

**Instructions for the Preparation of  
COSEWIC Status Reports**



**Approved by COSEWIC in November 2019**

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## **COSEWIC STATUS REPORTS AND THE REVIEW PROCESS; AN OVERVIEW**

COSEWIC (Committee on the Status of Endangered Wildlife in Canada) bases its status assessments primarily on status reports. A status report is a comprehensive technical report that compiles and analyzes the best available information on a wildlife species' status in Canada and indicates the threats to that wildlife species<sup>1</sup>. The status report must meet minimum standards of quality and completeness as outlined in this document. Status reports are written by knowledgeable people (hereafter referred to as "report writers") who have either been awarded contracts by the Secretariat (e.g., through the COSEWIC "Call for Bids" process), or are submitting unsolicited status reports.

A report writer will procure the best available scientific, community, and Aboriginal Traditional Knowledge<sup>2</sup> (ATK) when writing status reports for COSEWIC. Accurate evaluation, detailed analysis, and complete and up-to-date coverage of the relevant information are important. Among the most important types of information used are the sizes and trends in populations, distributions (e.g. extent of occurrence, area of occupancy, number of locations, etc.), habitat quality, and threats. It is equally important to identify gaps in knowledge and uncertainty associated with data or inferences.

While the primary purpose of a status report is to provide sufficient information to make a status assessment of a wildlife species, it also plays a role in subsequent processes, such as recovery planning.

There are several stages in the preparation of a COSEWIC status report and the average time to completion is approximately two and a half years.

1. "Draft Report". This is the report that is received by the Secretariat and the responsible Species Specialist Subcommittee (SSC) Co-chair from the report writer for the first time. The report is reviewed by the SSC, jurisdictions that have a responsibility for that wildlife species ("range jurisdictions") and by external experts at the discretion of the SSC Co-chair. Comments and suggestions are sent to the SSC Co-chair and forwarded to the writer with instructions from the Co-chair for changes that must be incorporated into the report.

2. "Provisional Report". Once changes have been made, the involvement of the report writer is concluded (although in certain circumstances, the writer may be re-engaged in a later stage – see paragraph below). The SSC and COSEWIC assume responsibility for further revision and completion of the report.

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<sup>1</sup> "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.

<sup>2</sup> Processes for obtaining information on ATK are currently under development.

3. “Interim Report”. The SSC uses the Provisional Report to produce an Interim Report, which is sent to range jurisdictions six months before a COSEWIC Wildlife Species Assessment Meeting (WSAM), and to all members of COSEWIC two months before the WSAM. In some cases, the report writer’s involvement may extend past the end of the six-month review period so that the report writer can undertake revisions resulting from the review, at the direction of the Co-chairs. This may be a part of the original contract with the report writer, or described in a separate contract with the original report writer or another person. The SSC subsequently may add additional information / analysis, or make changes as deemed necessary during this process. The SSC also adds a recommendation of status to COSEWIC. The Interim Report is the basis for COSEWIC’s assessment of status of the wildlife species.

4. “Final Report”. SSC Co-chair finalizes the status report, incorporating any changes requested by COSEWIC during the WSAM. COSEWIC’s assessment is appended, and the report is then translated and published on the [SARA public registry](#) as a “COSEWIC assessment and status report”.

Unsolicited reports are reports that have not been commissioned by COSEWIC through a Call for Bids. They may be received by COSEWIC from any credible source, including but not limited to provincial, territorial or federal agencies. Unsolicited status reports must be accompanied with a completed [Application for Wildlife Species Assessment](#) which includes a request for assessment, a permission to publish, a waiver of moral rights (see next section), a declaration of conflict of interest, and a justification for the assessment of the wildlife species. The full completed application and unsolicited status report is submitted to the Secretariat, which in turn forwards it to the appropriate SSC Co-chair. The report is then subjected to the same review process (see Section 5.3.2) as for a commissioned status report. The report writer is expected to make editorial changes, add available information, and/or delete inapplicable sections of the report as specified by the responsible Co-chair. Failure to comply with such requests may result in a report being returned “unreceived” by COSEWIC.

Unsolicited status reports can be received formally for consideration by COSEWIC only at a COSEWIC Assessment Meeting. Writers of unsolicited status reports are informed whether the report was accepted or rejected by COSEWIC, and in the case of the former, the status designation that was assigned the wildlife species and the reasons. If the report is rejected, COSEWIC provides the report writer with the reason(s).

In cases where a report concerns a wildlife species in a taxon for which there is currently no SSC (e.g., priapulids, dinoflagellates, or echinoderms), an ad hoc Species Specialist Subcommittee may be struck by the Chair of COSEWIC for the purposes of the designation process.

## **INTELLECTUAL PROPERTY (IP<sup>3</sup>) AND MORAL RIGHTS**

For all reports contracted by Environment and Climate Change Canada on behalf of COSEWIC, IP will be retained by the Government of Canada (“the Crown”) so that the reports can be published on the public registry.

COSEWIC will be cited as “author” for reports commissioned (or initiated) after May 2001. The report writer(s) will be acknowledged in the final status reports posted on the SARA public registry, and the roles of other contributors will be recognized. Report writers may, however, opt out of acknowledgement of their role in the status report if they wish. In the case of updated status reports, all report writers involved in the preparation of the original status report on the wildlife species and any previous updated reports will also be acknowledged.

### **Property Rights in ATK**

ATK is the property of those who hold it. Contractors will require permission for gathering ATK using appropriate consent forms to be provided. Knowledge holders will be provided with an opportunity to review and validate the factual information shared with the report writer, before it is integrated into the status report. Raw information (e.g. transcripts, tapes, etc.) will be returned to the knowledge holder or the community for storage. The report writer shall not have any intellectual property rights in the knowledge provided from Aboriginal sources.

## **GENERAL CONTENT OF REPORTS AND FORMATTING**

Generally speaking, report writers should present all information in an objective way, presenting both sides of contentious issues so that judgements on those issues by SSCs and COSEWIC are unbiased and well informed. This includes the case for separate DUs and the evidence that supports it.

### **Required Contacts and Other Sources of Information**

In addition to conducting a thorough review of the relevant scientific literature, report writers must contact the jurisdictions (federal, provincial and territorial) where the wildlife species is found or from where it has been extirpated to ensure that the report contains the best and most current information from all possible sources. If the wildlife species occurs within the jurisdiction of Wildlife Management Boards (WMBs), the appropriate WMB(s) must also be contacted. All report writers must contact the COSEWIC Secretariat for more information and instructions on integrating ATK in

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<sup>3</sup> IP protection provides the holder of the intellectual property the right to prevent others from doing something with a work for a certain period of time. Copyright includes giving the holder the sole right to produce, reproduce, perform or publish any translation of the work. For more information on IP see the internet site of the Treasury Board Secretariat:

[http://www.tbs-sct.gc.ca/pubs\\_pol/dcgpubs/contracting/tipaucpc\\_e.html](http://www.tbs-sct.gc.ca/pubs_pol/dcgpubs/contracting/tipaucpc_e.html)

reports, the preparation of distribution maps and calculating estimates of extent of occurrence, area of occupancy, and index of area of occupancy. Report writers must also contact relevant Canadian Conservation Data Centres or Natural Heritage Information Centres, and the Chair of the recovery team for the wildlife species, if one exists. Contact information for all agencies mentioned above is provided in [Required Contacts for Information on Wildlife Species](#) for report writers, available on the COSEWIC website. Report writers are encouraged to include information from other credible sources, including personal communications with knowledgeable local people and other experts. The report writer's own professional inferences are welcome. For updates on status reports, former report writers who may have new information on the wildlife species should be contacted and cited. Every effort should be made to substantiate these sources or provide corroborating information from multiple sources.

### **Including ATK in Wildlife Species Assessments**

It will be the responsibility of status report writers to include ATK in status reports on those wildlife species for which ATK is available. This will be facilitated through the ATK Subcommittee that will direct report writers to appropriate contacts. It could also include sources of ATK that have been investigated by the report writer provided that the supporting information for the source was reviewed by the ATK Subcommittee. ATK will be included when it becomes available, at any identified stage of report preparation.

Report writers must contact the COSEWIC Secretariat ATK coordinator (see [Required Contacts for Information on Wildlife Species](#) on the COSEWIC website) to advise that they are preparing a new or updated wildlife species status report. Report writers will provide the Secretariat with a preliminary map of the wildlife species Canadian distribution that will be used by the ATK Subcommittee to assess relevant Aboriginal contacts.

Under the guidance of the ATK Subcommittee and assisted by the COSEWIC Secretariat, information from Aboriginal sources, if available, should include:

- Wildlife species occurrence;
- Wildlife species distribution;
- Population size;
- Information related to observed changes in biology and/or population size, over time;
- Potential threats, existing management plans, harvesting restrictions;
- Aboriginal name and dialect; and
- Other relevant information.

Do not include specific information on Aboriginal cultural, medicinal or spiritual use of a wildlife species. It is appropriate, however, to identify that a wildlife species is used by an Aboriginal group.

Provide a list to the ATK Subcommittee of the names of all the people who were contacted for the purpose of accessing ATK.

Please use the inclusive term Aboriginal Peoples or, specify source as Inuit, Indian or Métis.

## **Sensitive Information**

Once approved by COSEWIC, the final status report will become a public document. Report writers should ensure that any detailed information that might further imperil a wildlife species (such as the precise locality of populations or their habitat) or that is considered confidential (such as ownership of private lands or specific details relating to ATK) does not appear in the status report. This level of detail is usually not necessary for status designation and, if included in reports, may encourage interference with populations that are already at risk and may have repercussions for access to private lands or ATK in future assessments or other conservation work. Sensitive information must be submitted to the SSC Co-chair and the COSEWIC Secretariat in a Sensitive Species Data Reporting Sheet that is separate from the status report itself and not explicitly referenced in the status report. Use the [Data Sensitive Species Reporting Sheet](#) provided on the COSEWIC website.

## **Updated Status Reports**

Status reports are updated every 10 years, or sooner, if necessary. The new procedure adopted by COSEWIC in 2001 for updated reports is to directly add to or modify the most recent status report on the wildlife species. In this way, an updated report can be prepared simply, efficiently and more cost effectively than in the past. All status reports commissioned or initiated after May 2001 will become “living documents” containing a complete summary of the knowledge to date. Report writers should thus contact the COSEWIC Secretariat and responsible Co-chair to determine to what extent a previous report can serve as the basis for the updated status report or whether a complete new report is required to serve as the basis for future updates. In either case, updated status reports should provide the same comprehensive summary of information about the wildlife species and its current status in Canada as a new report. Also, updated reports should adopt the format currently in use. Thus, the instructions and requirements in this manual apply equally to new and updated status reports.

In some situations where it is suspected that the wildlife species’ status hasn’t changed, COSEWIC may decide to prepare a short status appraisal summary, which outlines relevant information pertaining to status. This document accompanies the existing status report. In these cases, no updated status report is required.

## **Formatting**

Status reports may be written in English or French. For place names, use English names (or French if the report is written in French) throughout the report when available and easily understood i.e., do not translate into English place names written in languages other than English that are in common usage in English publications, such as



Tierra del Fuego. Provide the place name in the local language upon first use when appropriate and when in common use in the local area or scientific literature when doing so aids in understanding. Use the [Formatting Template](#) provided on the COSEWIC website. Inclusion of all headings and subheadings specified in the template is required (unless otherwise noted). This will ensure coverage of the crucial topics relevant to decision-making by COSEWIC. If information for some subheadings is deficient, this should be indicated under the appropriate heading. New subheadings may be added as necessary, depending on the taxon.

Status reports may vary in length depending on the amount of information available. They should contain a summary of all relevant information but not all details of all information. The report writer's job is not to be exhaustive but rather to pick out the relevant available material and succinctly summarize and synthesize it for COSEWIC's use. Report writers should strive to be brief, but bullets and lists should be avoided.

Do not use the first person, as the "author" of the report will eventually be COSEWIC. For information on citing literature or personal communications, see the section Information Sources.

All tables and figures should be numbered and referred to in the text of the report. Ensure that figures photocopy well in black and white, especially when colour is used, and that legends and symbols can be interpreted correctly when read in black and white. More information on figures and tables appears in Detailed Instructions below.

Ensure that map scales use metric units. Include metric conversions in brackets when quoting a source that uses non-metric units. When reporting uncertainty quantitatively, specify what measure of variability is used (standard error, standard deviation, quartiles, etc).

For instructions on writing numbers and abbreviations, please use [The Canadian Style](#).

## **DETAILED INSTRUCTIONS**

### **TITLE PAGE**

Refer to the formatting template for guidance on the content and format of this page.

### **EXECUTIVE SUMMARY**

The executive summary is intended for the layperson and will be included *verbatim* in the consultation document for legal listing under SARA and will be used for

information posted on the [SARA public registry](#). Summarize in simple terms the relevant material contained in the body of the report; do not include information that is not presented in the body of the report. Avoid jargon, overly technical language and facts that mean little to the public in the Executive Summary. Use the common names of wildlife species (the scientific name of the wildlife species that is the subject of the report can be provided after the common name is used the first time). Do not make reference to figures in the report, and do not include literature citations. Be brief; the executive summary should not exceed two pages. Use these headings:

- Wildlife Species Description and Significance (with emphasis on morphological description)
- Distribution (do not make reference to EOO, AO, IAO, and grid size)
- Habitat
- Biology
- Population Sizes and Trends
- Threats and Limiting Factors
- Protection, Status and Ranks

Under the last heading, include any previous COSEWIC designations, SARA listing, provincial/territorial legal listing, IUCN global listing (Red list), and Canada and jurisdictional General Status of Wild Species ranks. Convert NatureServe G-rank, Canada N-rank, and provincial/territorial S-rank notations into commonly understood terms.

## TECHNICAL SUMMARY

The technical summary is available on the COSEWIC website as part of the [Formatting Template](#). Complete the technical summary after you have finished the report. A technical summary for each proposed designatable unit should be provided separately as well as one for the entire species within Canada. For the meanings of terms in this Technical Summary, refer to the section entitled [Definitions and Abbreviations](#) found accompanying the [Information for Preparing Status Reports](#) on the COSEWIC/COSEWIC website. Questions about the technical summary should be directed to the appropriate SSC Co-chair. All information presented in the technical summary must be presented in the report.

Provide requested data and relevant associated information in the fields on the right-hand column. In the fields that include “**observed, inferred or projected**”, etc. leave the text in the left column intact, but add text such as “**yes, inferred**” or “**yes, inferred and projected**” to the right column.

If details are provided in text, cite relevant section(s) or page(s). In completing the table of number of mature individuals per population, the author can add or delete rows as needed.

When using a percentage clearly indicate whether the percentage refers to an increase

or a reduction by using a plus or minus sign.

The table for “Recommended Status and Reasons for Designation” is to be completed in the Interim Report by the SSC; COSEWIC will approve or modify the text in this section for the Final Report.

## **PREFACE (to updated status reports)**

Summarize new knowledge gained since the wildlife species was last assessed. Focus on what is relevant to the application of the assessment criteria, such as change in taxonomy, population size, trends, extent of occurrence, or area of occupancy.

## **WILDLIFE SPECIES DESCRIPTION AND SIGNIFICANCE**

### **Name and Classification**

Provide the most up-to-date accepted scientific name and authority, in agreement with the taxonomic standards used by the relevant SSC. Follow scientific writing format, including upper case for first letter of genus name, lower case for species and subspecies names, italics for all genus, species, subspecies, and variety names, and no italics for any taxonomic names above genus (e.g., Family, Order, Class names, etc). If needed, consult the appropriate SSC Co-chair regarding specific information or references, especially on subspecies taxonomy. Provide information on classification, including subspecies and variety (if applicable). Other classification categories can be included if relevant. List the recognized subspecies (or varieties) that occur in Canada. Discuss any recent taxonomic or nomenclatural changes or taxonomic problems or uncertainties. Give synonyms for names, including scientific names, and common names in English, French or other languages relevant in a Canadian context (Inuktitut, Cree, etc.). If there is confusion over the correct usage of a name, very briefly review the history related to the application of the names. Briefly justify the recognition of an infra-specific taxon if controversial.

For the document that outlines a framework for naming COSEWIC wildlife species, refer to the section entitled [COSEWIC Guidelines for Naming Wildlife Species](#) found accompanying the [Information for Preparing Status Reports](#) on the COSEWIC/COSEPAC website.

### **Morphological Description**

Provide an accurate, brief morphological description of the wildlife species using popular terms. If appropriate, include diagnostic features differentiating the wildlife species from similar or easily confused local wildlife species. References to good, easily accessible descriptions, illustrations or keys can be provided, if appropriate. For wildlife species with various life stages (e.g., larvae, pupae) or sexual dimorphism, describe stages and/or sexes using illustrations if necessary (but provide details on how

they fit into the life cycle in the Biology section). For lichens, information on characteristic chemical components should be mentioned.

Provide at least one line drawing or clear photograph with good contrast (i.e., must photocopy well in black and white) of the wildlife species. This can serve as a figure in this section, or be used on the cover page of the final published document. The illustration may be submitted as a high resolution electronic file or a hard copy. If the illustration is taken from a published document or belongs to someone other than the report writer, it must be accompanied with a letter of permission from the author/owner of the illustration.

### **Population Spatial Structure and Variability**

Provide information about population structuring for the wildlife species in Canada. Are there geographical, ecological, or behavioural barriers to movement that might create genetic structure or strong demographic isolation within the Canadian part of the wildlife species' range or between Canadian subpopulations and those outside of Canada?

All available information that would help to define population structure below the species level should be described. Such information could include genetic, tagging, parasite, ecological, morphometric and meristic data, as well as information about range disjunctions or barriers to population mixing. Studies pertaining to population structure should be described in enough detail that reliability can be assessed. In general, such detail would include some sense of the scope of the study in terms of numbers of individuals and number and geographic range of subpopulations surveyed. For genetic studies, the types and numbers of genetic markers employed, and measures of genetic differentiation such as  $F_{ST}$  statistics or sequence divergence estimates should also be reported. Statements such as "subpopulations are genetically distinct" should not be made or quoted without quantification and qualification (e.g.,  $F_{ST}$  estimates and  $P$  values). Report writers are not expected to do additional statistical analyses beyond those presented in source publications. However, if estimates of genetic differentiation are provided without estimates of mean distances among subpopulations, then report writers should calculate those distances if possible.

Where relevant to a wildlife species' status, summarize genetic measures of subpopulation variability (indices of heterozygosity ( $H$ ) for diploid markers or haplotype diversity ( $h$ ) for haploid markers such as mitochondrial or chloroplast DNA).

If the wildlife species has been subjected to human intervention, there must be a discussion based on the [COSEWIC Guidelines on Manipulated Wildlife Species](#) on which components are included and which are excluded from the assessment.

## Designatable Units

COSEWIC generally assesses the status of a species throughout its Canadian range. In these cases, the species itself is considered one designatable unit. Below the species level, status may be assigned in cases where a single designation is not sufficient to accurately portray the status of the species. The rationale for assessing a designatable unit separately must be clearly spelled out in this section.

The [Guidelines for Recognizing Designatable Units](#) on the COSEWIC website explain when a taxonomic unit may warrant more than one status designation. Note that “designatable unit” replaces what was formerly “population of national significance”. In applying the guidelines, report writers should be aware that even though a wildlife species may be found in several biogeographic zones (i.e., see ecozone maps in the Guidelines referenced above), a subpopulation in any one of these zones may be treated separately only when subpopulation trends and factors affecting them differ significantly or when there are other biological differences between subpopulations that reflect historical or genetic distinctions. Refer to information described in the Population Spatial Structure and Variability subsection as needed.

For status reports commissioned by COSEWIC, the treatment of designatable units will normally be specified in the terms of reference in the contract. If a report writer concludes that he/she is dealing with a designatable unit other than that specified in the contract, the report writer should discuss the situation with the SSC Co-chairs and come to an agreement.

In each subsequent section of the report, ensure that the required information (e.g., population size, habitat, trends, threats) is provided for the species in Canada as a whole and for each designatable unit separately. If biological information differs between designatable units, identify the differences.

## Special Significance

Summarize if already presented in other parts of the report. Otherwise, address any of the following that are relevant to a wildlife species' special significance: The endemicity of the species, subspecies, variety, etc. to Canada, especially if it is a relict wildlife species or a wildlife species in a monotypic genus; its ecological role (e.g., sentinel species, target species, keystone species, indicator species, top predator, significant prey item); the worldwide status of the wildlife species; the security of the taxonomic unit and whether any related forms are at risk; the importance of the gene pool, apart for survival, *per se*; the importance or special interest of the wildlife species for scientific reasons; its importance to the public, specifying the reason(s) ( e.g., hunting, sport fishing, food, especially subsistence exploitation, commercial exploitation, national or international trade for crafts, pets, aquaria, horticulture, recreation); its social-economic importance, such as medicinal, ethnobotanical, ethnozoological or culinary characteristics; any adverse public opinion or prejudice against the wildlife species; any confusion with a more common wildlife species to its detriment.

## **DISTRIBUTION**

This section deals only with the description of geographic ranges, extant and historical localities and populations, and changes in the numbers or extent of these quantities. Information relating to population sizes and trends (numbers of individuals, etc.) should go in the section Population Sizes and Trends.

When presenting and discussing distribution data, changes in distribution, etc., discuss any uncertainties associated with this information. When dealing with sensitive data (precise locality of populations, ownership of private lands, etc.), put these data in a separate appendix (refer to the Sensitive Information subsection above).

### **Global Range**

Provide a brief review of the global distribution of the wildlife species and prepare an up-to-date map indicating its current global range. When applicable, distinguish between breeding, wintering, migratory or other areas and routes. When available, include information or a map showing the historical range of the wildlife species and identify recently extirpated populations.

### **Canadian Range**

Provide a review of the wildlife species' current Canadian distribution. Indicate whether the range of the wildlife species is wide or restricted. Indicate whether the wildlife species is endemic to Canada or what proportion of the distribution is in Canada. Describe evidence for fragmentation or disjunctions. Indicate the biogeographic zones in which the wildlife species occurs. If the wildlife species is dependent on another wildlife species for survival, provide information on the Canadian distribution of the other wildlife species as well.

If relevant and feasible, subpopulations or specimens of plants of horticultural origin should be identified clearly and a distinction made between material derived from known native subpopulations and horticultural stock of unknown origin. Similar information on introduced subpopulations of animal species should be provided where applicable.

Describe temporal changes (expansions and contractions) in the distribution of the wildlife species. Of particular interest are changes over the last three generations or 10 years, whichever is longer (generation time is discussed further in the subsection Life Cycle and Reproduction). Provide evidence for trends in the number of subpopulations or locations (see discussion on location vs. subpopulation in the Important Information and Definitions for Distribution Mapping and Estimating Extent of Occurrence and Area of Occupancy subsection below) and differentiate among extant, extirpated and historical subpopulations or locations. Indicate historical subpopulations of unknown

status and erroneous reports (misidentified specimens and localities).

Prepare an up-to-date map showing the current and historical distributions of the wildlife species in Canada (refer to the Important Information and Definitions for Distribution Mapping and Estimating Extent of Occurrence and Area of Occupancy subsection below for notes on requirements and methods). If the distribution covers more than one designatable unit, map the distribution against the appropriate biogeographic zones for the taxonomic group (refer to the Designatable Units subsection above) and clearly label each unit. When applicable, distinguish between breeding, wintering, migratory or other areas and routes. Specify whether the distribution data refer to locations or populations. Clearly distinguish among extant, extirpated and historical locations or populations, and among native and cultivated or introduced locations or populations (see [COSEWIC Guidelines on Manipulated Wildlife Species](#)). Ensure that maps are not so detailed that exact locality information is discernible. In the text, localities of occurrence should only be identified in a generalized manner (refer to the Sensitive Information subsection above). Finally, ensure that the scale of the distribution map is appropriate to the geographic extent of the wildlife species' distribution (e.g., do not show the entire country when the distribution is limited to a region of Canada).

Provide estimates (in km<sup>2</sup>) of the extent of occurrence and area of occupancy of the wildlife species; report both a biologically meaningful value and an index of area of occupancy (refer to the Important Information and Definitions for Distribution Mapping and Estimating Extent of Occurrence and Area of Occupancy subsection below for a discussion of the definition of these terms and for notes on requirements and methods). Describe any trends or fluctuations in the size of the extent of occurrence and area of occupancy. Clearly document how the extent of occurrence and the area of occupancy were estimated (assumptions, methods, inferences, etc.).

### **Extent of Occurrence and Area of Occupancy**

To obtain detailed instructions and ensure that methodologies and concepts are applied correctly and consistently in the preparation of wildlife species distribution maps and in estimating extent of occurrence, area of occupancy and index of area of occupancy, report writers must contact the COSEWIC Secretariat (see [Required Contacts for Information on Wildlife Species](#) on the COSEWIC website). The Secretariat will assist with the preparation of distribution maps and the calculation of extent of occurrence and area of occupancy, when needed.

Report writers must submit to the SSC Co-chair and the COSEWIC Secretariat all survey data (species observations / localities, search effort), whether collected during field verification performed in the course of writing the status report or obtained from third parties (federal, provincial and territorial jurisdictions, Conservation Data Centres, recovery team, etc.). Reasonable effort should be made to ensure that the data obtained from third parties can be transferred to COSEWIC by obtaining proper permissions. Finally, report writers should submit the final version of the Canadian



distribution map in a format compatible with a Geographic Information System (GIS).

When writing about the Canadian range, it is important to use COSEWIC's definitions for populations, and locations. The Glossary on the COSEWIC website (under [Definitions and Abbreviations](#)) defines these terms in detail, and should be consulted.

- The population is the total number of individuals of the taxon in Canada.
- A subpopulation is a geographically or otherwise distinct group (a portion of the population) that has little demographic or genetic exchange with other such groups (populations) - typically one successful migrant individual or gamete per generation or less.
- A location is a geographically distinct area in which a single threatening event can rapidly affect all individuals of the wildlife species present. The size of the location depends on the area covered by the threatening event and may include part of one or many populations. Where more than one threatening event is possible, location should be defined by considering the most serious plausible threat. Figure 1 illustrates the differences between subpopulations and locations.

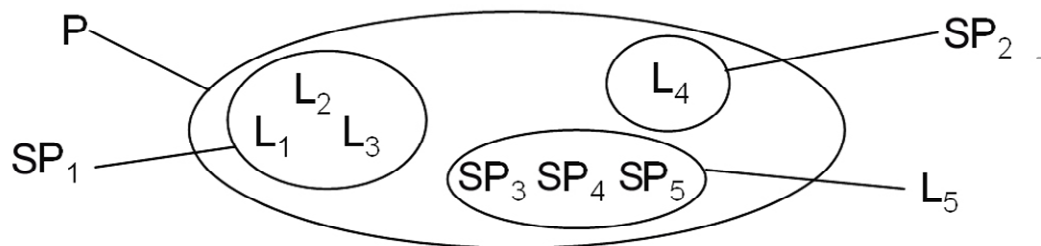


Figure 1: P = Population in Canada (or of a designatable unit); SP = Subpopulation; L = Location. For explanations of terms, see text. Note that populations and locations can form subsets of each other depending on the nature of the threats to the wildlife species.

The extent of occurrence (EOO) is the area contained within the shortest continuous boundary drawn to encompass all the known, inferred or projected sites of present occurrence of the wildlife 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 which contains all sites of occurrence (Figure 2).



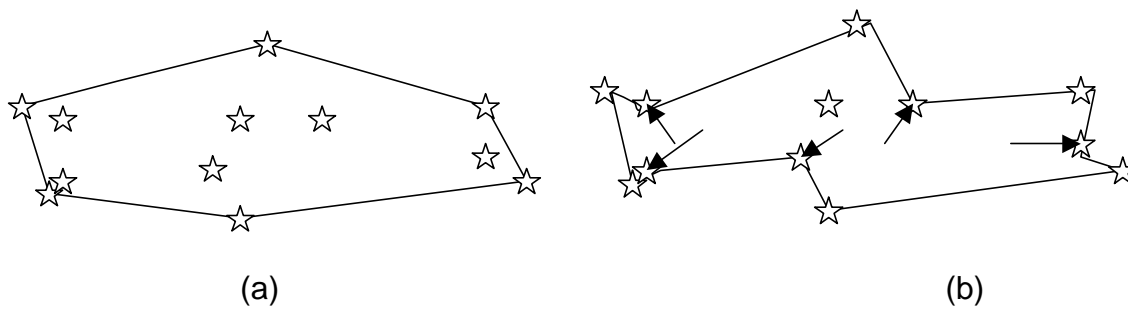


Figure 2. Estimating extent of occurrence. The method is correct in (a) and incorrect in (b). In (a) the outer most sites of occurrence (stars) are connected with a line such that no internal angle exceeds  $180^\circ$ ; the enclosed area is the extent of occurrence. In (b) the line drawn has several internal angles (arrows) that exceed  $180^\circ$  and the extent of occurrence would be underestimated.

The area of occupancy is defined as the area *within* the extent of occurrence that is occupied by the wildlife species, excluding cases of vagrancy. The measure reflects the fact that a wildlife species will not usually occur throughout the entire area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases (e.g., irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa), 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 Canada). The area of occupancy is measured both as an estimate of the actual area occupied by the wildlife species (“biological” area of occupancy) and as an index (index of area of occupancy).

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 is usually known and therefore can be simply added up. While, for a species of bird, the actual area of occupied habitat is often unknown, but 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 wildlife 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 thousand 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 COSEWIC'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). Currently, COSEWIC requires that this index be calculated based on a grid with a cell size of 2 km x 2 km. In addition, COSEWIC allows the use, in specific circumstances, of a grid with a cell size of 1 km x 1 km. In these cases, IAO based on a 2x2 grid must also be calculated and reported. If EOO is less than IAO, EOO should be changed to make it equal to IAO to ensure consistency with the definition of IAO as an area within EOO.

## **Search Effort**

Describe the qualitative (distributional) search effort, or provide the appropriate information sources, used to determine the wildlife species' Canadian range. Throughout this section, it is very important to document search effort, uncertainty, and *how* presence/absence data were collected. Use maps and tables to summarize large quantities of data.

Summarize the total search/catch effort for this species that has occurred in the past by *all researchers or methods*. Indicate which searches are general searches and which are targeted searches. Where possible, also include here the proportion of potential habitat searched (see discussion of negative data, below) and the total number of sites searched.

- Describe the search efforts used to locate populations and to measure population sizes. If based on CPUE (catch per unit effort) describe the 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).
- For search effort spent specifically for the preparation of the current report, specify the year in which the search was conducted, and the person who completed the work, e.g., "Sites x and y were discovered by Joe Mossman in 2007..." This should include number of person/hours, number of sites searched, and proportion of potential habitat searched.
- 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.

In data tables and on maps, clearly distinguish among positive and negative data. Positive data indicate where the species is or was found in the past, whereas negative data indicate where the species was searched for but not found. In general, negative data are important because they demonstrate the extent of search effort and should be included whenever they are available. Where applicable, the last date the wildlife species was collected, observed and/or reported at any given location or in any population should be provided.

## **HABITAT**

### **Habitat Requirements**

Describe the general habitat requirements of the wildlife species. If known, state if the wildlife species is a habitat generalist or specialist in terms appropriate to the taxon under consideration. Describe as precisely as possible the typical and essential habitats of the wildlife species. When practical, provide a map showing occupied habitats, as well as potential and unoccupied habitats (the latter is extremely useful to the discussion of sampling effort). If the wildlife species is dependent on another wildlife species for its survival, provide habitat requirements for the other wildlife species.

Provide, in a succinct form, as much information that is directly pertinent to the taxon as is available (Table 1). This may include such topics as: the stage(s) of ecological succession used by the wildlife species (if applicable, at different stages of its life cycle, e.g., for reproduction, during migration, for wintering); the level of habitat specialization of the wildlife species within any given life cycle stage; for presence of other wildlife species at risk designated by COSEWIC, or other rare wildlife species included in widely recognized lists used provincially and nationally; the wildlife species' tolerance to disturbance. Clearly indicate what part of the taxon's range the habitat information comes from, particularly when this information is not from Canada. When describing community structure, do not include extensive lists of associated wildlife species.

Identify, where possible, the category of an existing ecosystem classification in which the wildlife species occurs. If one of the habitat types the species has occupied corresponds to or is a component of a natural community that NatureServe has ranked, provide the rank(s).

Table 1. Check list for habitat characteristics to include<sup>4</sup>

Habitat characteristics to include	Plants and lichens	Invertebrates	Vertebrates	Aquatic species
Physiographic and topographic characteristics	[			
Substrate (ex. bedrock and soil type)	[	[		[
Drainage, pH, and nutrient availability	[			
Community structure	[			
Shade tolerance	[			
Ability to grow on unstable substrates	[			
Dependence on dynamic factors such as fire, erosion, deposition of nutrients, and flooding.	[	[		
Microhabitat	[	[		
Special habitat requirements for roosting, burrows, hibernating, staging and overwintering for juveniles, adults or larvae		[	[	[
Habitat area required for the home range (particularly of territorial species)		[	[	[
Water physico-chemical characteristics (temperature, depth, pH, salinity, current, turbidity, hardness, alkalinity)				[

## Habitat Trends

Provide pertinent information about habitat availability and describe potential habitats that have not been surveyed or new habitats that have become available. Indicate the extent of habitat fragmentation (patchiness), whether or not the fragmentation is natural and the extent to which the patches are occupied by the wildlife species. Discuss net trends in habitat, if any (e.g., net gain or loss of area or quality), and projections into the future when appropriate, 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. Discuss any uncertainties associated with estimations of trends. For wildlife species whose distribution crosses an international boundary, summarize habitat trends in the foreign country. Note that estimating trends in habitat (or potential habitat) is different from

<sup>4</sup> Use as a guideline. For some wildlife species, information not highlighted might be relevant (e.g., microhabitat for a vertebrate or an aquatic species, substrate for some invertebrates, etc.).

estimating trends in the number of locations or populations of the actual wildlife species addressed in the subsection Canadian Range above.

## BIOLOGY

Provide some preamble in a paragraph that provides context for the information being provided below. For example, if all the information is from one source, give the source here and describe its importance (e.g., a monograph, a comprehensive review, the only information available, etc.). If any information is from the report writer’s own research or experiences, briefly describe the research stating whether it is published (give references), in press, or in preparation.

Under the subheadings provided below, include only information about characteristics that make a wildlife species particularly susceptible or allow the reader to better assess the level of risk of the wildlife species. Avoid repetition of information under more than one subheading or that is presented elsewhere in the report. Other subheadings better suiting a particular wildlife species may be used under special circumstances with approval by the SSC Co-chair.

### Life Cycle and Reproduction

The organization of information under this subheading will differ greatly depending on whether the wildlife species is a plant, vertebrate, invertebrate, aquatic species, or terrestrial species (Table 2). It is in this section that report writers should try to estimate generation time, which is the average age of parents of the current cohort (i.e., newborn individuals in the population). This is greater than the age at sexual maturity or first breeding and less than the age of the oldest breeding individual, except in wildlife species where individuals breed only once. Where generation varies under threat (e.g., harvesting), the more natural (i.e., pre-disturbance), generation time should be used.

Table 2. Life cycle, population biology, and dispersal description check-list<sup>5</sup>

Attributes	Plants and lichens	Invertebrates	Vertebrates
Life cycle: life history stages, their development times and feeding strategy (filter feeder, grazer, gatherer, predator, parasite, shredder, omnivore, planktivore, herbivore, predator, benthivore, insectivore, molluscivore, etc.)	[	[	[
Longevity	[	[	[
Generation time	[	[	[

<sup>5</sup> Use as a guideline, as Table 1. For some wildlife species, information not checked might be relevant.

<b>Attributes</b>	<b>Plants and lichens</b>	<b>Invertebrates</b>	<b>Vertebrates</b>
Reproductive schedule (strategy): iteroparous (polycarpic), semelparous (monocarpic)	[	[	[
Potential for hybridization	[	[	[
Fertility (birth rate)	[	[	[
Dormancy, diapause, hibernation	[	[	[
Breeding habits (ex. solitary vs. colonial breeder) and requirements (isolation, open ground, courtship ground, courtship food, etc. Period of seed set / spore production, dormancy and germination requirements)	[	[	[
Population age, stage, or size structure, and sex ratios	[	[	[
Age at first reproduction		[	[
Type of reproduction (oviparity, ovoviviparity, viviparity, etc). For aquatic oviparous species, state where fertilization occurs, in the water (planktonic eggs and sperm) or internally.		[	[
Annual movements of any sort, such as juvenile dispersal, movement to and from over-wintering sites or hibernacula, migratory patterns, etc. Long-term fidelity to home range, concentration of individuals in staging or molting areas, any requirements of wintering range. Obstacles in the migratory or dispersal routes.		[	[
Vegetative propagation (clonal growth) or asexual reproduction	[	[	
Dispersal stages, mechanisms (spores, seeds or clonal propagules), vectors (e.g. insects, mammals, fish for glochidia of unionids; wind, current for ephippia and spores), distance for each mode, and time(s) of the year that dispersal occurs	[	[	
Pollination mechanisms and pollinators	[		
Spatial and temporal aspects of sex expression: flowers unisexual vs. hermaphrodite, plants monoecious, vs. dioecious, protogynous vs. protandrous, part of the growing season flowering take place	[		
Mating system	[		

Attributes	Plants and lichens	Invertebrates	Vertebrates
Voltinism : univoltine, bivoltine, multivoltine		[	
Mortality rates		[	[

## Physiology and Adaptability

Describe the wildlife species' main physiological requirements and tolerances. For aquatic organisms, describe any requirements or tolerances for physical characteristics (e.g., turbidity, water velocity, temperature, depth) and/or chemical characteristics (e.g., pH, alkalinity, calcium and total hardness, salinity/conductivity). Describe any special physiological adaptations that allow the wildlife species to survive periods of adverse conditions, such as spore formation in plants, hibernation, aestivation and thermoregulation in animals.

Confine discussion to adaptations that have direct bearing on the wildlife species' ability to survive. For example, describe any specializations that allow the wildlife species to adapt readily to change, and its susceptibility to stochastic events such as natural catastrophes (fires, fluctuating or abnormally high or low water levels, temperature extremes, severe weather conditions, extremes of rainfall or drought) or anthropogenic disasters (industrial activity or accidents, human exploitation).

For plants, describe any successes in artificial propagation, seed germination and growing the wildlife species horticulturally, as well as success in transplanting the wildlife species that has been bred in captivity or raised horticulturally. Discuss the feasibility of using cultivated individuals from horticultural sources for transplanting.

For aquatic species, describe any aquaculture successes in transplanting specimens that have been artificially reared and the feasibility of transplanting wild stock.

For terrestrial animals, focus on behavioural adaptations, such as social or reproductive behaviour, predator-avoidance behaviour, foraging behaviour, tameness, aggressiveness, curiosity, conditioning, response to acoustic or visual stimuli, etc. If the wildlife species is territorial, give the size of its territory and its home range and discuss any behaviours that may render it vulnerable to humans or other dangers. Describe any successes in breeding or raising the wildlife species in captivity and whether captive-reared individuals would likely survive if released in the wild.

## Dispersal and Migration

Discuss only dispersal mechanisms or patterns here with attributes relevant to the taxon (Table 2). Do not repeat anything stated previously in the "Distribution" section. Dispersal potential determines the range and numbers of populations that can be established by a wildlife species and is determined to some extent by the physiological

and ecological tolerances and requirements of the wildlife species. The two basic types of dispersal mechanisms are *passive* and *active dispersal*. Passive dispersal is hitch-hiking a ride using abiotic (for example, water currents, wind, ships, boats, etc.) or biotic (for example, birds, insects, mammals) vectors. Most of the active dispersal mechanisms are natural and include the swimming, running, walking or flying abilities of the wildlife species. Many of the passive dispersal mechanisms are anthropogenic and can be intentional or non-intentional. Intentional introductions are typical for organisms valued as food (e.g. plants, fish, molluscs).

It is important to address severely fragmented (see [Definitions and Abbreviations](#)) within the Canadian extent of occurrence, and the extent to which dispersal can create links between isolated populations. High gamete mobility (e.g., air borne pollen in plants) should be considered in this context as well as dispersal of individuals, or propagules.

### **Interspecific Interactions**

Discuss the reliance of the wildlife species on other wildlife species for its survival at any time during its life cycle (symbiotic, parasite/host, predator/prey relationships, specific food plant)? Describe any negative interactions with other plants, animals, pests, parasites and diseases or any toxic or allelopathic interactions with other organisms that may affect the life span or reproductive success of the wildlife species. Be sure to describe the importance of any of the interspecific interactions influencing the survival of individuals. Consideration should also be given to any obligate or facultative associations with other wildlife species (plants or animals, e.g., unionid bivalves need a fish or amphibian host for transforming glochidia into juveniles). If availability of a specific food is a limiting factor for the abundance of the wildlife species, give details on the importance of the food to reproduction, growth, biochemistry, etc. of the wildlife species.

If a plant, describe the main herbivores and their contribution to the decline of the wildlife species, if any. If an animal, describe the main predators for each life history stage and their contribution to the decline of the wildlife species, if any. Distinguish between natural mortality and unnatural mortality (e.g., herbivory/predation by an introduced wildlife species) with the latter being a potential significant “limiting factor”.

### **POPULATION SIZES AND TRENDS**

If a species is divided into more than one unit (see Designatable Units), use subheadings to provide separate information for each unit that is being proposed for assessment. Do not repeat any of the information already reported in the “Distribution” section. Ensure that all information appearing in the Technical Summary concerning population sizes and trends is presented and substantiated here. Although bullets are used here, do not use bullets in the report.



## Sampling Effort and Methods

Throughout this section, it is very important to document sampling effort, uncertainty, and *how* abundance data were collected.

Describe the sampling efforts and methods used to estimate population sizes. If based on CPUE (catch per unit effort) describe the 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). Use tables to summarize large quantities of data.

## Abundance

- Where possible, estimate the total number of individuals of all ages in Canada and the number of mature individuals in Canada (the latter quantity is termed the population). Mature individuals are those capable of reproducing (see [Definitions and Abbreviations](#) on COSEWIC website for more information on this term). If effective population size can be estimated do so. Provide a breakdown of the number of mature individuals for individual populations within the designatable unit (using populations that have been identified in the Canadian Distribution section). Identify each population using a generalized site name and specify the number of individuals in each. Present in tabular form if sufficient data are available. If appropriate, group populations along watersheds, counties, provinces, etc.
- 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.

## Fluctuations and Trends

- As much as possible, discuss year-to-year changes in total adult population size and density. Indicate whether there are fluctuations in population size, and if so, provide the upper and lower limits. For some wildlife species, a variety of indices are used to determine trends. Explain briefly how these indices or other trend data were gathered and the limitations to them. Attempt to distinguish between cyclic population changes and unusual or long-term changes (especially declines). Indicate if the wildlife species has always been rare as a result of chronically low numbers, limited numbers of populations and/or limited availability of specialized suitable habitat.
- Give the decline rate for the total adult population in Canada. Convert any data into a % decline over 10 years or three generations, whichever is longer. 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 which estimate extinction probability based on known life history, habitat requirements, threats, and management options.

- For many taxa, 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.
- When possible, provide information on trends and declines for individual populations within the designatable unit (identified in the section Canadian Distribution). Tabulate this information if sufficient data exist. Provide site counts or survey results in different years and comment on the extent to which they are comparable. Indicate which populations, if any, have disappeared and whether the numbers of populations also fluctuate. Indicate if new populations continue to be discovered.
- If possible, determine if there is “continuing decline”, defined as a recent, current or projected future decline that is liable to continue unless remedial measures are taken (see also [Definitions and Abbreviations](#) on the COSEWIC website). If the report includes or refers to a population viability analysis (PVA), make sure that the description of the analyses meets COSEWIC standards (see [Presenting Population Viability Analyses in COSEWIC Status Reports: Overview and Standards](#) on the COSEWIC website). Meeting such standards is especially important if the assessment relies on criterion E. Note that the report could include other information besides probability of extinction, such as population projection models, survival probabilities, and projected estimates

## **Rescue Effect**

- Rescue effect is the process by which a wildlife species may move through its range in a way that it mitigates a Canadian extirpation or population decline. For wildlife species whose distributions cross an international boundary of Canada or are otherwise shared with another country give the likelihood that dispersal from the foreign population will repopulate the Canadian population should the latter disappear or experience a decline. In making this assessment, consider:
  - the likelihood of individual/propagule immigration;
  - the inter-relationships between Canadian and non-Canadian populations (e.g., frequent exchange of individuals, extra-limital populations);
  - whether immigrants would be adapted to survive in Canada;
  - the availability of suitable habitat;
  - the status of bordering populations and population sources and sinks.

- Similarly, the likelihood that dispersal from other “healthy” DUs within Canada could repopulate a declining or extirpated DU should be assessed.

## THREATS AND LIMITING FACTORS

Status report writers must provide justification for any threats and limiting factors that are mentioned in the status report and are relevant to the species. Threats and limiting factors should be listed and discussed separately in the “**THREATS AND LIMITING FACTORS**” section of a COSEWIC status report, under different sub-headings.

- a) Threats are defined as activities or processes that directly negatively affect the Canadian population. Although threats are often related to human activities, natural phenomena can be regarded as direct threats in some situations, particularly when a species has lost its resilience from other threats, and is thus vulnerable to the point where a population decline is observed, projected, or suspected. Threats can be ongoing, and/or likely to occur in the future. Threats are proximate or direct causes of decline. Where possible, links should be made between proximate threats and biological features of the species or population such as inbreeding depression, small population size, genetic isolation, or their likelihood of regeneration or recolonization for ecosystems, all of which are considered limiting factors.
- b) Limiting factors are activities and processes that may not cause a population level decline, but limit growth, resilience or recovery of the population. Limiting factors can become threats if a species has lost its resilience due to other threats and is thus prone to decline. In this section, the status report writer should discuss those characteristics that make the wildlife species particularly susceptible to disturbance. They should also discuss biological, environmental or other factors limiting population size, growth, and/or distribution of the wildlife species being assessed.

Status report writers need to include a completed “threats classification and assessment calculator” Excel spreadsheet in the status report (in the form of a table or an appendix) and fully incorporate the results in the “Threats” sub-section of the report (see [Conducting and Incorporating a Threats Classification and Assessment Calculator into the COSEWIC Status Report](#)). The threat classification system used in COSEWIC status reports is based on the IUCN-CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification system which uses the same threat categories for all species (IUCN and CMP 2006; Salasky *et al.* 2008; Master *et al.* 2009). These original sources should be viewed and cited at the beginning of the threats section. Observed, inferred, or suspected threats are classified using 11 broad (“Level 1”) categories of threats, with each including several more specific, finer (“Level 2”) threats. In this system, each threat is characterized in terms of “scope”, “severity” and “timing” by the use of a threats calculator. The relative “impact” of each threat is automatically calculated from “scope” and “severity” and the overall threat to the wildlife

species reflects a roll-up of all threats. Status report writers and the responsible Co-chair should discuss at which point during the report writing process a threats calculator should be completed and incorporated into the status report.

Limiting factors do not have impact scores that contribute to the calculated threat impact in the threats calculator and should be discussed, under appropriate sub-headings under "Limiting Factors".

The threats classification system classifies threats based on direct or proximate factors. Where the ultimate or underlying factors are known or suspected, this should be discussed. For example, predation may be the proximate cause of high levels of mortality in a population. This direct or proximate threat can be increasing because of habitat changes brought about by increasing industrial activity that have stimulated a numerical response in the predator population. The threats calculator scores the proximate threat, but the text in the report should outline connections between the proximate and ultimate threats where they are known or suspected.

Cumulative impacts are only partially covered in the threats calculator assessment, that is, in the roll-ups for different sub-categories of threats and in the overall assigned threat impact. Cumulative impacts may arise from synergistic, interactive, and additive effects from multiple actions that have taken place in the past, are currently in progress, and are foreseeable in the future. Cumulative impacts on wildlife and ecosystems can result from individually minor but collectively significant actions taking place over a period of time. Particularly when the impacts of proximate threats are synergistic in nature and not merely additive, it is advisable to include a special section on cumulative impacts in the "Threats" section of the report. Where cumulative effects are greater than reflected in the roll-ups in the threats assessment the overall assigned threat impact can be adjusted, (with rationale) in the threats calculator. Where there are spatial and/or temporal overlapping of threats that act on the same components of the population, there can also be a downward adjustment of the overall assigned threat impact (again, provide rationale).

The threats calculator and the "Threats" section of the COSEWIC status report should complement one another. This section of the status report should concisely discuss the most important threats identified in the threats calculator, under different sub-headings, in order from the highest to lowest impact (minor or negligible threats should simply be listed). The explanation for each threat should include available details on the geographic scope, imminence and magnitude of the threat, suitably documented with concrete facts that are backed up by references. The explanation should be sufficiently clear to provide rationale for the scores in the threats calculator. It should also be noted if any of the factors that were responsible for the loss or decline of the wildlife species are reversible. There is no need to repeat text in the report and in the "comments" column of the threats calculator. Also, threats that are not applicable or that have a "negligible" impact need not be discussed in the text of the report as long as sufficient details are found in the "comments" column of the threats calculator appendix or table.

Status report writers should remember the following when writing the “**THREATS AND LIMITING FACTORS**” section of the status report:

1. Subheadings under the "threats" section should correspond with the level 1 or level 2 threat categories, as appropriate so that there is a straightforward correspondence between the narrative in the report and the threats calculator. It is helpful to maintain the same threat categories as the threats calculator even in initial report drafts prior to the completion of the threats calculator process. Subheadings under the "limiting factors" section can be devised as is appropriate for the species.
2. Threats where the “timing” and “severity” are both hypothetical but possible are of little value in documenting risk to a wildlife species or population and should not be included.
3. Threats with no clear relationship to the wildlife species' biology or impact on its habitat should not be included.
4. Climatic change should be explicitly considered in all Status Reports. Use the framework for assessing a species' vulnerability to climate change proposed by Foden *et al.* (2013): the framework considers a species' (i) exposure to climate change impacts, (ii) sensitivity to these impacts, and (iii) adaptive capacity (e.g., ability to relocate away from these impacts). Climate change would be listed as a threat if there are reliable empirical data or models that indicate vulnerability of the species to particular impacts of climatic change, such as changes in temperature mean and variation, water level mean and variation, substrate moisture mean and variation, or extreme weather event intensity and frequency, and such changes are likely to occur for the region in question. For example, Striped Whitelip can be considered highly vulnerable to climate change because (i) it is exposed to climate change (spring frost, absence of snow cover, droughts), (ii) it is sensitive (habitat specialist, specific microhabitat requirements), and (iii) it is the sort of snail that has a low dispersal ability. If climate change is not considered a threat (or benefit), a statement about why the species is not vulnerable to climate change should be included, again using the Foden *et al.* (2013) framework. If climate change is a relevant threat, the default score for timing of climate change in threats assessment calculators is usually “high (continuing)”. An “unknown” score for severity should be avoided with lifehistory characteristics and the framework of Foden *et al.* (2013) being considered.
5. Where habitat damage or loss is a threat, it is important to specify, where possible, if applications have been filed e.g., under SARA for proposed or pending development projects or activities that could cause such damage or loss. General statements such as “human population expansion in the near vicinity of sites will result in harm as the recreational use of lands increases”, are not suitable as indications of threat; 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.

6. Uncertainty about threats must be presented clearly.
7. Where there is disagreement among experts over the magnitude or likelihood of impacts, the nature of the debate should be presented and a balanced reference list included. This is particularly important where the “scope” and/or “severity” have been assigned a wide range rank or a rank of unknown.
8. If the species appears to be undergoing decline, range contraction or decline in EOO or IAO, but the threats assessment has been unable to document why such a decline should be occurring, a clear statement should be made indicating that observed declines are not currently understood and known threats do not explain observed or projected declines for the species.
9. Natural mortality itself should not be a threat, unless there are particular circumstances that have caused a recent change in, for example, predation rate.

### **Threats Calculator**

For earlier stages of the COSEWIC status report review process, the actual Excel spreadsheet with the threats calculator results must be sent for review along with the report but it must be embedded in the 2-month interim report. The entire worksheet, including who was involved in the threats assessment, should be included. The final status report published on the SARA Public Registry will include the threats calculator spreadsheet, but without blank rows. Brief comments should be retained in the table to assist in interpreting the table, but will be complemented by the narrative in the "threats" section of the report.

### **Number of Locations**

Discuss the probable extent of the most likely or imminent threats, in relation to the sites occupied by the species. From that discussion, determine clearly the number of locations that should be used to apply criteria B and/or D2 (see [Definitions and Abbreviations](#) on COSEWIC website). If the concept of location does not apply to the species, explain briefly why.

## **PROTECTION, STATUS AND RANKS**

### **Legal Protection and Status**

Describe any legislation, regulations, customs or conditions that currently serve to protect the wildlife species. This could include:

- international protection such as:
  - intentions for protection or listing under the US *Endangered Species Act*;
  - listing under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
  - international agreements (e.g., agreement on Polar Bears) or international conventions (e.g., the Migratory Birds Convention, the UN Convention on the Law of the Sea) that protect the wildlife species;
- protection by federal laws;
- protection by provincial/territorial wildlife or endangered wildlife species acts<sup>6</sup>.

If this is an updated status report and the wildlife species already receives protection under the federal *Species at Risk Act* (SARA), explain how the wildlife species is being protected (e.g., prohibitions created to protect the wildlife species from harm and its residence from being destroyed; whether or not critical habitat has been identified and is protected, etc.). If there is a Recovery Strategy, an Action Plan or Management Plan in place, briefly describe the key actions that have been implemented. If not, indicate the timelines for finalizing these recovery planning documents. If the wildlife species is receiving protection under provincial or territorial legislation, describe the prohibitions and recovery actions that have been implemented. Some helpful website addresses are available on the COSEWIC website under the heading [Required Contacts for Information on Wildlife Species](#).

### **Non-Legal Status and Ranks**

Identify non-legal status or ranks the species has, such as a status in the IUCN Red List of Threatened Species. Give the species' global (G) rank, national (N) ranks and subnational (S) ranks assigned by NatureServe, Conservation Data Centres (CDCs) or Natural Heritage Information Centres. These ranks and their definitions can be found on the [NatureServe Explorer](#) web page. The definitions should be presented in the text. Provide the most current Canadian and provincial/territorial [General Status](#) ranks, which can be found on the Wild Species web page.

### **Habitat Protection or Ownership**

Indicate how much habitat is legally protected and how much is likely to be secure in the future (e.g., through agreements with landowners, ownership by government or private conservation agencies). Discuss the adequacy of the present level of protection, and whether enough habitat is being protected to ensure long-term survival of the wildlife species. If known, indicate the federal lands on which the wildlife species occurs; federal lands include National Parks, National Wildlife Areas, Migratory Bird Sanctuaries, Indian Reserves, and all lands owned by a federal department (including Environment and Climate Change Canada, Parks Canada, Department of National

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<sup>6</sup> For the Quebec's legislation, it is suggested that the French title of the act be followed by the English translation in parentheses: *Loi sur les espèces menacées ou vulnérable* (Act respecting threatened or vulnerable species). The French title would be in italics. The English one would not be in italics and would not be uppercase, because it is not official.

Defense, Department of Fisheries and Oceans, Transport Canada, etc.). For riverine species, consider habitat protection/ownership upstream of the wildlife species' occurrence, especially if it impacts a wildlife species downstream.

## **ACKNOWLEDGEMENTS**

Acknowledge individuals, authorities and agencies that provided assistance and/or funding, or otherwise contributed to the report. If the report writer deems that individuals that provided personal communications are worthy of acknowledging, do so here but their name should also appear as an entry under Information Sources.

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

## **AUTHORITIES CONTACTED**

Provide a list of authorities contacted together with title, affiliation, city, province/state, and country if outside Canada. The list should include all of the [Required Contacts for Information on Wildlife Species](#) posted on the COSEWIC website. The authorities are listed in alphabetical order by last name.

List any cited personal communications in the Information Sources section below.



## INFORMATION SOURCES

List all literature and personal communications cited in the text, figures and tables. Cite multiple references chronologically in the text as follows, oldest first: (Hanson *et al.* 1989; Briggins *et al.* 1995; Brownell 1998; COSEWIC 2002) or (Licht 1971a,b; Scott 1986; Trites 1990, 2003; Hogarth 1993). Multiple references by the same authors (including citations by the same first author and then *et al.*) should be distinguished in the text with “a”, “b”, “c”, etc. with the “a” being for the reference appearing first in the text, “b” for the next, etc. Cite personal communications as: (Smith pers. comm. 1999); and electronic sources as: (Michigan DNR 1998). When possible, use primary literature (i.e., cite websites sparingly and only when the information comes from a credible source and the information is not available in printed form). Field verification reports should not be cited but the relevant information in the field report must be in the status report. If the report is an update from a previous COSEWIC report (and therefore part of the Living Document process) do not cite the previous report if entire sections of the previous report are used in the update report. Previous COSEWIC status reports will be listed on the Production Page when the report is finalized by the Secretariat. However, if conclusions or data in the form of tables or figures from the previous report are being used but not the actual table or figure, cite the previous report in Information Sources. State issue numbers for journal only when each issue within a single volume begins at page 1. Arrange all citations in alphabetical order as in the following example. If there are multiple co-authors, arrange citations in alphabetically order by second, then third, then subsequent co-author surnames. After alphabetically, arrange citations by the same single author and those that have the same order of co-authors chronologically, oldest first. **[Note that the text in bold illustrates the type of citation only and is not to be included in the bibliography]**

Briggins, B.G., R.J. Neves, and C.K. Dohner. 1995. Draft strategy for the conservation of native freshwater mussels. Fish and Wildlife Service, Washington, D.C. 2 pp.

**[Manuscript]**

Brownell, V.R. 1998. Update COSEWIC status report on the bluehearts *Buchnera americana* in Canada, in COSEWIC assessment and update status report on the bluehearts *Buchnera americana* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-15 pp. **[Report – COSEWIC single author]**

COSEWIC. 2002. COSEWIC assessment and status report on the margined streamside moss *Scouleria marginata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 14 pp. **[Report - COSEWIC Living Document]**

Foden, W.B., S.H.M. Butchart, S.N. Stuart, J.-C. Vie, H.R. Akcakaya, A. Angulo, L.M. DeVantier, A. Gutsche, E. Turak, L. Cao, S.D. Donner, V. Katariya, R. Bernard, R.A. Holland, A.F. Hughes, S.E. O’Hanlon, S.T. Garnett, C.H. Sekercioglu, and G.M. Mace. 2013. Identifying the world’s most climate change vulnerable species: a systematic trait-based assessment of all birds, amphibians and corals. PLoS ONE 8(6): e65427. <https://doi.org/10.1371/journal.pone.0065427> **[Journal Article - multiple authors - only available online]**

Hanson, J.M., W.C. Mackay, and E.E. Prepas. 1989. Effect of size-selective predation

- by muskrats (*Ondatra zibethicus*) on a population of unionid clams (*Anodonta grandis simpsoniana*). *Journal of Animal Ecology* 58:15-28. **[Journal Article - multiple authors]**
- Hogarth, M.A. 1993. Glochidial functional morphology and rarity in the Unionidae. Pp. 76-80, in A.C. Buchanan and L.M. Koch (eds.). *Conservation and Management of Freshwater Mussels. Proceedings of the Upper Mississippi River Conservation Committee Symposium*, St. Louis, Missouri. Illinois Natural History Survey, Champaign, Illinois. **[Conference Proceedings]**
- Licht, L.E. 1971a. Breeding habitat and embryonic thermal requirements of the frogs, *Rana aurora aurora* and *Rana pretiosa pretiosa*, in the Pacific Northwest. *Ecology* 52:116-124. **[Journal Article – single author]**
- Licht, L.E. 1971b. The ecology of coexistence in two closely related species of frogs (*Rana*). Ph.D. dissertation, University of British Columbia, Vancouver, British Columbia, Canada. 155 pp. **[Thesis]**
- McKeague, J.A. (ed.). 1978. *Manual on Soil Sampling and Methods of Analysis*. 2<sup>nd</sup> edition. Canadian Society of Soil Science, Ottawa, Ontario. 212 pp. **[Edited Book]**
- Michigan DNR (Department of Natural Resources). 1998. *Endangered Species Legislation*, Michigan Department of Natural Resources. Website: [http://www.dnr.state.mi.us/wildlife/heritage/The\\_End/end-act.htm](http://www.dnr.state.mi.us/wildlife/heritage/The_End/end-act.htm) [accessed April 1999]. **[Electronic Source]**
- Scott, J.A. 1986. *The Butterflies of North America*. Stanford University Press, Stanford, California. vii + 583 pp. **[Book]**
- Smith, J.D., pers. comm. 1999. *Email correspondence to R. Boles*. November 1999. Assessment Biologist, Ministry of Species at Risk, Government of Ontario, Toronto, Ontario. Cited in COSEWIC 2000. **[Personal Communication as cited in a previous COSEWIC status report to distinguish from the new pers. comms.]**
- Smith, J.D., pers. comm. 2019. *Email correspondence to R. Boles*. November 2019. Assessment Biologist, Ministry of Species at Risk, Government of Ontario, Toronto, Ontario. **[Personal Communication. Note the affiliation is for the person giving the pers. comm.]**
- The Canadian Style © Public Works and Government Services Canada, 2012, *TERMIUM Plus®*, the Government of Canada's terminology and linguistic data bank. Writing Tools – *The Canadian Style*. A product of the Translation Bureau. website: <http://www.btb.termiumplus.gc.ca/tpv2guides/guides/tcdnstyl/index-eng.html?lang=eng> [accessed February 2012]. **[Electronic Source]**
- Trites, A.W. 2003. Food webs in the ocean: who eats whom and how much? Pp. 125-143, in M. Sinclair and G. Valdimarsson (eds.). *Responsible Fisheries in the Marine Ecosystem*, CABI Publishing, Wallingford. **[Book Section]**

## **BIOGRAPHICAL SUMMARY OF REPORT WRITER(S)**

Provide a brief narrative, in third person, that outlines your background including education, research interests, and any relevant experience. Stress the qualifications

that make you a suitable writer for this report. Keep it to about half a page.

## **COLLECTIONS EXAMINED**

All institutions at whose collections were consulted, whether or not they had specimens of the wildlife species in question, should be cited in the report.

## **TABLES**

Tabular material must be created using the Table function in Word or in a spreadsheet program such as Excel (do not insert tables as images nor save tables as embedded images (i.e., jpeg or tiff files)) because all tables, in the report, must be editable. All tables must be collected and inserted sequentially at the end of the report, and should also be submitted as separate electronic files to facilitate their translation. A text version of tables should be provided, as well as the original files, if possible.

## **FIGURES**

All figures must reproduce well in black and white when photocopied. Colours can be used on maps and graphs, but such figures should remain interpretable in black and white. For example, a red box with black text is not compliant to Common Look and Feel publishing guidelines as text will not be readable for the visually impaired and the reader they use). All figures, including photos of the wildlife species and its habitat, should be collected and inserted sequentially at the end of the report, right after the tables. Images demonstrating the impact of threats can be valuable inclusions in reports; however, keep the number of figures, including photographs, to a minimum and identify those that can be removed when the report is finalized. In addition, figures should be submitted separately as electronic files. Any figures, such as diagrams or graphs, that can be available in text format should be submitted as such to facilitate translation and not saved as image files where editing is not permitted. Figures that are inserted in the report, such as photos of wildlife species or distribution maps, as well as those submitted separately, should use a compressed image format such as JPEG to significantly reduce file size. Image resolution needs only to be web acceptable therefore, (150 dpi or lower) is fine. Original files should be provided, if possible.

In addition, all survey data (wildlife species observation/localities, search effort etc), used to create distribution maps, whether collected during fieldwork performed in the course of writing the status report or obtained from sources (i.e., relevant jurisdictions, recovery teams, appropriate Conservation Data Centre) must be submitted to the COSEWIC Secretariat. Every effort must be made to ensure that the data obtained from these sources can be transferred to COSEWIC by obtaining the proper permission.

If a figure is taken from a published document or belongs to someone other than

the report writer, it must be accompanied with a letter from the author/owner indicating that rights have been obtained for their use. Include at least one illustration (line drawing) of the Wildlife Species with a scale bar (avoid numeric scale factors); if a scale bar is typically required for the taxonomic group. This drawing or a photograph may be used for the cover of the report. Provide credits for the photographer and map maker even if they were made by the report writer or Secretariat.

## **APPENDICES (WHERE APPLICABLE)**

Appendices should be numbered sequentially. They can be used for detailed data or other pertinent material too lengthy to be included in the body of the report. Appendices containing sensitive information must be submitted separately from the status report (see the Sensitive Information subsection).