Ontario Species at Risk Evaluation Report for Gray Fox (*Urocyon cinereoargenteus*)

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

Assessed by COSSARO as Threatened

June 2016

Final

Renard gris (*Urocyon cinereoargenteus*)

Le renard gris est au Canada depuis des siècles. On le croyait vagabond ou présent de façon isolée, mais ses populations ont migré des États-Unis vers le Nord du Canada, ce qui semble contribuer à son maintient. De récentes données indiquent que deux populations se reproduiraient au Canada, soit à l'île Pelée et dans le Nord-Ouest de l'Ontario (Thunder Bay – rivière à la Pluie), et quelques spécimens ont été observés dans certaines parties du Sud de l'Ontario. La taille de la population du renard gris en Ontario serait bien en deçà de 250 adultes, ce qui lui vaut son statut d'espèce menacée. Les données ne permettent pas de déterminer si la population est en baisse dans la province. Le renard gris est très vulnérable à la prédation des coyotes, particulièrement là où la population de ces derniers est importante. Les populations des États-Unis sont généralement saines et stables, voire en hausse, sauf en Ohio, où elles semblent décliner. L'espèce est visée par la chasse dans tous les États américains adjacents. Le renard gris répond aux critères du CDSEPO d'une espèce en voie de disparition – notamment la très petite taille de sa population (D1) –, mais il est tout de même considéré comme une espèce menacée vu la possibilité de l'incidence salvatrice des populations saines et stables des États américains adjacents.

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Executive summary

Gray Fox (formerly referred to as Grey Fox on the SARO List) have been in Canada for at least several centuries. Although once thought to be vagrant or occasional, they are expanding into Canada northwards from the United States and appear to be sustained by immigration from the US. Two populations have recent evidence of breeding in Canada - Pelee Island and northwestern Ontario (Thunder Bay – Rainy River), with sightings of the species in other parts of southern Ontario. The estimated population size of Gray Fox in Ontario is much less than 250 mature individuals, which qualifies the species as Endangered. There is insufficient information to determine whether the species is declining in Ontario. Gray Fox are very vulnerable to Coyote predation, especially where Coyotes densities are high. Adjacent populations in the United States are generally healthy and stable or increasing, except for Ohio where the population appears to be declining. The species is harvested in all adjacent American jurisdictions. Gray Fox meets the COSSARO criterion for Endangered, based upon the very small population size (D1), but is designated as Threatened due to the plausible and very likely rescue effect from healthy and stable populations in the adjacent American jurisdictions.

1. Background information

1.1. Current designations

- GRANK: G5 (NatureServe 2016)
- NRANK Canada: N1 (NatureServe 2016)
- COSEWIC: Threatened. Met criterion for Endangered, D1, but designated Threatened, D1, due to rescue effect . (COSEWIC 2016)
- SARA: Threatened (Schedule 1) (SARA 2016)
- ESA 2007: Threatened. The Gray Fox was already designated as Threatened when the Endangered Species Act took effect in 2008. (OMNRF 2015)
- SRANK: S1

1.2. Distribution in Ontario

While not common anywhere in Ontario, the Gray Fox is occasionally found in four areas of Ontario:

- northwestern Ontario, west of Lake Superior from Thunder Bay west to Rainy River;
- Pelee Island;
- the north shore of Lake Erie from Windsor to Niagara Falls; and
- the northeastern shore of Lake Ontario and the St. Lawrence River (COSEWIC 2016) (Figure 1).

Sightings appear to have increased in northwestern Ontario since 2006, with evidence of breeding as recently as 2015 (COSEWIC 2016). Breeding has also been confirmed on Pelee Island as recently as 2012, with fox presence documented in 2013 (COSEWIC 2016). While over 40 sightings have been confirmed in southwestern Ontario, along the north shore of Lake Erie, there have been no sightings in that area since 2002 (COSEWIC 2016). Gray Fox have been confirmed in southeastern Ontario along the north shore of Lake Ontario and the St. Lawrence River as recently as 2014 (COSEWIC 2016). There are currently considered to be only two breeding subpopulations.

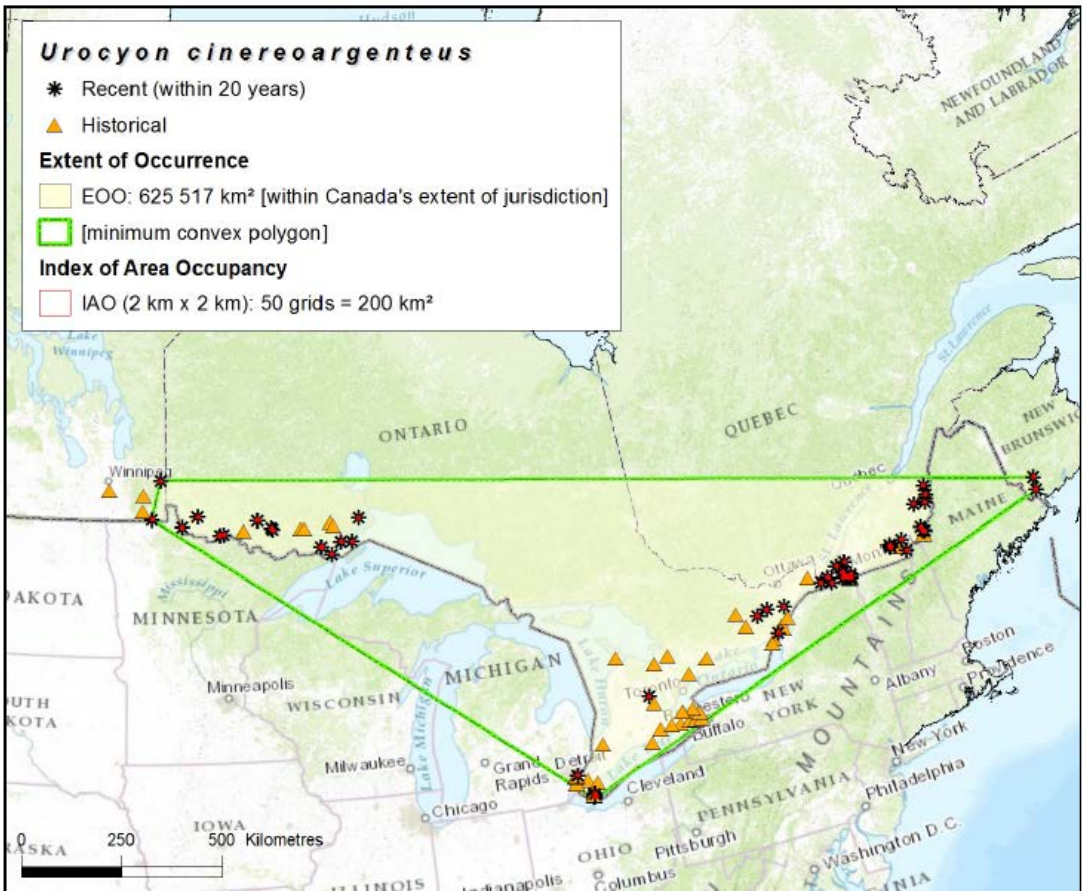
1.3. Distribution and status outside Ontario

Although the Gray Fox is occasionally found elsewhere in Canada (Alberta, Manitoba, Quebec, New Brunswick), confirmed breeding populations are limited to Ontario (COSEWIC 2016).For the Canadian population, NatureServe (2016) has provided an S-rank only for Ontario. South of Canada, the species has a wide distribution from the Atlantic to the Pacific (excluding the northwest and Great Plains of the USA), and southward through Mexico and Central America to northern Columbia and Venezuela (COSEWIC 2016).

1.4. Ontario conservation responsibility

Ontario has an extremely small percentage of the global range, and an even smaller percentage of the global population.

Figure 1. Extent of occurrence and recent record of Gray Fox in Ontario and adjacent provinces. Source: COSEWIC 2016 (reproduced with permission).



1.5. Direct threats

A COSEWIC Threats Calculator exercise concluded that hunting and trapping were high threats, and that other threats were residential and commercial development, roads and invasive non-native diseases (COSEWIC 2016).

Hunting and trapping are considered a high threat to the Gray Fox. Although not intentionally trapped in Ontario, there are records of Gray Fox being caught incidentally by trapping (COSEWIC 2016; OMNRF data - observations from the provincial records in Land Information Ontario (LIO), i.e. the Species Observation Provincially Tracked Data Class). While Gray Fox have the ability to sustain high harvest pressure in the core range, "incidental capture on the low density populations in Canada likely is limiting the establishment of Gray Fox populations in parts of Canada" (COSEWIC 2016). A bounty apparently existed on Gray Fox on Pelee Island until the 1980s (COSEWIC 2016). The species is legally trapped and/or hunted in all US jurisdictions adjacent to Ontario.

Urbanization was cited as a threat to Gray Fox in California, but does not appear to represent an equivalent level of threat in Ontario (COSEWIC 2016).

Mortality from vehicles is a possible threat (COSEWIC 2016). Gray Fox are susceptible

to roadkill mortality due to their large home range size, large dispersal distances and association with rural landscapes (COSEWIC 2011). Vehicle collisions accounted for almost 50% of the mortality of radio-collared Gray Fox in Louisiana (n=17) (COSEWIC 2016). There are at least three reports of Gray Fox roadkill mortality from eastern Ontario, and roadkill mortality represented 12% of the 42 Gray Fox observations recorded from the Pelee Island and northwestern Ontario breeding subpopulations (COSEWIC 2016).

Diseases such as canine distemper and rabies are fatal to Gray Fox elsewhere in their range, and there have been at least two recorded cases of rabies in Gray Fox in Ontario (COSEWIC 2016). COSEWIC (2016) considered that they could represent significant limiting factors during an epizootic situation.

Coyotes (*Canis latrans*) prey upon Gray Fox. Over 50% of radio-tagged Gray Foxes in California were killed by Coyotes. Small populations of Gray Fox may be particularly susceptible to Coyote predation.

1.6. Specialized life history or habitat use characteristics

The Gray Fox does not have any highly specialized life history characteristics or habitat requirements that make it particularly vulnerable to becoming more at risk.

2. Eligibility for Ontario status assessment

2.1. Eligibility conditions

2.1.1. Taxonomic distinctness

Yes. A distinct species. Former subspecific designations based upon morphological characteristics do not appear to be supported by more recent genetic analyses (Bozarth *et al.* 2011). While *Urocyon cinereoargenteus* is generally accepted as the appropriate scientific designation for this distinct species, NatureServe (2016) noted that it has been placed in the genus *Canis* or *Vulpes* by some authors, and *U. cinereoargenteus* and *U. littoralis* have been regarded by some authors as conspecifics.

OMNRF (2015) has previously referred to this species by the common name Grey Fox on the Species at Risk List and related information sources, while COSEWIC (2016), NatureServe (2016) and most authors refer to it as Gray Fox. COSEWIC changed the name from Grey Fox to Gray Fox in 2015.

2.1.2. Designatable units

One designatable unit is identified. The northwestern and southwestern Ontario subpopulations were originally considered to be two separate subspecies. Genetic analysis has found genetic differentiation between the Gray Fox in the northeastern USA and those in the southern USA, which did not coincide with previously proposed subspecific divisions (Bozarth *et al.* 2011, COSEWIC 2016). No genetic analyses have

examined the Canadian subpopulations. It is now assumed that both Ontario subpopulations likely originated from the same glacial refugium (COSEWIC 2016).

2.1.3.Native status

Yes. Has been resident in Ontario for several centuries. Archaeological remains of Gray Fox from aboriginal middens in Oxford, Middlesex, and Elgin counties have been dated at circa 350 years ago (Wintemburg 1921, Downing 1946). It was possibly extirpated from the province between ca. 1650 and the late 1930s or early 1940s (Zammit and Sutherland 2002). The first museum voucher specimen (ROM15707) was collected in 1942 (Zammit and Sutherland 2002). Breeding was first confirmed in 1952 in Kemptville District (MNR), where one or two Gray Fox were shot every year in the southern parts of Leeds & Grenville, and Stormont, Dundas & Glengarry counties (Peterson et al. 1953, Zammit and Sutherland 2002). Most records appear to have been obtained since the 1970's (Dobbyn 1994, OMNRF data). There has been some debate or whether Gray Fox is resident or a vagrant in Ontario and Canada. While most of the Canadian population is considered nonbreeding, confirmed breeding in at least two subpopulations in Ontario (e.g. Figure 2) warrant its consideration as a native species eligible for assessment (COSEWIC 2016).

Figure 2. Photo of a lactating female Gray Fox, Thunder Bay District, in 2015 (Foster 2015).

Photo by Paul Higgins

2.1.4.Occurrence

Extant. Breeding occurrences documented as recently as 2015.

2.2. Eligibility results

Gray Fox (*Urocyon cinereoargenteus*) 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

Does not apply. No evidence is available to suggest recent declines.

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

Does not apply. Area of Occupancy (AOO) is 96 km^2, much less than the 500 km^2 threshold, and there are only two known breeding locations (i.e. subpopulations) in Ontario. However this criterion does not apply as there are no projected declines in either population or habitat,

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

Does not apply. Number of mature individuals unknown but almost certainly less than 250; however, there is no indication of continuing decline.

3.1.4. Criterion D – Very small or restricted total population

Endangered. D1. Estimated to be fewer than 110 mature individuals across Canada (COSEWIC 2016).

3.1.5. Criterion E – Quantitative analysis

Insufficient Information. PVA has not been completed**.**

3.2. Application of Special Concern in Ontario

Does not apply.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

NA. The species is ranked globally as G5, and Ontario represents an extremely small percentage of the global population and range (much less than the 25% criteria cutoff).

3.3.2. Rescue effect

Highly likely. The Gray Fox population in Ontario is largely reliant upon the adjacent and much larger US population. It is unlikely that Ontario's population could be sustained in isolation. It appears that the relatively recent presence of Gray Fox in Ontario after an

estimated 350 year absence is entirely due to immigration from the United States (COSEWIC 2016). Rescue effect from the US is certainly plausible and highly likely, given the species' generally healthy status population in most states. They are increasing in Minnesota directly adjacent to northwestern Ontario (COSEWIC 2016; MNDNR 2016). Ohio, where the population is declining, is the closest jurisdiction to Pelee Island; although the source of immigrants to Pelee island is unknown, they could potentially also arrive from New York and Pennsylvania where populations are considered to be stable (COSEWIC 2016, ODNR 2015).

3.4. Other status categories

3.4.1. Data deficient

Not applicable.

3.4.2. Extinct or extirpated

Not applicable.

3.4.3. Not at Risk

Not applicable.

4. Summary of Ontario status

Gray Fox (*Urocyon cinereoargenteus*) meets the criteria for Endangered in Ontario based on criterion D1 (very small population). Rescue effect is highly likely and has been applied as a modifier to support the designation of the species as Threatened in Ontario.

5. Information sources

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Appendix 1: Technical Summary for Ontario

Species: Gray Fox (Urocyon cinereoargenteus)

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.	Two years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Unlikely
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. NA b. NA c. NA
Are there extreme fluctuations in number of mature individuals?	Unknown but unlikely

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence.	35,173 km^2 based upon recent records (past 20 years) for two Ontario breeding subpopulations (COSEWIC 2016). Estimated EOO of approximately 600,000 km^2 for all areas with recent records (<20 years) of animals that have dispersed into Ontario but including areas where they are likely not breeding (estimated from Google MyMaps for Ontario records shown in COSEWIC [2016]).

Area of occupancy (AOO).	96 km^2 based upon recent records (past 20 years) for two Ontario breeding subpopulations (COSEWIC 2016)
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. No b. No
Number of locations	Two (According to COSEWIC (2016):
Number of NHIC Element Occurrences	Two (representing the two recent confirmed breeding records at Pelee Island and Thunder Bay; a number of NHIC occurrences have not yet been linked to an EO or are not yet in the provincial record)
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?	No
Is there an observed, inferred, or projected continuing decline in number of locations?	No
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?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No. Gradual increase in recent years.
Are there extreme fluctuations in index of area of occupancy?	No

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

Sub-Population (or Total Population)	N of Mature Individuals
Total population	Unknown, although the population across Canada is estimated to be less than 110 (COSEWIC 2016) and almost certainly less than 250.
Northwestern Ontario subpopulation	Unknown
Pelee Island	Unknown

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is at least NA, PVA has not been conducted.

Rescue effect

Rescue effect attribute	Likelihood
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Yes.
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Unknown but likely. It is not known to what extent the highly fragmented, largely open agricultural landscape is a factor limiting the expansion of Gray Fox in southern Ontario (Zammit and Sutherland 2002)
Is the species of conservation concern in bordering jurisdictions?	US populations increasing or stable in most adjacent states, except for the Ohio population near Pelee Island which is declining (COSEWIC 2016)
Is rescue from outside populations reliant upon continued intensive recovery efforts?	No

2. Appendix 2: Adjoining jurisdiction status rank and decline

Information regarding rank and decline for Gray Fox

Jurisdiction	Subnational rank	Population trend & related information	Sources
Ontario	S1	Stable	n/a
Quebec	NA	Extralimital/vagrants	COSEWIC (2016)
Manitoba	NA	Extralimital/vagrants	COSEWIC (2016)
Michigan	S4	Harvested species, no kill limit. An estimated 750 harvested in 2010	COSEWIC (2016); MIDNR (2015)
Minnesota	SNR	Increasing and expanding range. Harvested species, a "few thousand" harvested annually	COSEWIC (2016); MNDNR (2016)
Nunavut	NA	Not present	n/a
New York	S5	Harvested species, no kill limit	COSEWIC (2016)
Ohio	SNR	Declining – 24-year decline in relative abundance (foxes seen/1000 hours) Harvested species	COSEWIC (2016); Ohio DNR (2015)
Pennsylvania	S5	Furbearer with open season, with an estimated 13,793-23,275 harvested annually in 2000s	COSEWIC (2016); Johnson and Boyd (2013)
Wisconsin	S4S5	More common in southern Wisconsin; harvested species, no kill limit	COSEWIC (2016); Wisconsin DNR (2015); Kitchell (2014)

Acronyms:
AOO: area of occupancy
COSEWIC: Committee on the Status of Endangered Wildlife in Canada
COSSARO: Committee on the Status of Species at Risk in Ontario
EOO: extend of occurrence
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
SARA: Species at Risk Act

SNR: unranked
SRANK: subnational conservation status assessment
S1: critically imperiled
S4: Apparently secure
S5: Secure