NORTHWEST TERRITORIES
SPECIES AT RISK COMMITTEE

DETAILED INSTRUCTIONS FOR PREPARATION OF A SARC STATUS REPORT:

SCIENTIFIC KNOWLEDGE COMPONENT

NWT Species at Risk Committee
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NORTHWEST TERRITORIES
SPECIES AT RISK COMMITTEE

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NORTHWEST TERRITORIES
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Preface

These instructions were developed by SARC for use in the NWT. They have been formatted to ensure reasonable consistency with the Detailed Instructions for Preparation of a SARC Status Report: Indigenous and Community Knowledge Component.

They are drawn heavily from, and in some cases reproduce verbatim, the following sources.:

- Committee on the Status of Endangered Wildlife in Canada [COSEWIC]. 2010. Instructions for the Preparation of COSEWIC Status Reports. Available at: http://www.cosewic.gc.ca/pdf/Instructions_e.pdf.
- Newfoundland and Labrador Species Status Advisory Committee. 2009. Status Report Template. Appendix 2 In Species Status Advisory Committee Annual Report 2008-2009. Available at: http://www.env.gov.nl.ca/env/wildlife/endangeredspecies/ssac/ssac_annual_report2008_09.pdf.
- Alberta Conservation Association and Alberta Sustainable Resource Development. 2010. Alberta Wildlife Status Report Series – Schedule B: Guide to Writers. Unpubl. guidelines.

NORTHWEST TERRITORIES
SPECIES AT RISK COMMITTEE

DETAILED INSTRUCTIONS FOR PREPARATION OF A SARC STATUS REPORT: SCIENTIFIC KNOWLEDGE COMPONENT

This document is intended for preparers of species status report components for the NWT Species at Risk Committee (SARC). It should be used together with the *SARC General Guidelines for Species Status Reports*, a separate document that gives other important guidance on the preparation, review, and use of status reports.

Each status report is prepared in two parts: an 'Indigenous and Community Knowledge Component' and a 'Scientific Knowledge Component.' This document gives detailed instructions for preparing the Scientific Knowledge Component. A complete status report typically includes both components presented together, unless SARC determines that there is not enough information available to complete one component.

The required headings and subheadings for the Scientific Knowledge Component are provided in the *SARC General Guidelines for Species Status Reports*.

Throughout the Scientific Knowledge Component, it is important to use SARC's definitions for technical terms such as total population, population, location, and continuing decline. The glossary found in Appendix C of this document defines several terms in detail and should be consulted.

These instructions describe the types of information to be provided, and questions to be answered, under each heading, to the extent possible. Inclusion of all the headings and subheadings is required (unless otherwise noted). This will ensure coverage of the crucial topics relevant to decision-making by SARC. If information for some sections is deficient or missing, this should be indicated under the appropriate heading. It is important to identify gaps in knowledge and uncertainty associated with the information and conclusions. New subheadings may be added as necessary, depending on the species. Within a section, the ordering of subheadings is flexible and can be changed.

In some cases, information is relevant under more than one heading. In these cases, it should be fully described and referenced only once, where most appropriate, but can be briefly referred to elsewhere where relevant.

Status report components may vary in length depending on the amount of available information. The preparer is responsible for synthesizing the best available knowledge into a clear and concise summary of the most relevant information. Bullets and lists should be avoided; in all cases, references must be cited.

The report should provide enough detail and contextual information to assess the biological status of the species. Details beyond this scope are not necessary. For example, information on reproductive success informs a species well-being, however details on mating rituals do not.

NORTHWEST TERRITORIES
SPECIES AT RISK COMMITTEE

Title Page

Each report should begin with a title page, as follows:

DRAFT

SPECIES STATUS REPORT

(Scientific Knowledge Component)

for

[English Common Name]

in the Northwest Territories

prepared for

Northwest Territories Species at Risk Committee

by

[Preparer name]

[Preparer address]

Submitted: [Date]

NORTHWEST TERRITORIES
SPECIES AT RISK COMMITTEE

Production Note

This page provides SARC with the opportunity to describe the internal review process used to produce the species status report (e.g., sections adopted from other reports) and ensure the accuracy and completeness of the species status report.

If this report is for something other than a full species (i.e., subspecies or distinct population), briefly provide the rationale using the *Assessment Process and Objective Biological Criteria*.

Executive Summary

The executive summary for the Indigenous and Community Knowledge Component is presented alongside the executive summary for the Scientific Knowledge Component. Summarize in simple terms the relevant material contained in each component of the report. Include the main headings used in writing the report. Under each heading, give a brief summary of the key information and conclusions for that topic. Do not include information that is not presented in the body of the report. Do not make reference to figures in the report, and do not include citations.

Use plain language. The executive summary is intended for the average NWT resident who does not have specialized knowledge of the species.

About the Species
Xxx
Place
xxx
Population
xxx

Threats and Limiting Factors
xxx
Positive Influences
xxx

Technical Summary

The technical summary provides an overview of information that must be considered in assessing the status of a species, with a focus on known changes. Bullet form is acceptable in the technical summary.

Scientific Knowledge	
Population	
Generation time (average age of parents in the population) (indicate years, months, days, etc.)	
Number of mature individuals in the NWT (or give a range of plausible values)	
Percent change in total number of mature individuals over the **last** 10 years or 3 generations	
Percent change in total number of mature individuals over the **next** 10 years or 3 generations	
Percent change in total number of mature individuals over any 10 year or 3 generation period that includes **both the past and the future**	

If there is a decline in the number of mature individuals, is the decline likely to continue if nothing is done?	
If there is a decline, are the causes of the decline reversible?	
If there is a decline, are the causes of the decline clearly understood?	
If there is a decline, have the causes of the decline been removed?	
If there are fluctuations or declines, are they within, or outside of, natural cycles?	
Are there 'extreme fluctuations' (>1 order of magnitude) in number of mature individuals?	
Distribution	
Estimated extent of occurrence in the NWT (in km^2)	
Index of area of occupancy (IAO) in the NWT (in km^2; based on 2x2 grid)	
Number of extant locations in the NWT	
Is there a **continuing decline** in area, extent, and/or quality of habitat?	
Is there a **continuing decline** in number of locations, number of populations, extent of occupancy, and/or IAO?	
Are there 'extreme fluctuations' (>1 order of magnitude) in number of locations, extent of occupancy, and/or IAO?	

Is the total population 'severely fragmented' (most individuals found within small and isolated populations)?	
Immigration from populations elsewhere	
Does the species exist elsewhere?	
Status of the outside population(s)	
Is immigration known or possible?	
Would immigrants be adapted to survive and reproduce in the NWT?	
Is there enough good habitat for immigrants in the NWT?	
Is the NWT population self-sustaining or does it depend on immigration for long-term survival?	
Threats and limiting factors	
Briefly summarize the threats and limiting factors, and indicate the magnitude and imminence for each	
Positive influences	
Briefly summarize positive influences and indicate the magnitude and imminence for each	

Glossary

Include a glossary of important terms/acronyms used in the report.

Status Report Table of Contents

Include a table of contents that can be automatically updated.

Place Names Map

Include a map showing place names used in the report to facilitate interpretation by a reader who may not be familiar with the region.

Preamble

Include a short preamble statement that introduces details important/relevant to the interpretation of the report (e.g., scope, significant information gaps, jurisdictional extent of information used, assumptions, etc.).

ABOUT THE SPECIES

Names and Classification

In general, use the species, subspecies, or distinct population specified by SARC. However, the preparer may suggest a modification of the specified distinct population if report-based research suggests a better alternative. Protocols for scientific and common names can be found in SARC's *Guidelines on Taxonomy and Species Names*.[1]

Scientific Name: [Full scientific name, including author]
Common Name [English]: [Common name (English)]
Common Name [French]: [Common name (French)]
...and others (e.g., local names, if available). Refine according to the level of distinct population used, if required (i.e., Rat River Arctic char).
Population(s) or subpopulation(s): [Name of population(s), if applicable]
Synonyms: [Full scientific name, including author]

- List several entries, if applicable. Synonyms should be assignable to the species, subspecies, or distinct population under consideration only. Clear errors should be excluded but may be discussed in the *Systematic/Taxonomic/Naming Clarifications* section below.

Class:

[1] www.nwtspeciesatrisk.ca/en/media/6120/download?inline

Order:
Family: [Latin name] [(common name)]
Life Form:

- Describe the type of life form; examples: "Animal, vertebrate, bird, woodpecker"; "Herbaceous, perennial, amphibious forb". There is no exact taxonomy here.

Systematic/Taxonomic/Naming Clarifications

A brief entry should be inserted here if a systematic or taxonomic clarification is critical to the general understanding of the main text, and to the ability of the reader to assess the status of the species being reported upon. If a more detailed systematic/taxonomic clarification is needed, a more detailed entry should be placed in Appendix A. In some cases, both a brief entry and a more detailed entry may be useful.

Description

Briefly describe the organism in a way that presents a good visual impression to the layperson. Include at least one good photograph of the species. The Secretariat can help with obtaining photographs if necessary. If deemed to be useful, a more detailed description, including photographs, may be placed in Appendix A.

Life Cycle and Reproduction

Discuss the life cycle and reproduction of this species in the NWT, in particular, those aspects of its life cycle and reproduction that make the species particularly susceptible, or that help the reader to assess the level of risk. Use the following questions as a guide:

- What are the different life cycle stages?
- What is the development time and feeding strategy of each stage?
- What is the reproductive strategy (e.g., live birth v/ hatching from eggs, internal fertilization v/ fertilization in the water, pollinated by insects v/ pollen blown by the wind, sexual reproduction v/ self-fertilization v/ cloning)?
- What are the breeding habits and breeding requirements (e.g., solitary breeder v/ colonial breeder, requires courtship ground)?

- What is the generation time (average age of parents of newborns)? ***required information*
- What is the age at which individuals reproduce for the first time?
- Do different generations overlap with each other?
- What is the age at maturity?
- What is the size at maturity?
- How long do individuals live?
- What is the ratio of males to females?
- What are the ratios of different age groups (or size groups) in the population?

Physiology and Adaptability

Discuss the physiology and adaptability of this species in the NWT, in particular, those aspects of its physiology that make the species particularly susceptible, or that help the reader to assess the level of risk. Use the following questions as a guide:

- What are the main physiological requirements of the species (e.g., temperature, soil chemistry, water flow rate)?
- What conditions is the species able to tolerate?
- Does the species have any traits or behaviours that help it adapt to changes?
- Is the species particularly susceptible to changes?
- Does the species have any traits or behaviours that help it adapt to extreme conditions?
- Is the species particularly susceptible to extreme conditions?
- Does the species have any traits or behaviours that help it survive unfavourable conditions (e.g., hibernation, forming spores, thermoregulation)?
- Is the species territorial? If so, what is its home range?

Interactions

Discuss the interactions with other species, and with others of the same species, in the NWT. Discuss the reliance on other species for its survival at any time during its life cycle (symbiotic, parasite/host, predator/prey relationships, specific foot plant, etc.). Describe any negative interactions with other plants, animals, pests, parasites, and

diseases that may affect the life span or reproductive success of the species. Be sure to describe the importance of any of the interactions influencing the survival of individuals. Use the following questions as a guide:

- Does it rely on other species for its survival? How (e.g., a parasite that requires a host, a plant that grows better in the presence of a certain fungus)?
- Does it require a specific food? How is this food important to growth and reproduction?
- Does it interact with other species that affect its survival or reproductive success? How (e.g., a predator that eats it, a disease that shortens its lifespan)?
- What are the main predators?
- Is it harvested? To what degree?
- Does it compete with others for resources (e.g., food, space, shelter, mates)?
- Are the negative interactions (predation, disease, competition, etc.) natural or unnatural?
- Do they live in colonies or groups? How is the group important to survival or reproduction?
- How do these interactions influence survival?

If necessary, this subsection may be organized using subheadings such as 'intraspecific competition,' 'harvesting,' 'interactions with predators,' 'interactions with competitors,' 'parasites and disease,' etc.

Note: This section should be used to describe the interactions and give the reader a good idea of their importance to the species' survival and mortality. Information on how these factors are changing or have contributed to declines (e.g., abundance and trends in the number of predators, increasing competition, decreasing supply of specific food plant) should usually go under Threats and Limiting Factors instead of this section.

PLACE

Distribution

This section deals only with geographic ranges, locations, and populations, and the numbers or extent of these quantities. Information relating to population sizes and trends does not belong in this section.

Note: ESRI Geographic Information System (GIS) projected feature files (or compatible files) and associated metadata used to create the range maps must be included with the first draft. If arrangements have been made for the Secretariat to coordinate mapping, the information required to create the maps must be included with the first draft.

World, Continental, or Canadian Distribution

Include an accurate and current range map of the world, continental, or Canadian distribution, whichever is most appropriate, showing both breeding and wintering grounds (if applicable, i.e., for migrants). Change the title of this subsection as appropriate, based on the range of the species.

Include a general statement of world, continental, or Canadian distribution, and a list of provinces/territories/states/countries where the species is found, in logical geographic order.

NWT Distribution

Include an accurate and current range map of the NWT distribution, showing current range. If the historic range is known to be different and can be mapped, show this as well.

List all known occurrence localities (or, if localities are particularly numerous, list localities more generally), in logical geographic order. If the species is migratory or nomadic, distinguish between breeding/nesting localities and other occurrence localities if required. In all cases, cite references.

Comment on whether the distribution of the species in the NWT is continuous or fragmented. If fragmented, describe the structure of the NWT population by defining terms such as subpopulation (or occurrence, etc.). Also, comment on the number and

size of the subpopulations and degree of isolation. How close are the nearest populations in adjacent jurisdictions? Are any NWT subpopulations considered to be particularly isolated from each other (e.g., exchange of individuals/gametes limited to less than one per year)?

Is the NWT population severely fragmented? Use the glossary definition of 'severely fragmented' (see Appendix C: Glossary).

Specify whether the distribution data refer to locations or populations (see Appendix C: Glossary).

Distribution entries and maps should refer only to the species, subspecies, or distinct population being reported upon, unless there is some specific reason for doing otherwise.

If a species is migratory or nomadic, distinguish between breeding and wintering/other distributions. If appropriate, also note distribution during the migratory period. Treat historical and recent distributions separately. Treat verified and unverified records separately. Treat breeding and 'other' distributions separately (i.e., use different symbols). Differentiate among extant, extirpated, and historical populations or locations. If things get too complicated, add additional maps.

Indicate historical populations of unknown status and erroneous reports (misidentified specimens and localities).

Sensitive data (e.g., precise localities of populations) should be placed in Appendix B and referenced in the body of the report.

Given the SARC definition of extent of occurrence (see Appendix C: Glossary). Briefly describe how the extent of occurrence was estimated (assumptions, methods, inferences, etc.). A map showing the extent of occurrence can be included if appropriate. Provide an estimate (in km^2) of the extent of occurrence of the species in the NWT. Contact the Secretariat for assistance with this calculation if needed.

Further instructions are found under 'guidance on estimating extent of occurrence' at the end of this document.

Give the SARC definitions of 'area of occupancy' and 'index of area of occupancy (IAO)' (Appendix C: Glossary). Briefly describe how these were estimated (assumptions, methods, inferences, etc.). A map showing the area of occupancy and IAO can be included if appropriate. Provide an estimate (in km^2) of the area of occupancy and the IAO of the species in the NWT. Contact the Secretariat for assistance with these calculations if needed. Further instructions are found under 'guidance on estimating area of occupancy and IAO' at the end of this document.

Location(s)

How many extant locations are there in the NWT? Use the Appendix C: Glossary definition of 'locations.' For species for which the distribution is best represented by discrete site records (e.g., species confined to discretely distributed habitat, such as amphibians), the NWT map must be accompanied by a table with details of each record in Appendix A.

Search Effort

Describe the qualitative (distributional) search effort used to determine the species' NWT range. Summarize the total search/catch effort for this species that has occurred in the past by all researchers or methods. Where possible, include the total number of sites searched.

Describe how presence/absence data were collected. Indicate which searches were general searches and which were targeted searches.

Discuss the potential of unexplored sites to harbour the species. Where possible, also include the proportion of potential habitat searched.

Clearly distinguish among positive and negative data. Positive data indicate where the species was found, whereas negative data indicate where the species was searched for but not found. Negative data are important because they demonstrate the extent of search effort.

If applicable, any additional efforts by the preparer to locate the species should be specifically described including the number of person hours, number of sites searched, and proportion of potential habitat searched.

Where applicable, the last date the species was collected, observed, and/or reported at any given location or in any population should be provided.

Document uncertainty by using, where appropriate, confidence intervals, plausible maximum or minimum values, etc. Explain any assumptions made and identify gaps in knowledge. Always indicate limitations of estimation methods.

Movements

Discuss the dispersal and migration of this species in the NWT using the following questions as a guide:

- How does the species disperse from one place to another (e.g., water currents, carried by birds, walking, intentionally moved by humans)?
- How far does the species disperse?
- Are there certain stages of the life cycle that disperse?
- Are there any effective barriers in the dispersal or migration routes?
- Does the species make annual movements?
- Is the species faithful to a certain area over a long period of time?
- Does the species concentrate in certain areas (e.g., rutting areas, molting areas)?

Distribution Trends

Describe temporal changes (expansions and contractions) in the distribution of the species. If possible, discuss changes over the last three generations or 10 years, whichever is longer. If appropriate, distribution trends may be described using extent of occurrence or area of occupancy.

Provide evidence for trends in the number of populations or locations. Have any (sub)populations disappeared? Have any new populations appeared? Note that 'populations' and 'locations' are defined differently. A location is a geographically

distinct area in which a single threatening event can rapidly affect all individuals of the species present.

Comment on fluctuations and/or annual variation if applicable, including the magnitude of variation, and any factors that could influence temporal changes in distribution.

When presenting and discussing distribution data, changes in distribution, etc., discuss any uncertainties associated with this information.

This section should focus on changes in the range, not population trends in different parts of the range.

Habitat Requirements

Briefly describe the habitat the species uses, with emphasis on the NWT if data are available. When possible, identify specific habitat attributes that are critical to the species. If the species is migratory or nomadic, distinguish between breeding/nesting habitats and other habitats. If habitat differs significantly between occurrence localities, it may be necessary to describe habitat specifically for each locality.

- Include a general description of vegetation and terrain (ecozone or ecoregion descriptions may be helpful, depending on the scale of the distribution).
- Climatic factors, both microclimate and macroclimate, should be discussed.
- For smaller organisms, microhabitat/microclimate may be just as significant, or even more significant, than gross habitat/climate.
- For plants, and for aquatic species in general, soil and water chemistry may be a particularly important factor.
- A photo of the organism in its habitat may be useful to include here, if the habitat does not vary too greatly between occurrence localities.
- If appropriate, a more detailed habitat description, including photographs, may be placed in Appendix A.

Habitat Availability

Discuss habitat availability. Are there areas of the NWT that appear to have suitable habitat, but are not occupied by the species? Are there potential habitats that have not been surveyed or new habitats that have become available? When practical, provide a map showing occupied habitats, as well as potential and unoccupied habitats.

Are there key habitat areas in the NWT that are known to be important for the survival of the species? If so, briefly describe these and include a map if possible.

Habitat Trends

Discuss recent trends in suitable habitat in the NWT, if any (e.g., net gain or loss of area or quality), and describe known causes for these trends. When possible, calculate the rate of habitat change over the last three generations or 10 years, whichever is longer, and describe the data used to calculate this trend. Comment on predicted future trends in habitat. Discuss any uncertainties associated with estimations of trend. State clearly if there are no data available, but there is convincing anecdotal evidence of habitat loss.

Habitat Fragmentation

Comment on the degree of habitat fragmentation, whether or not the fragmentation is natural, and how fragmentation affects the species. Specifically, how well can the species disperse within or through fragmented habitat? Does suitable habitat for dispersal exist between known populations?

POPULATION

Abundance

Where possible, estimate the total number of individuals of all ages in the NWT and the total adult population in the NWT (i.e., the number of mature individuals (those capable of reproducing)). Clearly state the proportion of the global and/or continental population occurring in the NWT.

If accurate population size estimates are not available, the preparer should comment on this and make an attempt at giving a range as an estimate of population size (i.e.,

tens of thousands or hundreds of thousands). Personal observations and/or communications are acceptable for this type of estimate.

If appropriate, provide a breakdown of the number of mature individuals for individual populations within the unit being assessed. Identify each population using a generalized site name and specify the number of individuals in each.

Document sampling effort and how abundance data were collected. Describe the sampling effort involved (for example, if person hours of searching, state the number of people searching, the hours searched by each, and the total hours searched).

Describe methods used to estimate population sizes.

Document uncertainty by using appropriate confidence intervals, plausible maximum or minimum values, etc. Explain any assumptions made and identify gaps in knowledge. Always indicate limitations of estimation methods. Consider rounding off estimates to an appropriate number of significant digits, given the uncertainty.

If needed, state how an individual is defined (e.g., for asexually reproducing plants, count reproducing individuals within a clone that are capable of surviving on their own).

Population Dynamics

Discuss the population dynamics of this species in the NWT using the following questions as a guide:

- What is the birth rate?
- What is the recruitment rate?
- What is the death rate (or survival rate)?
- What is the immigration rate?
- What is the emigration rate?
- In the long term, do the populations in the NWT depend on immigration for survival, or are they able to sustain themselves?

For many species, changes or trends in size or age can be important indicators of status, because these may reflect changes in mortality or recruitment rates. Changes in body

condition or other indicators of overall health can also be important indicators. If appropriate and if data are available, include information on these factors. Examples could include: trends in age or size frequencies over time, trends in mean length or age, trends on a body condition indicator.

Trends and Fluctuations

As much as possible, discuss year-to-year changes in total adult population size and density in the NWT. Both long-term and short-term trends should be addressed. If possible, trends from the most recent 10-year period, or three generations (whichever is longer), should be clearly indicated. Include a graph if sufficient data are available.

Indicate whether there are fluctuations in population size, and if so, state the magnitude of the fluctuations. Indicate whether the fluctuations are 'extreme' (see Appendix C: Glossary). Attempt to distinguish between cyclic population changes and unusual or long-term changes (especially declines).

If data are available, convert data into a percent decline over 10 years or three generations, whichever is longer.

If possible, determine if there is 'continuing decline' (see Appendix C: Glossary).

If data are available, provide declines projected into the future. Try to make a prediction about extinction/extirpation if the decline continues, and report on any published quantitative analyses that estimate extinction probability. If the report includes or refers to a credible population viability analysis (PVA), briefly present the results here. A more detailed analysis may be placed in Appendix A. Make sure that the description of the analysis meets the *Standards for Reporting Population Viability Analyses in COSEWIC Status Reports*.

When possible, provide information on trends and declines for individual populations within the unit being assessed. Indicate which populations, if any, have disappeared and whether the numbers of populations also fluctuate. Indicate if new populations continue to be discovered.

For many species, changes or trends in size or age can be important indicators of status, because these may reflect changes in mortality or recruitment rates. If appropriate and if data are available, include information on these factors. Useful ways of showing trends include histograms of age or size frequencies over time, graphs of trends in abundance of specific size components (particularly mature or large individuals), and graphs of trends in mean length or age.

For some species, a variety of indices are used to determine trends. Explain briefly how these indices or other trends data were gathered and the limitations to them.

Comment on the reliability/confidence of extrapolations, and assumptions for predicting trends.

Indicate if the species has always been rare as a result of chronically low numbers, limited numbers of populations, and/or limited availability of specialized suitable habitat.

Comment on the extent to which counts or survey results from different years are comparable.

Possibility of Rescue

Rescue effect is the process by which a species may move through its range in a way that would mitigate an NWT extirpation or population decline. For species whose distributions are shared with another jurisdiction, discuss the likelihood that dispersal from the outside population will repopulate the NWT population should the latter disappear or experience a decline. In making this assessment, consider:

Likelihood of individual/propagule immigration:

- Are there any populations elsewhere that are close enough that immigrants could reach the NWT?
- Are there any barriers that prevent movement to and from these other populations?
- Is the species capable of moving over long distances?
- Is the species known to move over long distances?
- If the NWT population were to decline or disappear, is it likely that immigration from elsewhere will re-establish the population?

Local adaptations:

- Does the NWT population have any special adaptations that are different from populations elsewhere?
- Would individuals from elsewhere be able to survive and reproduce in the NWT?

Availability of suitable habitat:

- If immigrants were to come into the NWT, is the current environment suitable for them?
- Are there suitable patches of habitat in the NWT?
- Did the species decline or disappear from the NWT because conditions were not favourable?
- Is the NWT habitat expected to improve in the future because of actions that are being taken now?

Status of populations elsewhere:

- Outside the NWT, how numerous is this species?
- Outside the NWT, are the numbers shrinking, getting bigger, or staying the same?
- Are there any important threats to the populations elsewhere?
- Is it likely that many individuals come from the populations elsewhere, and will continue to do so in the future?

Possibility of captive breeding:

- Can the species be successfully bred in captivity and released into the wild?

THREATS AND LIMITING FACTORS

Outline existing and potential threats and limiting factors affecting the species and its habitat in the NWT and explain what impact they are likely to have.

A threats assessment based on the content in this section, along with the Threats and Limiting Factors section of the Indigenous and Community Knowledge Component, will be completed collaboratively by SARC, following submission of a final draft of the status report by the preparer. Threats will be assessed in terms of their relevance to the status of the species in the NWT over approximately the next 10 years. It is important that the preparer lay out and discuss threats in a manner that will be useable by SARC during this assessment. This includes ranking threats by importance, and, insofar as is possible, addressing the following parameters for each threat:

Table 1. Parameters used in threats assessment.

Parameter	Description	Categories
LIKELIHOOD		
Timing (i.e., immediacy)	Indicates if the threat is presently happening, expected in the short term (<10 years), expected in the long term (>10 years), or not expected to happen.	Happening now Short-term future Long-term future Not expected
Probability of event within 10 years	Indicates the likelihood of the threat to occur over the next 10 years.	High Medium Low

CAUSAL CERTAINTY		
Certainty	Indicates the confidence in that the threat will have an impact on the population.	High Medium Low
MAGNITUDE		
Extent (i.e., scope)	Indicates the spatial extent of the threat (based on the percentage of population or area affected).	Widespread (>50%) Localized (<50%)
Severity of population-level effect	Indicates how severe the impact of the threat would be at a population level if it occurred.	High Medium Low Unknown
Temporality	Indicates the frequency with which the threat occurs.	Seasonal Continuous
Overall level of concern	**Indicates the overall threat to the population (considering the above).**	**High** **Medium** **Low**

Examples of threats and limiting factors to consider for inclusion:

- Limiting nutrient(s) or element(s)
- Loss, degradation, or fragmentation of habitat
- Invasive species
- Hybridization resulting in genetic swamping
- Inter- and intraspecific competition, predation, or disease – if any of these events are aggravated or amplified by human activities and result in increased pressures on a population, report them as threats but give details of the anthropogenic involvement
- Harvesting

- Cumulative effects
- Characteristics of the species that make it particularly susceptible to disturbance

Guidance on threats and limiting factors

- Provide justification for any that are mentioned. Indicate and justify the imminence and degree of real or potential harm. More than speculation is needed.
- Uncertainty about these must be presented clearly. Where there is disagreement among experts, present the nature of the debate and a balanced reference list.
- Present the relative scope of the impact with suitable explanations.
- Consider threats and limiting factors to the species in all parts of its range and life cycle.
- If a species is migratory or nomadic, treat factors within breeding v/ wintering/other distributions separately. If appropriate, also note them during the migratory/nomadic period.
- Where habitat damage or removal is a threat, specify, where possible, if applications have been filed for activities that would cause the damage or removal.
- Indicate if any of the factors that were responsible for past trends of the species are reversible.
- Be specific and include proximal threats, not simply general ones. For example, describe specific threats related to climatic change if data or reliable models indicate a particular sensitivity to a particular aspect of climatic change (increased temperature, permafrost changes, etc.).
- Do include:
    - Actual or imminent threats or limiting factors that can result in harm and population-scale impacts. This is of high importance for status evaluation and must be suitably documented with concrete factors.
    - Imminent threats or limiting factors where harm to the population(s) is uncertain. This should be reported but with uncertainties explained.

- Imminence of threats or limiting factors is uncertain but harm is likely if they occur. These should not be listed as primary threats.

- Do not include:
  - Threats where the imminence and harm are both hypothetical but possible as these are of little value in documenting risk.
  - Threats with no clear relationship to the species' biology or impact on its habitat.
  - Natural mortality, unless there are particular circumstances that have caused a recent change.
  - General statements (for example: "human population expansion in the near vicinity of sites will result in harm as the recreational use of lands increases"). If included, such statements must be supported by evidence of increased housing developments and of documentation of observed harm resulting from such activities as ATV use and damage to sensitive habitat features.

Note: Some information on threats will have already been addressed in previous sections of the report (e.g., Interactions, Habitat Trends). The earlier sections can provide the background needed to understand how the threat works and how it affects the species. Then in the Threats and Limiting Factors section, focus on how important the threat is (magnitude, immediacy), the current state of affairs (e.g., how many predators are there), and how it may be changing (e.g., proposed industrial development projects).

POSITIVE INFLUENCES

Outline existing and potential positive influences on the species and its habitat in the NWT and explain what impact they are likely to have. Address positive influences in a logical order (e.g., from most important in the NWT to least important in the NWT). Positive influences will be considered by SARC during the assessment of threats (i.e., how

a threat is being addressed could modify a threats score) and during the overall assessment of the status of the species.

This section should focus on positive influences that are actual (already happening) or imminent (will happen soon).

Guidance on positive influences:

- Provide justification for any that are mentioned. Indicate and justify the imminence and degree of real or potential benefit. More than speculation is needed.
- Uncertainty about these must be presented clearly. Where there is disagreement among experts, present the nature of the debate and a balanced reference list.
- Present the relative degree/scale of the impact with suitable explanations.
- Consider positive influences on the species in all parts of its range and life cycle.
- If a species is migratory or nomadic, treat positive influences within breeding v/ wintering/other distributions separately. If appropriate, also note them during the migratory/nomadic period.
- Indicate if any of the factors that were responsible for past trends of the species are reversible.

What should be included:

- Actual or imminent positive influences that can result in benefit and population-scale impacts. This is of high importance for status evaluation and must be suitably documented with concrete factors.
- Imminent positive influences where benefit to the population(s) is uncertain. This should be reported but with uncertainties explained.
- Imminence of positive influences is uncertain, but benefit is likely if they occur. This should not be listed as a primary influence.
- Existing and proposed habitat protection in the NWT (e.g., critical habitat regulations, protected areas, land use plans).

- If management recommendations/suggestions are not likely to be implemented, they should not be included.
- If imminence and benefit are both hypothetical but possible, do not include the influence as it is of little value to the assessment.
- Influences with no clear relationship to the species' biology or impact on its habitat should not be included.
- Climatic changes, unless there are data or reliable models that indicate a particular sensitivity to climate change, should not be included.
- General statements should not be included.
- Consider traits that make the species recover quickly (e.g., early reproduction age, many offspring, good dispersal capacity, wide range of food preferences, etc.).

Examples of positive influences to consider:

- Increase in food
- Creation of habitat
- Increase in quality of habitat
- Protection of habitat
- Removal of a disease or parasite
- Reduced competition

Some information on positive influences will have already been addressed in previous sections of the report (e.g., Interactions, Habitat Trends). The earlier sections can provide the background needed to understand how the positive influence works and how it affects the species. Then in the Positive Influences section, focus on how important the positive influence is (magnitude, immediacy), the current state of affairs (e.g., how much habitat is protected now), and how it may be changing (e.g., proposed new habitat protection).

ACKNOWLEDGEMENTS

Acknowledge individuals, authorities, and agencies that provided assistance and/or funding, or otherwise contributed to the report. If the preparer deems that individuals that provided personal communications should be acknowledged, do so here. However, their name(s) should also appear under Cited Sources.

If this is an updated status report, acknowledge all report writers involved in the preparation of the original status report and any previous updated reports.

AUTHORITIES CONTACTED

Under a separate subheading, provide a list of authorities contacted together with title, affiliation, city, province/territory/state, and country if outside Canada. The list should include all the minimally required contacts provided at the beginning of the project. However, if none of the attempts to contact were successful, the contact should not be included.

Territorial government representatives:

Joanna Wilson, Wildlife Biologist (Species at Risk), Environment and Climate Change, Government of the Northwest Territories, Yellowknife, NT, Canada

Federal government representatives:

Isabelle Duclos, Biologist, Species at Risk, Environment and Climate Change Canada, Yellowknife, NT.

Indigenous organizations and wildlife management boards:

Steven Baryluk, Joint Secretariat, Inuvialuit Game Council – Inuvialuit Hunters and Trappers Committees, Inuvik, NT.

Bruce Hanbidge, Resource Biologist, Wildlife Management Advisory Council (NWT), Inuvik, NT.

Other species experts:

Andrea Hanke, Ph. D. candidate, Department of Ecosystem and Public Health, Faculty of Veterinary Medicine, University of Calgary, Calgary, Alberta.

Debbie Jenkins, Qikiqtani Regional Biologist, Wildlife Research Section, Department of Environment, Pond Inlet, NU.

CITED SOURCES

List all literature and personal communications cited in the text, figures, tables, and appendices. Use the formatting and style described in the *SARC* *General Guidelines for Species Status Reports*.

COLLECTIONS EXAMINED

Include this section only if collections were consulted. All institutions with collections that were consulted, whether or not they had specimens of the species in question, should be cited in the report. List these by institution, citing the number of specimen lots examined. Put additional details in Appendix A.

BIOGRAPHY OF PREPARER(S)

Briefly outline your background, using the third person (e.g., use 'he is' instead of 'I am'). Stress the qualifications that make you a suitable writer for this report.

APPENDIX A. ADDITIONAL DETAILS

This appendix contains additional background support for the main report. Information should be organized under the same headings as the main report. The main report should contain ONLY information that is needed for doing the assessment. The main report should reference any entries included in Appendix A.

For species for which the distribution is best represented by discrete site records (e.g., species confined to discretely distributed habitat, such as amphibians), a table with details of each record should be included in this appendix under the heading *Distribution*. For each record, where data are available, include:

- Site name
- Date
- Location (in either lat-long or UTM, including projection, units of measure, zone, and datum that the locations were collected at)
- Number of individuals
- Estimates of population size and area of occupancy
- Observer
- Notes (e.g., habitat)
- Collection/museum catalogue number and/or photo reference

Where detailed information is available, and where practical, records should be listed by individual site. Otherwise, or in addition, the records may be compiled into one or more summarizing tables.

Treat verified records separately from unverified records. Verified occurrences consist of observations supported by the collection of a voucher specimen (i.e., a sample to be identified/confirmed by experts and deposited in a museum); or well-documented, diagnostic photographs; or well-documented field observations meeting the observational standards for verification accepted by reputable workers in any particular field. Unverified records should, nevertheless, be considered to be basically credible. Note: records from databases or internet listings may or may not qualify as 'verified' records; knowledgeable judgment is required here. When in doubt, such records should be treated as unverified.

Provide all location data in the same format (i.e., all lat-long or all UTM, all lat-long in same format [all degrees, minutes, seconds; all decimal degrees, etc.]). To convert batches of data from UTMs to latitude and longitude (or vice versa), go to: http://www.uwgb.edu/dutchs/usefuldata/howuseexcel.htm.

If collections were consulted, a detailed entry should be included in this appendix under the heading Collections Examined. Indicate museum/institutional collections and catalogue/collection numbers.

APPENDIX B. SENSITIVE INFORMATION

This appendix contains information that is necessary for assigning species status but that should not be released to the public. Information should be organized under the same headings as the main report.

Preparers should ensure that any detailed information that might put a species in danger (such as the precise locality of populations or their habitat) or that is considered confidential, does not appear in the main body of the report. Sensitive information should be placed in Appendix B. It should not be explicitly referenced in the body of the report; however, it should be generally referenced so that a reader of the report can understand its implications for status determination.

Appendix B will be provided to SARC so that a fully informed assessment can be done. Appendix B will not be made public and will not be distributed beyond SARC.

Appendix B should be prepared and submitted **as a separate document** to help maintain confidentiality.

APPENDIX C. GLOSSARY [do not include in the report; definitions can be provided where necessary]

DEFINITIONS OF TERMS[2] USED IN STATUS REPORTS – SCIENTIFIC KNOWLEDGE COMPONENT

Area of occupancy: The area within 'extent of occurrence' that is occupied by a species, excluding cases of vagrancy. The measure reflects the fact that the extent of occurrence may contain unsuitable or unoccupied habitats. In some cases (e.g., irreplaceable colonial nesting sites, or crucial feeding sites for migratory species) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a species (in such cases, this area of occupancy does not need to occur within the NWT). The size of the area of occupancy will be a function of the scale at

[2] Definitions of terms follow those of COSEWIC, which are based on those of the International Union for the Conservation of Nature (IUCN), with minor adjustments for NWT circumstances and conditions.

which it is measured and should be at a scale appropriate to relevant biological aspects of the species, the nature of threats, and the available data. To avoid inconsistencies and bias in assessments caused by estimating area of occupancy at different scales, it may be necessary to standardize estimates by applying a scale-correction factor. Different types of species have different scale-area relationships. An index of area of occupancy may be calculated.

Continuing decline: A recent, current, or projected future decline (which may be smooth, irregular, or sporadic), that is liable to continue unless remedial measures are taken. Fluctuations will not normally count as continuing declines, but an observed decline should not be considered as a fluctuation unless there is evidence for this.

Distinct population: Under the *Species at Risk (NWT) Act*, a distinct population means a geographically or biologically distinct population of a species, or a distinct population (other than a geographically or biologically distinct population) referred by the CMA or a Management Authority to SARC for assessment under subsection 26(2).

Extent of occurrence: The area included in a polygon without concave angles that encompasses the geographic distribution of all known populations of a species.

Extreme fluctuation: Changes in distribution or in the total number of mature individuals of a species that occur rapidly and frequently, and are typically of more than one order of magnitude (tenfold).

Generation: Generation length is the average age of parents of a cohort (i.e., newborn individuals in the population). Generation length therefore reflects the turnover rate of breeding individuals in a population. Generation length is greater than the age at first breeding and less than the age of the oldest breeding individual, except in species that breed only once. Where generation length varies under threat, the more natural (i.e., pre-disturbance) generation length should be used.

Index of area of occupancy: The index of area of occupancy (IAO) is a measure that aims to provide an estimate of area of occupancy that is not dependent on scale. The

IAO is measured as the surface area of 2 km x 2 km grid cells that intersect the actual area occupied by the wildlife species (i.e., the biological area of occupancy).

Location: The term 'location' defines a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the species present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.

Mature individuals (number of): The number of mature individuals is the number of individuals known, estimated, or inferred to be capable of reproduction. When estimating this quantity, the following points should be kept in mind:

- Mature individuals that will never produce new recruits should not be counted (e.g., densities are too low for fertilization).
- In the case of populations with biased adult or breeding sex ratios, it is appropriate to use lower estimates for the number of mature individuals that take this into account.
- Where the population size fluctuates, use a lower estimate. In most cases this will be much less than the mean.
- Reproducing units within a clone should be counted as individuals, except where such units are unable to survive alone (e.g., corals).
- In the case of species that naturally lose all or a subset of mature individuals at some point in their life cycle, the estimate should be made at the appropriate time, when mature individuals are available for breeding.
- Re-introduced individuals must have produced viable offspring before they are counted as mature individuals.

Population: A geographically or otherwise distinct group within a species that has little demographic or genetic exchange with other such groups. Theoretically, populations maintain genetic distinction if there is typically less than one successful breeding

immigrant individual or gamete per generation. Equivalent to the term 'subpopulation' as employed by the IUCN. See also 'distinct population.'

Propagule: A living entity capable of dispersal and of producing a new mature individual (e.g., a spore, seed, fruit, egg, larva, or part of or an entire individual). Gametes and pollen are not considered propagules in this context.

Quantitative analysis: An estimate of the extinction probability of a species based on known life history, habitat requirements, threats, and any specified management options. Population viability analysis (PVA) is one such technique. Quantitative analyses should make full use of all relevant available data. If there is limited information, available data can be used to provide an estimate of extinction risk (for instance, estimating the impact of stochastic events on habitat). In presenting quantitative analyses, the assumptions, the data used, and the uncertainty in the data or quantitative model must be documented.

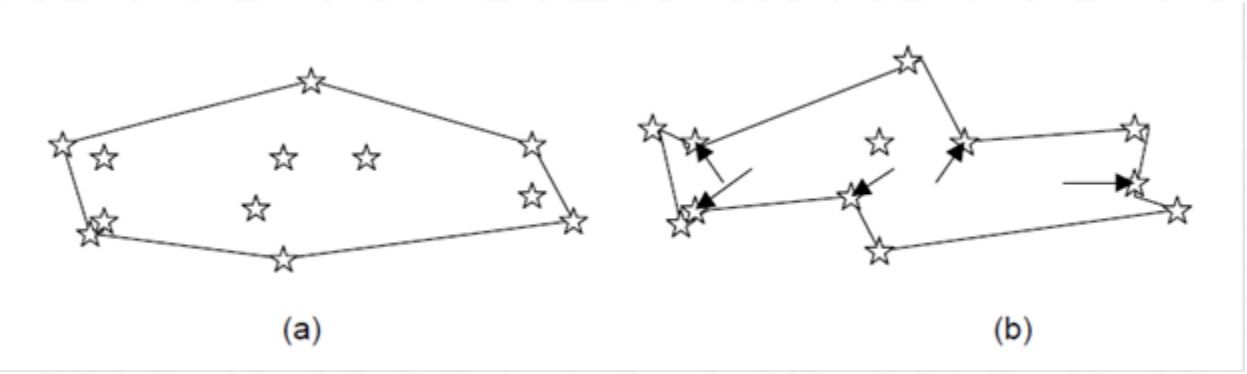
Reduction: A reduction is the percentage decline in the number of mature individuals, although the decline need not be continuing. A reduction should not be interpreted as part of a fluctuation unless there is reasonable evidence for this. The downward phase of a fluctuation will not normally count as a reduction.

Rescue effect: Immigration of gametes or individuals that have a high probability of reproducing successfully, such that extirpation or decline of a population can be mitigated. If the potential for rescue is high, the risk of extirpation may be reduced.

Severely fragmented: A situation where most individuals are found in small and relatively isolated populations (in certain circumstances this may be inferred from habitat information). Severe fragmentation results in a reduced probability of recolonization of habitat patches where populations go extinct, which increases extinction risk for the species.

Total population: The total number of mature individuals of a species in NWT. Equivalent to the term 'population' as employed by IUCN 2001.

Guidance on estimating extent of occurrence: The extent of occurrence is the area contained within the shortest continuous boundary drawn to encompass all the known, inferred, or projected sites of present occurrence of the species, excluding cases of vagrancy. This measure may exclude large areas of obviously unsuitable habitat. The extent of occurrence can be measured by drawing the smallest polygon in which no internal angle exceeds 180 degrees and that contains all sites of occurrence.



The method in (a) is correct. The method in (b) is incorrect. In (a), the outermost sites of occurrence (stars) are connected with a line such that no internal angle exceeds 180 degrees; the enclosed area is the extent of occurrence. In (b), the line drawn has several internal angles (arrows) that exceed 180 degrees and the extent of occurrence would be underestimated.[3]

Guidance on estimating area of occupancy and IAO: The area of occupancy is defined as the area within the extent of occurrence that is occupied by the species, excluding cases of vagrancy. The measure reflects the fact that a species will not usually occur throughout the entire area of its extent of occurrence, which may contain unsuitable or unoccupied habitats.

Where populations are dispersed, a direct calculation of area of occupancy may not be possible. In some cases, proxies may be useful, such as the estimated total area of

[3] Figure reproduced from COSEWIC (2010).

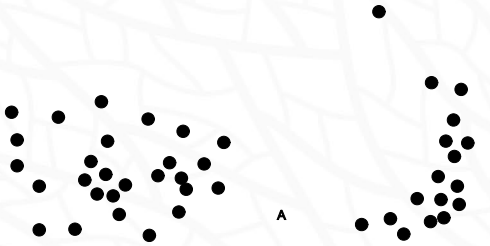
several individual territories or home ranges. In some cases (e.g., irreplaceable colonial nesting sites, crucial feeding sites for migratory species), the area of occupancy is the smallest area essential at any stage to the survival of existing populations (in such cases, this area of occupancy does not need to occur within NWT).

The area of occupancy is measured both as an estimate of the actual area occupied by the species ('biological' area of occupancy) and as an index (index of area of occupancy, or IAO). The 'biological' area of occupancy is essentially the total area of habitat occupied by all existing populations. This value can be estimated in several different ways, depending on the taxonomic group and the information available. For example, for a plant species, the actual area of each occupied site if known can be simply added up. For a bird, if the actual area of occupied habitat is unknown, the number of pairs and the average home range size can be estimated; the area of occupancy can therefore be roughly estimated by multiplying these two values. Because species vary greatly in the amount of habitat required to sustain a population (e.g., from a few square centimetres for a lichen species to thousands of hectares for a caribou population), the size of the area of occupancy is a function of the scale at which it is measured.

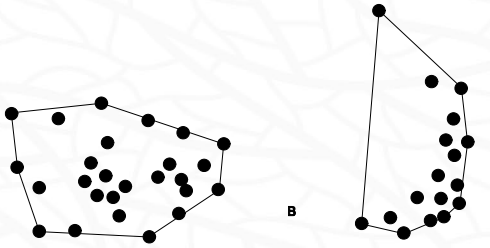
The index of area of occupancy (IAO) is a measure that aims to provide an estimate of area of occupancy that is not dependent on scale and, therefore, that can be compared across taxonomic groups and against SARC's assessment criteria. The IAO is measured as the surface area of grid cells that intersect the actual area occupied by the wildlife species (i.e., the biological area of occupancy). SARC requires that this index be calculated based on a grid with a cell size of 2 km x 2 km.

This figure shows two examples of the distinction between **extent of occurrence** and **index of area of occupancy**.[4]

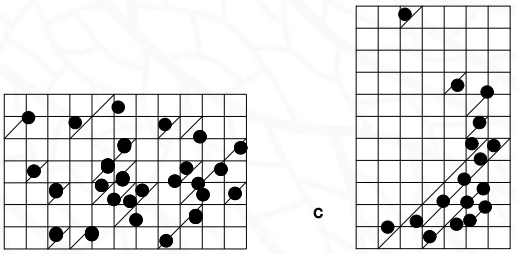
[4] Figure reproduced from Alberta Endangered Species Conservation Committee (2010; originally adapted from IUCN 2001, IUCN Red List categories: version 3.1).



(a) is the spatial distribution of known, inferred or projected sites of present occurrence.



(b) shows one possible boundary to the extent of occurrence, which is the measured area within this boundary.



(c) shows the Index of Area of Occupancy (IAO), which can be achieved by the sum of the occupied grid squares (2 km x 2 km).