COSEWIC
Rapid Review of Classification

on the

Roseate Tern
Sterna dougallii

in Canada

ENDANGERED
2023

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

The Rapid Review of Classification process is used by COSEWIC for wildlife species that have not changed status since the previous COSEWIC assessment. Readily available information from the previous status report or status appraisal summary, recovery documents, recovery teams, jurisdictions, conservation data centres, and species experts was initially reviewed by the relevant Species Specialist Subcommittees before being reviewed by COSEWIC. The following is a summary of the relevant information.

COSEWIC Rapid Review of Classification are working documents used in assigning the status of wildlife species suspected of being at risk in Canada. This document may be cited as follows:

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COSEWIC
Assessment Summary

Assessment Summary – May 2023

Common name
Roseate Tern

Scientific name
Sterna dougallii

Status
Endangered

Reason for designation
This globally-distributed colonial seabird breeds on small coastal islands from eastern Nova Scotia to Long Island, New York, and winters from Colombia to eastern Brazil. Regular breeding in Canada is now confined to 2-8 colonies in Nova Scotia, although individuals of this species, and its hybrids with other tern species, are occasionally present in other tern colonies. The Canadian breeding population is about 106-146 mature individuals. Both the number of adult birds breeding in Canada and the range in Canada have declined by about 64% over the past 3 generations (1995-2019). The main factors limiting population recovery are predation, low post-fledging survival rates, habitat degradation, and impacts of stochastic weather events such as hurricanes.

Occurrence
Nova Scotia, New Brunswick, Quebec, Atlantic Ocean

Status history
Designated Threatened in April 1986. Status re-examined and designated Endangered in April 1999. Status re-examined and confirmed in October 1999, April 2009, and May 2023.

COSEWIC
Rapid Review of Classification

Assessment Summary

English name
Roseate Tern

French name
Sterne de Dougall

Scientific name
Sterna dougallii

Status
Endangered

Reasons for designation (COSEWIC 2009)

In Canada, this colonial species is part of the northeastern population that breeds on small islands off the Atlantic coast from the Magdalen Islands in the Gulf of St. Lawrence south to Long Island, New York. It winters in South America, from Colombia to eastern Brazil. The most recent (2007) population estimate for Canada was 200 mature individuals occupying 7 locations (approximately 98% are in only 2 locations). The number of mature birds has been fairly stable over the past decade despite recovery efforts. Rescue through immigration of birds from the United States is unlikely since the species is endangered in New England and the population there is also small (circa 7600 mature individuals in 2007). The primary factors limiting the population are predation of eggs, young and adults, low adult survival rates, and stochastic events (e.g. hurricanes).

PREFACE

Since the status of the Roseate Tern in Canada was last assessed by COSEWIC (2009), annual breeding surveys in Canada have documented continuing declines in abundance and habitat (Gochfeld and Burger 2020; McKnight pers. comm. 2021). One pair was present in the Magdalen Islands, Quebec, in each of 2009, 2010, 2013, and 2017 (McKnight pers. comm. 2021), although breeding of pure Roseate Terns has not been confirmed there since 2001 (Gochfeld and Burger 2010).

Four apparent Roseate Terns were observed nesting in the Magdalen Islands in 2022, each paired with a Common Tern (*S. hirundo*; Rail pers. comm. 2023). However, examination of photographs of these four birds by Canadian Wildlife Service biologist J-F. Rail and tern expert I.C.T. Nisbet indicates that all four were hybrid Roseate x Common Terns (Nisbet pers. comm. 2022; Rail pers. comm. 2023). Similar mixed pairs and hybrids between Roseate and Common Terns have been reported from many North American and European colonies (Gochfeld and Burger 2020). Recognizable hybrids comprise up to 0.2% of breeding birds in the Northeastern United States, and occur disproportionately frequently in small or peripheral colonies, such as those in Canada (Gochfeld and Burger 2020; Nisbet pers. comm. 2022). These hybrid individuals are not considered here as Roseate Terns, as they cannot contribute to maintaining the Canadian Roseate Tern population, and Quebec is not included in the current breeding range of this species in Canada.

Breeding has not been confirmed in New Brunswick since 2004 (COSEWIC 2009). Only three tern colonies in Canada are now consistently occupied by Roseate Tern: North Brother, Country, and Sable Islands, all in Nova Scotia. A few other sites in Nova Scotia have been occupied during the breeding season in some recent years by very small numbers, usually 1-2 pairs, but with little evidence of breeding (McKnight pers. comm. 2022; Figure 1). Recent surveys have documented a range of 53-73 breeding pairs (106-146 mature individuals), with 68 pairs present in 2019 (McKnight pers. comm. 2021). Note that observations and counts at Canadian colonies in 2020, 2021, and 2022 were incomplete due to COVID-related restrictions on field activities. With the apparent loss of the Magdalen Islands as a breeding colony since the last assessment, the extent of occurrence, which was estimated as 98,707 km^2 by COSEWIC (2009), has declined to about 36,000 km^2 (McKnight pers. comm. 2021).

A Roseate Tern Recovery Strategy has been completed (Environment Canada 2010), and research has addressed some knowledge gaps relevant to the assessment, notably limiting factors, threats, and movements among colonies (Knutson 2021; McKnight pers. comm. 2021; Pratte *et al.* 2021). No formal threat assessment exists for the Canadian Roseate Tern population, although one was undertaken for the western Atlantic (= eastern North American) population as a whole, by tern conservation managers from Canada, the United States, and Brazil, in October 2019 (McKnight pers. comm. 2021).

Recent studies show that Roseate Tern is more of a specialist as it forages on sand lance (*Ammodytes* spp.) to a greater extent than previously thought, highlighting the importance of threats related to foraging habitat or competition for this food source (Staudinger *et al.* 2020). Predation of eggs, young, and adult Roseate Terns by Herring (*Larus argentatus*) and Great Black-backed (*L. marinus*) Gulls, Red Fox (*Vulpes vulpes*) and American Mink (*Neovison vison*) is still the main threat at Canadian colonies. Although declining regionally, gull numbers near tern colonies remain high due to human-subsidized food sources (fisheries and garbage), with Country Island and The Brothers requiring active predator management in order to persist (McKnight pers. comm. 2021). Mink that have been released or escaped from commercial farms periodically kill large numbers of terns, including Roseate Terns, at colonies in Nova Scotia (COSEWIC 2009).

Additional potential threats during the breeding season include dredging and wharf construction near one of only two known foraging sites near North Brother Island, Nova Scotia, and a proposal to construct an aquaculture facility within one kilometre of that colony. This island, which hosts the most consistently occupied colony in Canada, with up to 75% of the Canadian population in many years, is also eroding rapidly (McKnight pers. comm. 2021). Newly identified winter threats that have resulted in mortality include collisions with transmission lines and a recent oil spill in coastal Brazil, where both Canadian and US Roseate Terns overwinter (USFWS in prep.). The overall impact of all threats is considered to be Very High – Medium (McKnight pers. comm. 2021).

New information is available with respect to the potential for rescue. Banding studies and genetic research have continued to document significant inter-colony movements, including those between US and Canadian colonies (USFWS in prep.). Dayton and Szczys (2021) found only small genetic differences between cold-water colonies in Atlantic Canada and warmer water colonies in the northeastern United States. Metapopulation modelling which accounts for partitioning of the Roseate Tern population into colonies, with some movement of birds among them, suggests that large colonies are critical for population survival (Garcia-Quismondo *et al.* 2018). Smaller colonies, such as those in Canada, are also important to persistence, as they maintain a range of genetic diversity and spread the risk from threats over more sites (Garcia-Quismondo *et al.* 2018).

Current Status

- Endangered D1 (April 2009).

Updated Map

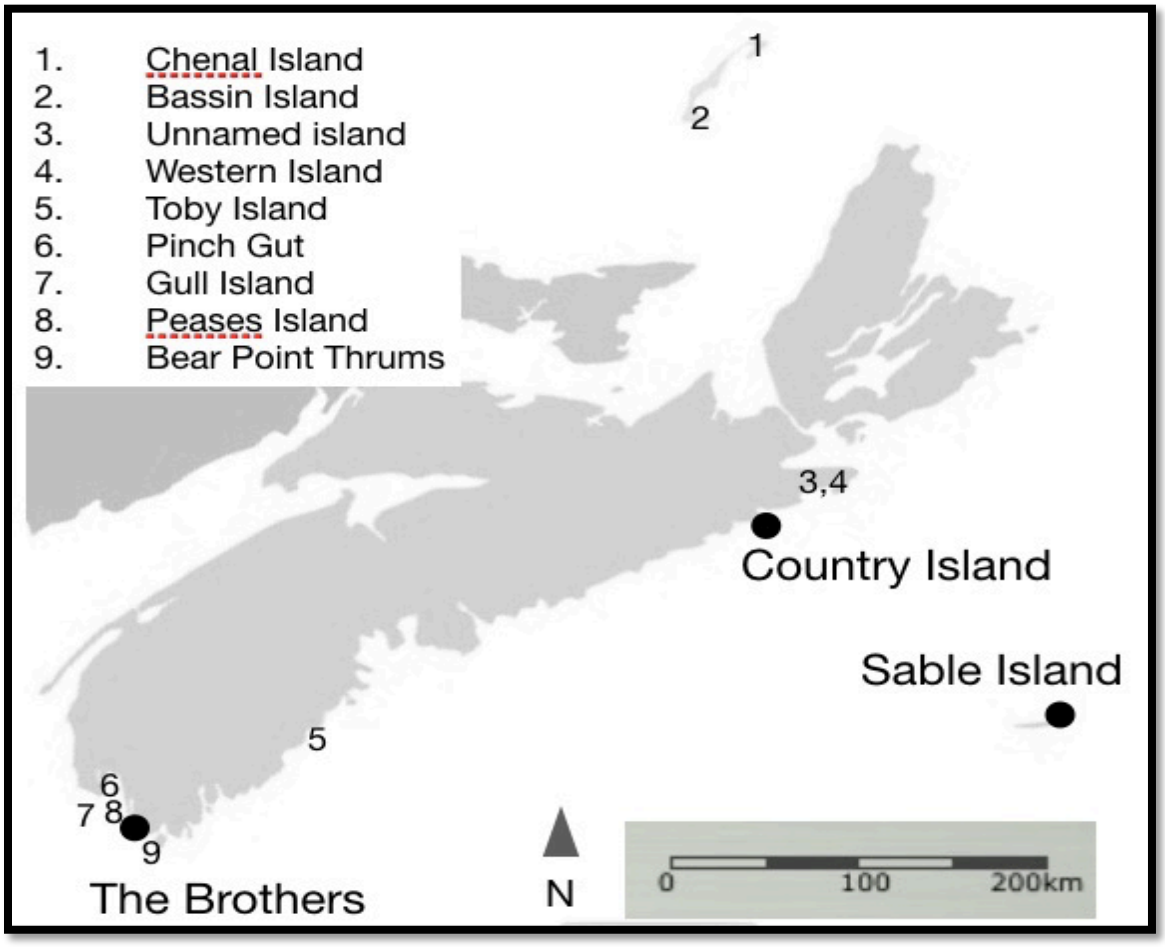

Figure 1. Sites occupied by the Roseate Tern (*Sterna dougalli*) during breeding seasons 2010-2019, showing the three colonies that were active for all (Country Island and The Brothers) or most of those years (8 years for Sable Island) with filled circles and labels. Other sites where pairs were present during the breeding season are numbered, and were occupied in three (Chenal and Toby Islands), two (Gull Island), or one (Unnamed Island, Western Island, Pinch Gut, Peases Island, and Bear Point Thrums) of those years. Note that breeding was not confirmed at these sites. Most notably, breeding has not been confirmed in Quebec (Chenal and Bassin Islands in the Magdalen Islands) since 2001 (Gochfeld and Burger 2020). The maximum number of sites occupied in any given year since 2009 is eight. Updated information provided by McKnight (pers. comm. 2021).

TECHNICAL SUMMARY

Sterna dougallii

Roseate Tern

Sterne de Dougall

Range of occurrence in Canada (province/territory/ocean): Nova Scotia, New Brunswick, Quebec, Atlantic Ocean

Demographic Information

Generation time (usually average age of parents in the population)	Approximately 8.4 years	Based on IUCN estimate (Bird *et al.* 2020).
Is there an observed continuing decline in number of mature individuals?	Yes	Observed decline in number of breeding adults at known colonies (McKnight pers. comm. 2021).
Estimated percent of continuing decline in total number of mature individuals within 2 generations.	45% decline (95% CI = -59%, -30%)	Estimated based on 3-generation trend, applied to 2 generations (17 years)
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations, whichever is longer up to a maximum of 100 years].	64% decline (95% CI = -84%, -44%) over about 3 generations (1995-2019)	Observed based on number of pairs counted in known colonies over 24 years (rather than 25 years or 3 generations), as the 1994 survey was incomplete (McKnight pers. comm. 2021).
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations, whichever is longer up to a maximum of 100 years].	About 45% reduction (range: -16% to -75%)	Inferred based on trend over past three generations, and Very High – Medium projected threat impact.
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any period [10 years, or 3 generations, whichever is longer up to a maximum of 100 years], including both the past and the future.	About 50% reduction (range: -16% to -84%)	Inferred, using average of extreme estimates from trend over past three generations (minimum CI, Box 4) and Very High – Medium projected threat impact (maximum of range, Box 5).
Are the causes of the decline clearly understood?	Yes	Primarily caused by increased predation of eggs, nestlings, and nesting adults, and low post-fledgling survival (COSEWIC 2009; Environment Canada 2010).
Have the causes of the decline ceased?	No	Predation continues at all known colonies despite predator control programs; post-fledgling phase is not well-monitored (McKnight pers. comm. 2021).

Are the causes of the decline clearly reversible?	Partly	Predator control programs can be partially successful, but factors affecting post-fledgling survival are poorly understood (McKnight pers. comm. 2021).
Are there extreme fluctuations in number of mature individuals?	No	

Extent and Occupancy information

Estimated extent of occurrence (EOO)	Approximately 36,000 km^2	Calculated using a minimum convex polygon around colonies known to be active during the recent 10-year period (2010-2019) (McKnight pers. comm. 2021).
Index of area of occupancy (IAO), reported as 2x2 km grid value.	8-32 km^2	Based on the range of 2-8 colonies occupied in any year during the recent 10-year period (2010-2019), assuming 4 km^2 per colony.
Is the population "severely fragmented" i.e., is >50% of its total area of occupancy 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"∗ (use plausible range to reflect uncertainty if appropriate).	3 (2-8)	Equal to the number of colonies with pairs during the breeding season in 2019 (and range in recent 10–year period 2010-2019), as each differs in the exposure to the main threat from predation by human-subsidized gulls, fox, and mink at the colony (McKnight pers. comm. 2021).
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	Yes, observed.	Estimated EOO declined by about 63.5% as colonies in Quebec are no longer included. However, there is no consistent trend in number or distribution of active colonies in Nova Scotia (COSEWIC 2009; McKnight pers. comm. 2021).
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	No	There is no consistent trend in number or distribution of active colonies (COSEWIC 2009; McKnight pers. comm. 2021).

∗ See Definitions and Abbreviations on COSEWIC website for more information on this term.

Is there an [observed, inferred, or projected] continuing decline in number of subpopulations?	Not applicable	No subpopulations
Is there an [observed, inferred, or projected] continuing decline in number of “locations”*?	No	There is no consistent trend in number or distribution of active colonies (COSEWIC 2009; McKnight pers. comm. 2021).
Is there an [observed, inferred, or projected] continuing decline in area, extent and/or quality of habitat?	Yes	Observed and inferred continuing decline in quality of habitat, through continuing erosion, predation, and threats to foraging habitat (McKnight pers. comm. 2021).
Are there extreme fluctuations in number of subpopulations?	Not applicable	No subpopulations.
Are there extreme fluctuations in number of “locations”∗?	No	COSEWIC 2009; McKnight pers. comm. 2021.
Are there extreme fluctuations in extent of occurrence?	No	COSEWIC 2009; McKnight pers. comm. 2021.
Are there extreme fluctuations in index of area of occupancy?	No	COSEWIC 2009; McKnight pers. comm. 2021.

Number of Mature individuals (in each subpopulation)

Subpopulations (No subpopulations)	**N Mature Individuals**	**Notes on individual estimates.**
Total	106-146 (136 present in 2019)	Range is based on minimum and maximum annual counts at Canadian colonies during 2010-2019; counts were higher in 2008 (166) and in all previous years (McKnight pers. comm. 2021).

Quantitative Analysis

Is the probability of extinction in the wild at least [20% within 20 years or 5 generations whichever is longer up to a maximum of 100 years, or 10% within 100 years]?	Unknown	Analysis not conducted.

∗ See Definitions and Abbreviations on COSEWIC website for more information on this term.

Threats and Limiting Factors

Was a threats calculator completed for this species?	No, although threats were identified in the Recovery Strategy (Environment Canada 2010).	A threats calculator was completed for the combined US and Canada populations in 2019. The impact of some threats is unknown or low, but as several colonies are intensively managed and threats are likely cumulative, the overall threat impact was raised to Very High – Medium (McKnight pers. comm. 2021).
Key threats identified in the Recovery Strategy (except as noted), with impact level based on threats calculator for combined US and Canadian population in 2019 (McKnight pers. comm. 2021) are: i. IUCN 8 Invasive and other problematic species and genes: 8.2. Problematic native species: High-Low impact ii. IUCN 11 Climate change and severe weather: 11.4. Storms and flooding: High-Low impact iii. IUCN 1 Residential and commercial development: 1.2. Commercial and industrial areas, and 1.3. Tourism and recreation areas: Unknown impact iv. IUCN 2 Agriculture and aquaculture: 2.4. Marine and freshwater aquaculture: Unknown impact v. IUCN 3 Energy production and mining: 3.1. Oil and gas drilling, and 3.3. Renewable energy: Unknown impact vi. IUCN 4 Transportation and service corridors: 4.2 Utility and service lines: Unknown impact (McKnight pers. comm. 2021) vii. IUCN 5 Biological resource use: 5.1. Hunting and collecting terrestrial animals, and 5.4 Fishing and harvesting aquatic resources: Unknown impact What additional limiting factors are relevant? Roseate Tern has low reproductive potential compared to other terns, linked to its low annual adult survival rate (83%), delayed age of first breeding until its third year, small clutch size (median 1.7 eggs), and very specific foraging habitat requirements (Environment Canada 2010). It is also dependent on nesting within colonies of other tern species.		

Rescue Effect (natural immigration from outside Canada)

Status of outside population(s) most likely to provide immigrants to Canada.	Stable or increasing, but assessed as Critically Imperilled (S1) in CT, NY, and NJ; Imperilled (S2) in ME and MA, and Presumed or Possibly Extirpated (SX or SH) in NH, RI, DE, MD, VA, and NC (NatureServe 2022)	Trends based on counts at main colonies in northeastern US coastal states (USFWS in prep.).
Is immigration known or possible?	Yes	Banding studies show routine juvenile and adult dispersal in both directions between US and Canadian colonies (McKnight pers. comm. 2021).

Would immigrants be adapted to survive in Canada?	Yes	
Is there sufficient habitat for immigrants in Canada?	Yes	
Are conditions deteriorating in Canada?+	Yes	Continuing decline in quality of habitat, through erosion, predation, and threats to foraging habitat (McKnight pers. comm. 2021).
Are conditions for the source (i.e., outside) population deteriorating?+	No	
Is the Canadian population considered to be a sink?+	No	
Is rescue from outside populations likely?	Possible, but unlikely	Although US colonies could provide immigrants to Canada, breeding habitat in Canada is declining in quality.

Occurrence Data Sensitivity

Are occurrence data of this species sensitive?	No	

Status History

COSEWIC: Designated Threatened in April 1986. Status re-examined and designated Endangered in April 1999. Status re-examined and confirmed in October 1999, April 2009, and May 2023.

Status and Reasons for Designation

Status:	Endangered
Alpha-numeric codes:	A2ac+4ac; B2ab(i,iii,v); C2a(i,ii); D1
Reason for change of status	Not applicable
Reasons for designation (2023):	This globally-distributed colonial seabird breeds on small coastal islands from eastern Nova Scotia to Long Island, New York, and winters from Colombia to eastern Brazil. Regular breeding in Canada is now confined to 2-8 colonies in Nova Scotia, although individuals of this species, and its hybrids with other tern species, are occasionally present in other tern colonies. The Canadian breeding population is about 106-146 mature individuals. Both the number of adult birds breeding in Canada and the range in Canada have declined by about 64% over the past 3 generations (1995-2019). The main factors limiting population recovery are predation, low post-fledging survival rates, habitat degradation, and impacts of stochastic weather events such as hurricanes.

+ See Table 3 (Guidelines for modifying status assessment based on rescue effect).

Applicability of Criteria

A: Decline in total number of mature individuals	Meets Endangered, A2ac+4ac. There is an observed reduction of 64% in the number of mature individuals (95% CI = 84%, 44%) within 3 generations (1995-2019) which is anticipated to continue into the future, with an observed decline of about 63.5% in extent of occurrence since the last assessment and an observed and inferred decline in habitat quality, both anticipated to continue into the future.
B: Small distribution range and decline or fluctuation	Meets Endangered, B2ab(i,iii,v). The index of area of occupancy is <500 km², the Canadian population occurs at <5 locations, with continuing decline observed in extent of occurrence, observed and inferred in quality of habitat, and observed in number of mature individuals.
C: Small and declining number of mature individuals	Meets Endangered, C2a(i,ii). The Canadian population is estimated to be <2,500 mature individuals, with observed continuing decline in the number of mature individuals; no subpopulation estimated to contain >250 mature individuals; and the only subpopulation having 100% of all mature individuals.
D: Very small or restricted population	Meets Endangered, D1. The population is estimated to be <250 mature individuals.
E: Quantitative analysis	Not applicable, analysis not conducted.

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WRITER OF Rapid Review of Classification:

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COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS
(2023)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

Environment and Climate Change Canada
Canadian Wildlife Service
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Canada

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