradation from snow geese foraging are expected.
Is the species of conservation concern in bordering jurisdictions?	Yes
Is rescue from outside populations reliant upon continued intensive recovery efforts?	Unknown

Appendix 2: Adjoining jurisdiction status rank and decline

Information regarding status rank and decline for Red-necked Phalarope

Jurisdiction	Subnational rank	Population trend	Sources
Ontario	S3S4B	n/a	NatureServe (2015)
Quebec	S4B, S3M	n/a	NatureServe (2015)
Manitoba	S4B	n/a	NatureServe (2015)
Michigan	SNRN	n/a	NatureServe (2015)
Minnesota	SNRM	n/a	NatureServe (2015)
Nunavut	SNRB	n/a	NatureServe (2015)
New York	SNRN	n/a	NatureServe (2015)
Ohio	SNA	n/a	NatureServe (2015)
Pennsylvania	SNA	n/a	NatureServe (2015)
Wisconsin	SNA	n/a	NatureServe (2015)

Acronyms:

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

COSSARO: Committee on the Status of Species at Risk in Ontario

EO: Element occurrences

ESA: Endangered Species Act

GRANK: global conservation status assessments

IAO: index of area of occupancy

MNRF: Ministry of Natural Resources and Forestry

NHIC: Natural Heritage Information Centre

NNR: Unranked

NRANK: National conservation status assessment

NS: no significance between populations pre and post WNS detected

PVA: Population viability analysis

SARA: Species at Risk Act

SNA: Not applicable

SNR: unranked

SRANK: subnational conservation status assessment

S3: Vulnerable

S4: Apparently secure

B: Breeding

M: Migrant

N: Nonbreeding