



NATIONAL COUNCIL FOR AIR AND STREAM IMPROVEMENT

**SPECIES AT RISK ASSESSMENT IN CANADA:
A CROSS-JURISDICTIONAL REVIEW**

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FEBRUARY 2018**

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PRESIDENT'S NOTE

The effective and efficient long-term conservation of forest-dwelling species is an important role for managers of commercial forestry operations. Actions oriented at conservation of species at risk—those deemed to be declining or imperiled for a number of reasons—are an important element of that role.

Canada is committed to the identification and protection of species at risk across the country. As landlords of the forest, provincial and territorial governments are responsible for the legal and regulatory framework under which species are evaluated for risk status. Thus, the mechanisms of assessment and classification of threat status can vary across the country, with differing levels of protection and conservation management afforded to species at risk.

In this report, the authors review and contrast federal, provincial, and territorial assessment and management processes applied by each jurisdiction. They provide clarity on why each region employs a diverse array of tools for species at risk management, with different strengths and weaknesses of each.

This report is a follow-up to NCASI's Technical Bulletin No. 1005, *A Review of the History and Scientific Basis for Species at Risk Assessments in Canada*, and continues our review of the species at risk assessment and listing process in Canada. This report will be of value to the forest industry as it continues to address the needs of species at risk on the landscapes they manage, and as these companies continue to provide both ecological and socioeconomic value to the communities they serve.



Dirk Krouskop

February 2018

NOTE DU PRÉSIDENT

Les gestionnaires d'opérations forestières commerciales ont un rôle important à jouer dans la conservation efficace à long terme des espèces qui vivent en forêt. La mise en place de mesures destinées à la conservation des espèces en péril – espèces dont les populations sont jugées en déclin ou en péril pour un certain nombre de raisons – constitue un élément important de ce rôle.

Le Canada s'est engagé à identifier et à protéger les espèces en péril dans l'ensemble du pays. À titre de propriétaires de la forêt, les gouvernements provinciaux et territoriaux sont responsables du cadre légal et réglementaire dans lequel sont évaluées les espèces pour déterminer leur niveau de risque. Par conséquent, les mécanismes d'évaluation et de classification du niveau de menace peuvent varier dans le pays et donner lieu à des différences dans les efforts de gestion accordés aux espèces en péril relativement à leur protection et à leur conservation.

Dans le présent rapport, les auteurs examinent et comparent les processus fédéraux, provinciaux et territoriaux d'évaluation et de gestion mis en place dans chaque juridiction. Ils expliquent pourquoi chaque juridiction fait appel à une panoplie d'outils pour gérer les espèces en péril, outils qui ont chacun leurs forces et leurs faiblesses.

Le présent rapport fait suite au Bulletin technique n° 1005 publié par NCASI, *Une revue du fondement historique et scientifique des évaluations de risque de la situation des espèces en péril au Canada*, et est la suite de notre revue sur le processus d'évaluation et d'inscription des espèces en péril au Canada. Ce rapport sera utile à l'industrie forestière qui doit gérer les besoins des espèces en péril dans les paysages qu'elle aménage tout en continuant à apporter une valeur écologique et socio-économique aux collectivités qu'elle dessert.



Dirk Krouskop

Février 2018

SPECIES AT RISK ASSESSMENT IN CANADA: A CROSS-JURISDICTIONAL REVIEW

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ABSTRACT

In 1992, Canada signed and ratified the International Convention on Biological Diversity, the key purpose of which is the protection and conservation of the world's flora and fauna. Conserving species at risk is a vital part of the maintenance of biodiversity. As a party to the Convention, Canada has committed to the identification and protection of species at risk, and each jurisdiction within Canada has committed to work together with the federal government to do the same within their respective regions. That said, given that natural resources and land-use decisions fall under the jurisdiction of provincial and territorial governments, the way in which species at risk are assessed, categorized, and managed may vary. The purpose of this report is to review the species at risk assessment and management mechanisms used across Canada by the federal, provincial, and territorial governments, and to examine the role science plays in helping to ensure assessments and listings are objective, transparent, and science-based. While most jurisdictions within Canada have some mechanisms for recognizing and managing species at risk, only some have dedicated legislation for that purpose, and one jurisdiction has no specific species at risk programs at all. While species at risk management varies significantly across the country, it is a complex undertaking with multiple elements to be considered. Biological and ecological science plays a key role in helping in the assessment, recovery, and ultimately the long-term conservation of species at risk.

KEYWORDS

assessments, biodiversity, legislation, species at risk, wildlife

RELATED NCASI PUBLICATIONS

Technical Bulletin No. 1005 (January 2013). *A review of the history and scientific basis for species at risk assessments in Canada.*

Technical Bulletin No. 983 (October 2011). *The role of forest management in maintaining conservation values.*

Special Report No. 10-02. (October 2010). *Compendium of long-term wildlife monitoring programs in Canada.*

Technical Bulletin No. 885. (August 2004). *Managing elements of biodiversity in sustainable forestry programs: Status and utility of NatureServe's information resources to forest managers.*

L'ÉVALUATION DES ESPÈCES EN PÉRIL AU CANADA : UNE ANALYSE DES MÉCANISMES MIS EN PLACE DANS LES DIFFÉRENTES JURIDICTIONS

BULLETIN TECHNIQUE N^o 18-01
FÉVRIER 2018

RÉSUMÉ

En 1992, le Canada a signé et ratifié la Convention internationale sur la diversité biologique dont le principal objectif est la protection et la conservation de la flore et de la faune à l'échelle mondiale. Conserver les espèces en péril est un élément essentiel du maintien de la biodiversité. À titre de signataire de la Convention, le Canada s'est engagé à identifier et à protéger les espèces en péril et toutes les juridictions au sein du Canada se sont engagées à travailler avec le gouvernement fédéral pour faire de même dans leurs régions respectives. Cela étant dit, les mécanismes d'évaluation, de catégorisation et de gestion des espèces en péril peuvent varier d'une juridiction à une autre compte tenu que les ressources naturelles et l'utilisation des terres sont des champs de compétence provinciale et territoriale. Le présent rapport a pour but d'examiner les mécanismes d'évaluation et de gestion des espèces en péril mis en place au Canada par le gouvernement fédéral et par les gouvernements provinciaux et territoriaux et d'évaluer le rôle que joue la science pour s'assurer que les évaluations et les inscriptions sont objectives, transparentes et fondées sur des données scientifiques. Bien que la plupart des juridictions aient mis en place certains mécanismes pour reconnaître et gérer les espèces en péril, seules quelques juridictions ont adopté une loi à cette fin et une juridiction n'a mis en place aucun programme spécifique pour les espèces en péril. Même si la gestion des espèces en péril varie considérablement d'une juridiction à une autre, il n'en reste pas moins qu'il s'agit d'une démarche complexe qui implique de nombreux éléments à considérer. Les sciences biologiques et écologiques ont un rôle important à jouer dans l'évaluation, le rétablissement et, ultimement, dans la conservation à long terme des espèces en péril.

MOTS-CLÉS

biodiversité, espèces en péril, évaluations, faune, législation

AUTRES PUBLICATIONS DE NCASI

Bulletin technique n^o 1005 (janvier 2013). *Une revue du fondement historique et scientifique des évaluations de risque de la situation des espèces en péril au Canada* (seuls le résumé et la Note du président sont en français)

Bulletin technique n^o 983 (octobre 2011). *Le rôle de l'aménagement forestier dans le maintien des valeurs de conservation* (seuls le résumé et la Note du président sont en français)

Rapport spécial n^o 10-02 (octobre 2010). *Recueil des programmes de suivis à long terme des espèces fauniques au Canada* (seuls le résumé et la Note du président sont en français)

Bulletin technique n^o 885 (août 2004). *La gestion des éléments de biodiversité dans les programmes de foresterie durable : état de la situation et utilité des ressources de NatureServe pour les gestionnaires de forêts* (seuls le résumé et la Note du président sont en français)

CONTENTS

1.0	INTRODUCTION	1
1.1	History of Species at Risk Assessments	1
1.2	Species at Risk Assessment in Canada	3
1.3	Purpose of This Report	5
2.0	THE SPECIES AT RISK ASSESSMENT PROCESS ACROSS CANADA	5
2.1	Federal	6
2.2	British Columbia.....	7
2.3	Alberta	8
2.4	Saskatchewan.....	9
2.5	Manitoba	10
2.6	Ontario	10
2.7	Quebec	11
2.8	New Brunswick.....	12
2.9	Nova Scotia.....	13
2.10	Prince Edward Island.....	14
2.11	Newfoundland and Labrador	14
2.12	Yukon Territories.....	14
2.13	Northwest Territories.....	15
2.14	Nunavut.....	15
3.0	DISCUSSION.....	16
4.0	CONCLUSIONS	21
	REFERENCES	23
	APPENDIX	
A	Glossary of Terms.....	A1

TABLES

Table 1.1	Criteria, Indicators, and Threshold for IUCN Risk Classifications.....	4
Table 3.1	Jurisdictional Application of Species at Risk Assessment Laws and Processes	17
Table 3.2	Criteria Used in Threat Assessment to Determine Legal Status and Species at Risk Category	19

FIGURES

Figure 1.1	Structure of IUCN Red List Categories of Extinction Risk	2
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SPECIES AT RISK ASSESSMENT IN CANADA: A CROSS-JURISDICTIONAL REVIEW

1.0 INTRODUCTION

Around the world, the conservation of biological diversity has become a topic of increasing concern in the public eye. Losses of species at a global scale are thought to be linked to vital changes to ecosystems (Hooper et al. 2012), and the intersection of rare species and habitats with human development has raised concerns around managing threats to biodiversity. To that end, governments and non-governmental organizations have devised systems and protocols to classify and rank the level of extinction threat to species (Regan et al. 2005), with the aim of managing and mitigating those risks. These protocols form the basis of modern threat assessments, including the system used in Canada to assess risks to species and ecosystems across the country.

Species at risk management in Canada is a complex process used to determine which species are at risk, and what to do about them. Broadly speaking, the process is divided into three parts: 1) extinction threat assessments, 2) prioritization, and 3) recovery planning.

Threat assessments are objective assessments to determine the likelihood of species going extinct based on scientific information and analysis [i.e., population viability analysis, trends in population or distribution (NCASI 2013)]. Species may be evaluated at the global and international scales [e.g., the International Union for the Conservation of Nature (IUCN)'s Red List of threatened species], the national scale [e.g., the Committee On the Status of Endangered Wildlife In Canada (COSEWIC) process], the provincial scale [e.g., the Committee on the Status of Species at Risk in Ontario (COSSARO)], and regional scales, such as determining the threat of loss of a local population. However, despite the scale of the assessment, each species at risk assessment process has similar attributes and uses available information to address questions of population size, distribution, and trends (Possingham et al. 2002; Regan et al. 2005), and factors are included to allow for outside influences at smaller scales (e.g., rescue effect).

Priority setting is a different process, whereby government jurisdictions determine which of those species that have been assessed as “at risk” will receive full protection under the law. At the national level, this determination is made by the Governor in Council and the relevant Ministers, and is based in part on the available information, socioeconomics, and other priorities.

Finally, recovery planning is the process of developing plans of action to prevent a species from further decline and to help recover populations. Recovery planning uses information derived from the threat assessment, but also includes factors such as the likelihood of recovery success, socioeconomic or political concerns, or the logistics of recovery (Mace and Lande 1991; NCASI 2013), and includes significant stakeholder engagement.

The overarching goals of any species at risk management process are to evaluate the level of extinction or extirpation risk to species, to determine which ones need urgent protection, and then to figure out how to carry out the necessary work or protective actions that are needed to conserve and recover the species. The individual species at risk assessment (sometimes referred to as status assessment) is just one part of a lengthy process for identifying species in decline and legal designation, with the eventual aim being species recovery and conservation.

1.1 History of Species at Risk Assessments

The first formal, coordinated effort to assess extinction risk of wild species was in the 1940s with the founding of the International Union for the Protection of Nature (IUPN), now the International Union

for the Conservation of Nature (IUCN) (NCASI 2013). Although the organization has grown, a key focus of the IUCN has always been to assess, at a global scale, the threat of extinction to wild species and thereby produce the IUCN Red List of Threatened Species (initially referred to as the IUCN Red Data Book). The initial attempts at identification of threat classification and risk categories depended on subjective perceptions and were vulnerable to uncertainty and skepticism (Mace et al. 2008). Therefore, the rules for assessing threat status came under scrutiny and in 1984, a review highlighted the need for an objective, robust, and a widely applicable system (Fitter and Fitter 1987; Mace et al. 2008). A discussion paper authored by a group of scientists was circulated within the IUCN community, which eventually ended in a proposal for the present-day threat categories of *critical*, *endangered*, and *vulnerable*, and included quantitative criteria to form each definition (Mace and Lande 1991). This proposal eventually formed the modern day version of the IUCN Categories and Criteria to Assess Threatened Species (Mace et al. 2008). These categories and criteria have now been adapted to different scales (global, national, regional) and have contributed to many countries' species at risk assessment process, including Canada's.

The objective of the IUCN Categories and Criteria protocol is to create a universal system to assess threatened species and foster transparency and objectivity in the species at risk assessment process (IUCN 2001). The IUCN uses five criteria to determine whether a species is at risk, with specific thresholds established to define each criterion (as listed below, and see Table 1.1). Only one out of five of these criteria is needed to meet a projected risk threshold, thereby classifying a species into one of the threat categories (IUCN 2012, Figure 1). However, assessments use all available data to address all criteria and assign a threat category for each criterion based on the various criteria thresholds. A species is designated as the highest threat category reached under any one criterion in the assessment.

Criterion A – Declining population (past, present, and/or projected)

Criterion B – Geographic range size, and fragmentation, decline, or fluctuations

Criterion C – Small population size and fragmentation, decline, or fluctuations

Criterion D – Very small population or very restricted distribution

Criterion E – Quantitative analysis of extinction risk (e.g., population viability analysis)

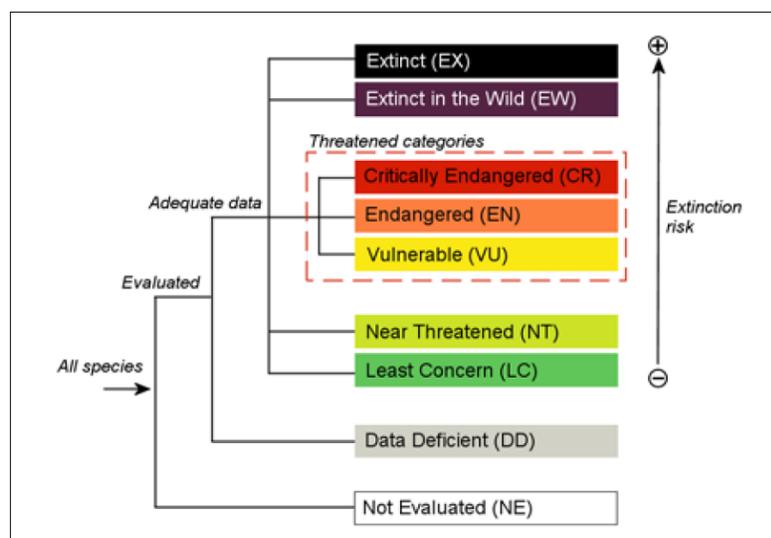


Figure 1.1 Structure of IUCN Red List Categories of Extinction Risk (from IUCN 2012)

1.2 Species at Risk Assessment in Canada

In Canada, the foundation of the species at risk assessment and management process is formed by our unique governing structure as determined by the constitution and the division of management responsibility. Canada is comprised of ten provinces and three territories. Each of these jurisdictions has a unique governing structure and holds the majority of control over public lands and natural resources within those boundaries (Benidickson 2009). The laws and regulations under the federal Species at Risk Act (SARA, S.C. 2002, c. 29) apply directly to federal lands (e.g., national parks and monuments, Department of National Defense lands), but do not have direct sway over a large majority of the land in Canada. Therefore, management of species at risk requires cooperation between jurisdictions, both between different levels of government and inter-provincial and territorial.

Canada signed the United Nations Convention on Biodiversity in 1992, and subsequently created Canada's Biodiversity Strategy that same year. A key goal stemming from this strategy was intergovernmental cooperation, which resulted in the Accord for the Protection of Species At Risk (1996). This inter-Canadian Accord was formed in recognition that "no single jurisdiction can effectively protect species at risk" and resulted in a partnership between jurisdictions (federal, provincial, and territorial) to designate species at risk, protect their habitats, and develop recovery strategies (Environment Canada 2001). As a result of this partnership, there is complementary legislation to protect biodiversity and habitat across Canada, and a degree of oversight of provinces by the federal government should jurisdictions fail to adequately protect species at risk.

Table 1.1 Criteria, Indicators, and Threshold for IUCN Risk Classifications

Criteria	Description	Risk Categories of Extinction		
		Critically Endangered (CR)	Endangered (EN)	Vulnerable (VU)
A. Declining Population (past, present, and/or projected)	An overall reduction in population size	>80-90% in 10 years or 3 generations, and depending on the nature of the threats involved (e.g., unknown or ongoing)	≥50-70% in 10 years or 3 generations, and depending on the nature of the threats involved (e.g., unknown or ongoing)	≥50-70% in 10 years or 3 generations, and depending on the nature of the threats involved (e.g., unknown or ongoing)
B. Geographic Range size, fragmentation, decline or fluctuation	Extent of occurrence (EO) or area of occupancy (AO) is very small, declining, or unique.	<100 km ² or <10 km ² if extreme fluctuations in populations or area.	<5000 km ² or <500 km ² if extreme fluctuations in populations or area.	<20,000 km ² or <2,000 km ² if extreme fluctuations in populations or area
C. Small population size and fragmentation, decline or fluctuation	Small population combined with ongoing or projected decline or extreme fluctuations.	Population smaller than 250 mature individuals and an estimated decline of >25% over 3 years or 1 generation OR continued decline with uneven subpopulation distribution or extreme population fluctuations.	Population smaller than 2500 mature individuals and an estimated decline of >25% over 3 years or 1 generation OR continued decline with uneven subpopulation distribution or extreme population fluctuations.	Population smaller than 10,000 mature individuals and an estimated decline of >10% over 3 years or 1 generation OR continued decline with uneven subpopulation distribution or extreme population fluctuations.
D. Very small population or restricted	A small enough population that makes any threat to the population a significant risk of extinction.	Less than 50 mature individuals.	Less than 250 mature individuals.	Less than 1,000 mature individuals or a population restricted area of occupancy (<20 km ² or less than 5 locations).
E. Quantitative analysis	Quantitative analysis on population data and risk of extinction.	Probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer (up to a maximum of 100 years).	Probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).	Probability of extinction in the wild is at least 10% within 100 years.

The Committee on the Status for Endangered Wildlife in Canada (COSEWIC)—a non-governmental body of scientists and provincial and territorial representatives—conducts federal species at risk assessment in Canada. COSEWIC is an independent body that exists to provide advice to Canadians and the government on the status of wild species and their risk of extinction or extirpation nationally. COSEWIC has been operating since 1977 and aims to act as a national scientifically sound system to classify species as at risk (Government of Canada 2012). Status assessments conducted by COSEWIC are used to inform decisions on listing and protecting species at risk under SARA, which was enacted in 2002 (see NCASI 2013 for a review).

1.3 Purpose of This Report

Following the Accord for the Protection of Species at Risk (1996), Canada's provinces and territories agreed to implement complementary legislation and associated threat assessment processes. Although Canada aims to protect biodiversity and habitat within its borders through the actions of each province and territory, there are inevitable differences in implementing this goal due to the variations in the governing structures of the various jurisdictions. The aim of this report is to summarize the species at risk assessment processes across jurisdictions in Canada, and to compare and contrast the approaches while highlighting the role of science in the decision-making process.

Note that while every effort has been made to provide a useful and accurate overview of Canadian regulations, the information contained in this report should be used for reference only and is neither intended nor designed to render legal advice to the reader or serve as legal documentation. Under no circumstances shall NCASI be liable for any damages, including incidental, special or consequential damages, arising from the use of the present report.

2.0 THE SPECIES AT RISK ASSESSMENT PROCESS ACROSS CANADA

In Canada, the federal species at risk assessment process is supported primarily by federal legislation, the Species at Risk Act (SARA). Threat assessments are conducted by scientific experts and reviewed by an independent organization (COSEWIC). Priority setting involves examining the feasibility of recovery and the social, political, and economic factors of recovery, which all contribute to the development and implementation of recovery plans and activities (i.e., recovery strategies, management plans, and action plans).

An essential element to species assessment in Canada is the use of Conservation Data Center (CDC) data, and the NatureServe methodology used by the CDCs in their data collection and analysis. NatureServe was established in 2000 by The Nature Conservancy to act as an independent, international non-governmental organization. NatureServe encompasses a network of independent Natural Heritage Programs and Conservation Data Centers (CDCs), the first of which was established by The Nature Conservancy in the state of South Carolina in 1974. In Canada, most jurisdictions rely on data collected through NatureServe affiliated Conservation Data Centers. CDCs have been established in all provinces and territories, except for the Atlantic Canada CDC, which represents New Brunswick, Nova Scotia, and Prince Edward Island. CDCs perform inventories of biodiversity, rare and endangered species and ecological communities, analyze conservation data, provide a range of information products and services, and make their data available to the public. Data collected or submitted to CDCs are held to a standard of quality to help ensure consistency and validity of records of species occurrence. CDCs employ the NatureServe methodology, a system of data products, terminology and assessment procedures, which can be reviewed in NCASI Technical Bulletin No. 885, *Managing Elements of Biodiversity in Sustainable Forestry Programs: Status and Utility of NatureServe's Information Resources to Forest Managers* (NCASI 2004).

As previously noted, the Canadian federal process for evaluating and managing species at risk applies directly to lands over which the federal government has responsibility. These include Canadian

Armed Forces bases and training areas, national parks and protected areas, any other federal property holdings and, in co-management with First Nations, designated treaty areas. Lands that are managed by the provinces and territories (i.e., Crown Lands) do not fall directly under federal management. What follows are descriptions of the federal and provincial species assessment and management processes.

2.1 Federal

Species at risk are regulated federally under the Species at Risk Act (SARA, S.C. 2002, c. 29), and may be designated as extirpated, endangered, threatened, or of special concern. Risk assessments are conducted by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), a non-governmental, arms-length committee of scientific experts and jurisdictional representatives that conduct assessments to evaluate species risk of extinction or extirpation from Canada (Government of Canada 2012). The federal species at risk assessment begins with the COSEWIC assessment process, which includes three steps: (1) COSEWIC candidate list, (2) status report, and (3) final designation.

The COSEWIC candidate list is a list of species suspected of decline that are recommended for a detailed status assessment. Recommendations may come from a variety of sources such as the Species Specialists Subcommittees (SSCs) or the Aboriginal Traditional Knowledge (ATK) Subcommittee (NCASI 2013). Species may also be added to this list based on information gathered through the National General Status of Wild Species in Canada, a report produced every five years that is a collaborative effort between Canada and the provinces and territories to monitor wildlife populations (including mammals, birds, marine and freshwater fishes, vascular plants, mosses, lichens, arthropods, mollusks, reptiles, and amphibians) across Canada. In addition, information drawn from other assessments may contribute to a species nomination (e.g., IUCN Red List).

The second step in the COSEWIC process involves the development of a detailed status report. The status report is a compilation and scientific analysis of all relevant information pertaining to the species in question, including biological information, distribution, extent of occurrences, area of occupancy, abundance, habitat and population trends, and threats or factors that may be limiting the species (NCASI 2013). The information contained in the report is used by COSEWIC to determine the level of extinction risk for a given species. Upon completion, status reports are peer reviewed (internally and by relevant experts) and undergo an approval process by COSEWIC. A threat status assessment is subsequently determined for the species based on the application of the COSEWIC criteria and thresholds that define the threat categories. The completed status report, along with the Committee's threat status assessment, is then submitted to the federal government for consideration for legal listing under SARA.

Once submitted to the federal government, the species is added to the public registry and becomes a candidate for legal protection and recovery under SARA. The Minister of Environment subsequently issues a response statement that details the federal government's response to the COSEWIC threat assessment. It is the government's role to incorporate consideration of social, political, and economic aspects of protecting a species and its habitat during their review of the assessment. The government can make one of three determinations based on the COSEWIC assessment: 1) decline to list the species, 2) refer the species back to COSEWIC for further assessment, or 3) confirm the assessment and list the species under SARA.

Once the species is legally listed as "at risk" under SARA, a recovery strategy and action plan, or a management plan is created, depending on the threat status. Each risk category carries mandatory timelines by which the federal government must develop recovery strategies and action plans (endangered or threatened), or management plans (special concern). The recovery strategy outlines the steps needed to recover the species and identifies critical habitat. Recovery strategies for species listed as endangered must be completed within one year of listing and within two years of listing for

species listed as threatened or extirpated (in the case of extirpated, the government will still draft a recovery strategy while recognizing a species may not technically be recoverable). Management plans are created for species listed as special concern and must be completed within three years of listing. Development of an action plan follows the recovery strategy, to outline in detail the steps to implement the recovery strategy. Action plans are not required for management plans.

Under some circumstances, assessments of species perceived to be in dire situations may be made without the full oversight and assessment of COSEWIC. If a species is thought to be in immediate and imminent risk of extinction or extirpation from Canada, COSEWIC may issue an emergency listing that goes into place immediately, and which can then be ratified by COSEWIC at the next available opportunity. Although rare, emergency listings have happened recently, such as for three species of bats that experienced significant population declines due to the spread of White Nose Syndrome in Canada (COSEWIC 2012a, 2012b, 2012c).

Implementation of recovery strategies, along with action plans or management plans, is accomplished through a wide variety of stewardship activities from conserving individual populations or species, to habitat protection and restoration, to targeted research efforts. Stewardship, defined as activities that "...contribute to the recovery of endangered, threatened, and other species at risk, and to prevent other species from becoming a conservation concern, by engaging Canadians from all walks of life in conservation actions to benefit wildlife," is a key element of Canada's species at risk strategy. Stewardship is mediated primarily through the Habitat Stewardship Program (HSP), which is one of the three pillars of the Canadian strategy, the other two pillars being the National Accord for the Protection of Species at Risk, and the Species at Risk Act. The primary goal of Canada's HSP is to contribute to the recovery of species at risk (Environment and Climate Change Canada 2016).

While the assessments and listings of species at risk do not apply directly to lands outside of federal oversight, there are provisions within the Species at Risk Act that allow the federal cabinet to make emergency protection orders on non-federal land, if the federal cabinet believes that a species considered "at risk" by the federal legislation is not being given "reasonable protection" under provincial or territorial management. This "federal safety net" has been applied in only a limited number of cases.

2.2 British Columbia

There are two modes of species at risk designation/listing in British Columbia: through the Wildlife Act (Wildlife Act, S.B.C. 1996, c.488); and/or inclusion as a Category of Species At Risk under the Forest and Range Protection Act (Forest and Range Practices Act, S.B.C. 2002, c.69) and the Private Managed Forest Lands Act (Private Managed Forest Land Act S.B.C. 2003, c. 80). Each process begins with a status assessment of species in British Columbia. British Columbia assesses and assigns conservation status ranks through the British Columbia Conservation Data Centre, a member of the Conservation Data Centre network in Canada, using the NatureServe methodology to assess all species in the province. Species are then categorized into the Red List and Blue List to communicate risk status (British Columbia Ministry of Environment, n.d.-a). The Red List is comprised of the species or ecological communities that have been ranked as extirpated, endangered, or threatened within British Columbia and therefore show significant signs of decline (British Columbia Ministry of Environment 2016). The Blue list includes those species of special concern (British Columbia Ministry of Environment 2016).

Species that are listed on the Red List or have been assessed by COSEWIC as at risk (i.e., extirpated, endangered, threatened, or of special concern) are candidates for provincial legal listing under the Wildlife Act (British Columbia Ministry of Environment n.d.-a). A detailed status assessment report is either adopted from COSEWIC or prepared by the provincial CDC for all candidates for provincial listing, and includes information about the species conservation rank, as well as information on the

taxonomy, ecology, distribution, range, occurrences, population trends, and threats. Once completed, the report is assessed by BC's Department of Environmental Protection and Sustainability, under the Ministry of Environment and Climate Change, after which a final assessment report is sent to the Lieutenant Governor in Council, who makes the final decision on species designation (British Columbia Ministry of Environment n.d.-a). The basis or criteria for the final decision is not published. It is unclear what discretion the Minister has after receiving the assessment recommendation.

As part of this formal listing process, and in accordance with the Accord for Protection of Species at Risk in Canada, British Columbia includes recovery planning and the creation of recovery plans and management plans for species at risk as part of its conservation framework (British Columbia Ministry of Environment 2009). The recovery planning stage for species at risk management is not included in legislation and there are no strict timelines for recovery planning in British Columbia. The conservation framework details a two-stage process for recovery planning in British Columbia: (1) the creation of a recovery plan, and (2) the creation of an action plan (British Columbia Ministry of Environment 2009). Both the recovery strategy and action plan are designed to be similar to national-level documents, in both form and content. The action plan illustrates the measures needed to be taken to recover the species or ecological community (e.g., ecosystem/habitat protection or restoration) (British Columbia Ministry of Environment 2009).

BC has established an additional mechanism that provides special management attention to species that may be negatively affected from forest or range practices through the Forest and Range Practices Act and the Private Managed Forest Lands Act. There are two categories for listing under these provisions: (1) species at risk, and (2) regionally important wildlife (British Columbia Ministry of Environment n.d.-b). Both federal and provincial species at risk are included in the first category if they are potentially negatively affected by forest or range practices on Crown land and lack sufficient protection through other mechanisms (British Columbia Ministry of Environment n.d.-b). The second category includes regionally important wildlife, focusing on species that are important to BC and which rely on habitats that are not already protected and may be adversely affected by forest and range practices (British Columbia BC Ministry of Environment n.d.-b). The establishment of this additional mechanism offers BC a secondary protection and management tool that can be used to address species habitat requirements (British Columbia Ministry of Environment n.d.-a). Listing under this mechanism is similar to that under the Wildlife Act: an Important Wildlife Management Strategy Account (report) is created and sent for provincial review and consultation, and then by order of the Minister of Environment, species are listed as "identified wildlife" which require additional protective measures. Using the Forest and Range Practices Act, the government may then establish wildlife habitat areas and implement general wildlife measures, such as adjusting or changing standard operating procedures to maintain these species on the landscape (British Columbia Ministry of Environment n.d.-b).

2.3 Alberta

In the province of Alberta, species at risk are regulated provincially under the Wildlife Act. Species may be designated as extirpated, endangered, threatened, or of special concern under this Act. The Wildlife Act (Wildlife Act, R.S.A. 2000, c. W-10) establishes two working groups that assist in species at risk designation and management: the Endangered Species Conservation Committee (ESCC) and an independent Science Subcommittee. The purpose of the ESCC is to advise the Minister of Sustainable Resource Development on endangered species and biodiversity conservation, while the Science Subcommittee reviews assessments to ensure that the species at risk assessment process in Alberta is science-based (Alberta Environment and Parks 2016).

Species at risk assessment in Alberta is comprised of six strategies: (1) general status, (2) detailed status assessment, (3) legal designation, (4) recovery planning, (5) prevention planning, and (6) implementation (Alberta Environment and Parks 2016). Strategy 1 in the species at risk assessment

process in Alberta is to assess the “general status” of species in Alberta for the purpose of assigning initial priorities for species assessment, data collection, and species management. This process is revisited every five years. Alberta is a part of the Conservation Data Centre (CDC) network in Canada and uses the NatureServe methodology to establish conservation status ranks for species residing the province (Alberta Government n.d.).

If, during this process, a species is suspected of decline based on information and analyses concerning population size, distribution trends, and threats, then the assessment process triggers Strategy 2, a detailed status assessment. This report is prepared by species experts and reviewed by the SSC. The SSC uses the status report and the IUCN Criteria to formulate a recommendation for the status of the species for review by the ESCC and Minister. The completion of this step moves the process forward to Strategy 3, legal designation, where the Minister makes a decision as to the legal designation for the species. There is no published information as to the criteria or basis for the Minister’s decision.

In the case that a decision has been made regarding designation of a species as requiring management, the process continues to Strategy 4, recovery planning. Species designated under the *Wildlife Act* as endangered or threatened receive legal protection from harm or harassment and a recovery plan must be created. The recovery plan must be produced within one year of legal designation and includes goals, strategies, and actions with associated timelines for the recovery of the listed species. Species designated as special concern or data deficient fall under Strategy 5, prevention planning. These species require conservation management plans with the aim of preventing these species from becoming at risk. Finally, Strategy 6 is the implementation of recovery plans and conservation management plans that will be carried out by government and non-government organizations to manage species at risk in Alberta. These plans are similar in form and content to the federal recovery strategies and action plans.

2.4 Saskatchewan

Species at risk in Saskatchewan are protected provincially under the *Wildlife Act* (The *Wildlife Act*, 1998, SS 1998, c W-13,12). The Act has provisions for four species at risk categories: extirpated, endangered, threatened, and vulnerable. Species at risk assessment in Saskatchewan begins with the general status assessment of all the flora and fauna in the province through the Saskatchewan Conservation Data Centre (Saskatchewan Conservation Data Centre 2016). The SCDC is a part of the national CDC network and uses the NatureServe methodology to assign conservation status ranks to prioritize candidates for listing under the *Wildlife Act* (Government of Saskatchewan 2013).

Once species are identified as candidates for legal protection, a detailed status assessment is performed and a report is created describing the species biology, trends in population and distribution, and threats (Encyclopedia of Saskatchewan | Details n.d.). COSEWIC ranking criteria and definitions are used to determine species conservation status (Encyclopedia of Saskatchewan | Details n.d.). Two separate groups review the status assessments: the Scientific Working Group (SWG) and the Endangered Species Advisory Committee (ESAC). The SWG, an independent committee of scientific experts, is charged with reviewing the COSEWIC status assessments to ensure that the province’s species at risk designation process follows a science-based approach (Government of Saskatchewan 2013). The ESAC is a group made up of 12 stakeholders to ensure that the species at risk assessment process includes public involvement (Government of Saskatchewan 2013). Each of the two groups makes recommendations to the Minister on legal designation. There is no published information as to the criteria or basis for the Minister’s decision. If a species is designated as being at risk, the next stage in the species at risk assessment process is recovery planning. Recovery planning is not a legal requirement for species protected under the *Wildlife Act* in Saskatchewan.

2.5 Manitoba

Species, as well as ecosystems may be designated as being at risk under the Manitoba Endangered Species and Ecosystems Act (Endangered Species Act, C.C.S.M. 2011, c. E111). There are four risk categories in Manitoba: extirpated, endangered, threatened, and of special concern. The species at risk assessment process in Manitoba begins with an initial general status assessment to monitor species in the province. To set conservation priorities, the Manitoba Conservation Data Centre, which is a member of the national CDC network, assigns plant and animal species and plant communities conservation ranks using the NatureServe methodology (Conservation Branch Province of Manitoba n.d.). Species or ecosystems are flagged for assessment through this process based on species distribution, population trends, and threats (Wildlife Branch Province of Manitoba n.d.). A detailed status assessment is then completed and the species risk status is determined using criteria modeled (adjusted for scale) after COSEWIC's species at risk assessment process (Province of Manitoba 2015).

Once a detailed status assessment is completed, the assessment process shifts to the review and legal designation stage. The assessment is reviewed by the Endangered Species Advisory Committee (ESAC), the majority of whose members must be professional scientists who have, to the satisfaction of the minister, expertise in a field of science related to plant and animal life. The ESAC is charged with making recommendations to the Minister concerning the status of species or ecosystems. There is no published information as to the criteria or basis for the Minister's decision. The Minister's recommendations will then be used to advise the Lieutenant Governor in Council on species/ecosystem designation under the Endangered Species and Ecosystems Act.

Once a species or ecosystem has been designated as at risk, the recovery planning stage of the assessment process is triggered, a requirement of the *Endangered Species and Ecosystems Act*. Similar to the federal Species at Risk Act process, recovery strategies are created for species and ecosystems designated as extirpated, endangered, or threatened. Species and ecosystems designated as special concern receive management plans. There are no legally set timelines for the recovery planning process in Manitoba.

2.6 Ontario

In Ontario, species at risk are governed under the Endangered Species Act (Endangered Species Act, S.O. 2007, c. P. 43), through which species may be designated as extirpated, endangered, threatened, or of special concern. Species classified as endangered or threatened receive automatic legal protection once classified (Government of Ontario 2015b). The general status of species in Ontario is monitored through the Natural Heritage Information Centre, a member of the Canadian CDC network. The center uses the data collected and compiled to calculate conservation status ranks using the NatureServe methodology to identify priority species and areas for conservation in Ontario (Government of Ontario, 2015c). Species exhibiting signs of decline or species assessed by COSEWIC as at risk then trigger a provincial assessment (Government of Ontario 2015a).

Provincial species at risk assessments and designations are conducted by the Committee on the Status of Species at Risk in Ontario (COSSARO), an independent committee of experts in science and/or aboriginal traditional knowledge. Species are classified based on the best scientific information, including community knowledge and Aboriginal Traditional Knowledge. Ontario uses criteria modeled after the IUCN and COSEWIC processes to assess species at risk (A. Mougeneil, personal communication, May 2, 2016). Species at risk assessments, along with recommendations for designation and advice on species at risk, are then forwarded to the Minister of Natural Resources and Forestry for the final legal stage of designation. Once the Minister of Natural Resources and Forestry receives the recommendation, legal designation of species is automatic.

Once a species is classified as a species at risk, the species at risk assessment process moves to the recovery planning stage. The Endangered Species Act highlights specific timelines for recovery planning in Ontario. Recovery strategies must be completed for species listed as endangered within one year of designation and within two years for species assessed as threatened. A management plan is created for all species listed as of special concern and is to be completed within five years of listing. Both recovery strategies and management plans are similar in form and content to federal documents of the same name. Once the recovery or management plan is received by the government, the Ministry of Natural Resources and Forestry has nine months to consider the advice for conservation action and to issue a response statement. Progress on conservation activities in the province as defined in the recovery and management plans is then reviewed five years after the response statement. Public consultation is ongoing throughout the Ontario species at risk assessment process, including consultation on recovery strategies, government response statements, and habitat regulations (Government of Ontario 2015b).

2.7 Quebec

Species at risk in Quebec are governed provincially under An Act Respecting Threatened or Vulnerable Species and their Habitats (Loi sur les espèces menacées ou vulnérables 1989, RSQ, c E-12.01). Through this law the government can designate an assessed species at risk as threatened or vulnerable. The responsibility for the protection of flora and fauna in Quebec is divided between the Ministry of Sustainable Development, Environment and the Fight Against Climate Change (MDDELCC) (plants and natural communities) and the Ministry of Natural Resources and Wildlife (MRNF) (wildlife) and therefore, any species at risk designation requires joint recommendations from these departments (Tardif, Lavoie, and Lachance 2005). The Québec Natural Heritage Data Centre (Le centre de données sur le patrimoine naturel du Québec - QDPNQ), which is the conservation data centre (CDC) and NatureServe network member in Quebec, is also divided between these branches. As with other provinces, the QDPNQ assigns conservation status ranks for species in Quebec using the NatureServe methodology (Tardif, Lavoie, and Lachance 2005). This process allows Quebec to prioritize species in need of further investigation of decline.

Species at risk assessment and legal designation is a multi-stage process in Quebec. The first stage involves the identification of species liable to be designated as at risk. The next stage of the process involves the development of a proposed designation report. The report includes a full description of the species in question, along with a list of regulations and legislation that may apply to the species and its habitats. (Government of Quebec 1992). Quebec publishes a list of species liable to become at risk, which is used as an administrative and educational tool designed to aid species conservation and recovery (Government of Quebec 1992). There is no information available describing how this list is developed.

To oversee species listing, the Quebec government has established several committees. As Quebec has divided responsibility for species at risk between two different sections of the government, there are two scientific advisory committees along with another overarching steering committee to supervise the process. Each committee is composed of six individuals: three from within the department and three outside of government (Government of Quebec 1992). Quebec uses its own criteria to assess species at risk and determine threat status, with recommendations incorporated into an assessment report created by the relevant advisory committee. The criteria encompass factors such as taxonomic status, distribution, biology, population size and demographic trends, habitat, community ecology, and limiting factors that may be affecting the species (Government of Quebec 1992). The final assessment report outlines recommendations within three categories: (1) a proposal for risk designation as either threatened or vulnerable, (2) a list of threat factors affecting the species and habitats in question, and (3) the establishment of measures for the management and conservation of the species in question (Government of Quebec 1992).

The assessment report is then passed to the steering committee for review and consultation. Consultations involve all relevant provincial government departments and First Nations and municipal/regional governments. In James Bay and northern Quebec territories, additional consultations are required through the Hunting, Fishing, Trapping Coordinating Committee, which is an organization that represents the First Nations and governments of northern Quebec (Government of Quebec). After consultations are complete, the Minister of Sustainable Development, Environment and the Fight Against Climate Change and the Minister of Natural Resources and Wildlife make the final decision regarding listing of the species. In cases where a species is designated as threatened or vulnerable, the species at risk assessment process concludes with the government adopting a “designation regulation” (Government of Quebec 1992). Quebec requires that all proposed designation regulations be published in the *Gazette officielle du Québec* and that the species at risk assessment process includes a public consultation process.

Once a species is designated as a provincial species at risk, the assessment process then leads to the recovery and management of the species. This includes management and protection of habitat and recovery planning [Ministère des Forêts, de la Faune et des Parcs (MFFP) 2016]. A recovery team is created to draft and implement the recovery plan for species at risk in Quebec. A recovery plan is prepared for all species at risk in Quebec, which outlines species-specific strategies for recovery and five-year recovery targets (MFFP 2016).

2.8 New Brunswick

Species at risk in New Brunswick are governed under the provincial Species at Risk Act (Species at Risk Act, S.N.B. 2012, c.6.). Under the Act, species may be classified as extirpated, endangered, threatened, or of special concern. New Brunswick conducts a general status assessment for groups of flora and fauna to provide a starting point for assessing and managing species at risk (New Brunswick Natural Resources 2016). The general status assessment in New Brunswick is conducted through the Atlantic Conservation Data Centre, which is a member of the national CDC network, and uses the NatureServe methodology to assign conservation status ranks and set priorities for conservation based on rarity, trends, and threats and provide a starting point for identifying species for provincial assessment (Conservation Status Assessment/NatureServe n.d.; New Brunswick Natural Resources, 2016).

Provincial species at risk assessments are conducted by the Committee for the Status of Species at Risk (COSSAR), an independent committee responsible for assessing and advising the Minister of Natural Resources on species at risk classifications. The committee is comprised of scientific experts and/or experts in wildlife conservation based on Aboriginal Traditional Knowledge. The COSSAR uses criteria based on the IUCN and COSEWIC criteria to assess species at risk using the best available scientific information, as well as community and Aboriginal Traditional Knowledge. The COSSAR reviews or reassesses species at risk status at a maximum interval of 10 years. Each part of the species at risk assessment process is made public on the public registry (<http://www1.gnb.ca/0078/SpeciesAtRisk/search-e.asp>). COSSAR recommendations of endangered are forwarded to the Minister, who may designate a species as at risk, or refer it back to COSSAR should the Minister have received further scientific information, community knowledge or aboriginal traditional knowledge that was not provided to COSSAR as part of the original status report.

Once a species is classified as “at risk” under New Brunswick’s Species at Risk Act, a recovery strategy or management plan is created depending on the status of the species. Species classified as extirpated, endangered, or threatened require a recovery plan if COSSAR has determined that recovery is feasible. A management plan is required for species designated as of special concern. There are no specific regulatory timelines for recovery planning in New Brunswick. The next step in the process involves an action plan, which outlines the actions needed to recover the species.

Official designation as endangered does not necessarily provide protection under New Brunswick provincial law. A separate “protection assessment” is conducted by Ministerial staff, which includes details of the recovery strategy, implications for the province, landownership issues, and socioeconomic considerations. In preparing the assessment, the Minister may consult with relevant government departments (both provincial and federal), aboriginal communities, and any other interested party, agency, or body. Once the protection assessment is complete, the Minister may decide whether or not the prohibitions of the Act apply to the species in question (New Brunswick Natural Resources 2012). After the protection assessment is completed, the Minister will make protection recommendations to the Lieutenant Governor in Council regarding the listed species. Any decisions not to enact protection measures for the species at risk must be made public on the public registry.

2.9 Nova Scotia

Species at risk in Nova Scotia are governed under the Endangered Species Act (Endangered Species Act, S.N.S. 1998, c.11), through which species at risk may be designated as extirpated, endangered, threatened, or vulnerable. Nova Scotia uses data from the National General Status Working Group assessment, which offers a “first alert” system to flag species that may be in decline and in need of further assessment through the provincial assessment process (General Status of Wild Species | novascotia.ca n.d.). The National General Status Working Group is composed of representatives from each of the Canadian provinces and territories and of the three federal agencies, and is responsible to the Canadian Wildlife Directors’ Committee, and ultimately to the Canadian Endangered Species Conservation Council, regrouping all wildlife ministers in Canada (www.wildspecies.ca). Using the National General Status Assessment and the conservation status assessments conducted by the Atlantic Conservation Data Centre, which, as noted above, is a member of the national CDC network and uses the NatureServe methodology, species are monitored and information is used to assign conservation ranks to aid in identifying species for the provincial species at risk assessment process (General Status of Wild Species | novascotia.ca n.d.; Nova Scotia’s Species at Risk: Municipal and Community Stewardship n.d.). A detailed status assessment is triggered when species are exhibiting signs of decline in population or distribution or are being negatively impacted by threats (M. Elderkin, personal communication, April 28, 2016).

The Nova Scotia Species at Risk Working Group, a group of scientific experts, is responsible for conducting the detailed status assessments for species at risk (Nova Scotia’s Species at Risk: Municipal and Community Stewardship n.d.). The status assessments include information on the biology and ecology of the species, distribution, habitat requirements and trends, population size and trends, and threats to the species’ survival within Nova Scotia. A recommendation for provincial threat status is also included in the assessment and is based on criteria modeled after the COSEWIC process. The Minister of Natural Resources subsequently reviews the report and makes a decision on listing or delisting a species under the Nova Scotia Endangered Species Act. There is no published information as to the criteria or basis for the Minister’s decision.

Recovery planning begins once a species is designated as endangered or threatened under the Endangered Species Act. Nova Scotia has regulatory provisions that stipulate the timeline for recovery plans: a recovery plan must be created within one year of listing if the species is classified as endangered and two years if it is classified as threatened. Species at risk in Nova Scotia are required to have an assigned recovery team. Recovery teams are responsible for assisting in developing and implementing recovery plans, which detail the needs and threats to endangered and threatened species and outline actions needed to recover populations in the province.

2.10 Prince Edward Island

Species at risk in Prince Edward Island are governed under the Wildlife Conservation Act, (Wildlife Conservation Act, RSPEI 1988, c E-9). Species may be designated as extirpated, endangered, threatened, or of special concern under the act. Prince Edward Island conducts regular provincial state of wildlife assessments, termed “wildlife and habitat inventories”. The Atlantic Conservation Data Centre, which is part of the national CDC network, determines conservation status ranks for species in Atlantic Canada using the NatureServe methodology.

The Species at Risk Advisory Committee is responsible for advising the Minister of Communities, Land and Environment on provincial listing of species at risk based on biological and scientific information (Government of Prince Edward Island 2014), although it is unclear who participates on this committee. There are no specific requirements for recovery planning in Prince Edward Island. To date, the province has yet to list a species under its provincial legislation.

2.11 Newfoundland and Labrador

Newfoundland and Labrador (NL) governs species at risk provincially under the Endangered Species Act (Endangered Species Act, SNL 2001, c E-10.1). Species may be designated as extirpated, endangered, threatened, or vulnerable under this Act. Species are monitored through general status assessments, and conservation status ranks are assigned using the NatureServe methodology and through the Atlantic Conservation Data Centre, which is a member of the national CDC network. Those species exhibiting declining trends are selected for detailed status assessments.

Based on these assessments, the province’s Species Status Advisory Committee (SSAC) makes recommendations to the Minister of Environment and Climate Change regarding designation of species at risk (Newfoundland and Labrador Department of Environment and Conservation 2016). The SSAC is an independent committee comprised of government and non-government experts charged with making recommendations to the Minister regarding the status of species at risk in Newfoundland and Labrador. Recommendations by SSAC are based on the best available scientific information as well as traditional ecological and local ecological knowledge (Newfoundland Department of Environment and Conservation 2016). The criteria used to determine species risk status are modeled after the criteria used by COSEWIC, with adjustments to local circumstances and criteria (Species Status Advisory Committee 2013). Based on the Minister’s recommendation, the Lieutenant Governor in Council may decide to designate the species under Section 7 of the Act in the recommended category, designate the species in a different category and release to the public the reason for the decision, or make no designation and release to the public the reason for no designation. The Minister may also remove the designation of a species (with the Lieutenant Governor in Council’s approval) where it is recommended by the SSAC.

Recovery planning in Newfoundland and Labrador is a requirement of the Endangered Species Act and includes specific timelines. For species designated as endangered or threatened, a recovery team is established to aid recovery efforts. Recovery plans must be completed for these species within one year of listing for endangered species, two years for threatened species, and three years for extirpated species. Species listed as vulnerable have a management plan created within three years of listing.

2.12 Yukon Territories

The Yukon Territory (YT) does not have any legislation that pertains to species at risk. The Wildlife Act (Wildlife Act, RSY 2002, c.229) deals with “specially protected wildlife”, which are designated as such by the Minister (Executive Council Member) responsible for the administration of the Act. The Yukon Territory relies wholly on COSEWIC to undertake status assessments and species protection under the SARA. There is no complementary process for species at risk assessment and management in the Yukon. The territory’s Conservation Data Centre is a member of the national

network of CDCs, collecting/disseminating data and conducting general assessments using the NatureServe methodology (Yukon Conservation Data Centre 2016). However, there is no process in place to further assess species identified as of potential concern in the territory.

2.13 Northwest Territories

Species protection and management are governed under the Species At Risk Act (Species At Risk (NWT) Act, S.N.W.T. 2009, c.16) in the Northwest Territories (NWT). The territory uses the General Status Ranking Program (GSRP) (<http://www.nwt-species-at-risk.ca/general-status-program>) as a tool to monitor species within the jurisdiction and to flag species in decline for further assessment (Northwest Territories Species at Risk n.d.). The GSRP is a collaborative program with all agencies working on wild species in the NWT, and which collects information on all species in the NWT. The General Status Ranking Program conducts conservation status assessment through the territory's Conservation Data Centre, which is a member of the national CDC network, using the NatureServe methodology to create conservation status ranks to prioritize conservation efforts (Working Group on General Status of NWT Species 2011). A detailed status assessment is conducted by the Species At Risk Committee (SARC) for species classified as "may be at risk" by the GSRP and the CDC (Working Group on General Status of NWT Species 2011).

The Species At Risk Committee (SARC) is responsible for conducting species at risk assessments in the Northwest Territories using the best available traditional, community, and scientific knowledge of the species (Government of the Northwest Territories 2016). The SARC is an independent committee of experts brought together to advise the Conference of Management Authorities on species at risk assessment. The Conference of Management Authorities is a group comprised of representatives from the federal and territorial government, the Taicho government, and the co-management boards (the Environmental Impact Screening Committee, the Environmental Impact Review Board, the Wildlife Management Advisory Council (NWT), the Fisheries Joint Management Committee, and the Wildlife Management Advisory Council - North Slope), with the purpose of building consensus on the conservation of species at risk. The assessments are then brought to the Conference of Management Authorities for review and agreement. Recommendations from the Conference then trigger consultations (aboriginal and other stakeholders) and processes required by law under land-claim agreements (Government of the Northwest Territories 2016).

Species listed under the territory's Species at Risk Act require a recovery strategy or management plan depending on threat status. Species listed as endangered or threatened require a recovery strategy be created within one (threatened species) or two (endangered species) years of listing. A management plan is required for species of special concern within two years of listing. Recovery strategies are also required for species listed as extirpated. The recovery strategy addresses the question of whether recovery is feasible for the species at risk. Public consultation is a part of the recovery process in NWT and all recovery documents must reach a consensus agreement with the Conference of Management Authorities. A five-year review of the actions to implement the recovery strategy or management plan are conducted to assess and summarize the progress of recovery.

2.14 Nunavut

Nunavut has a different governing structure than the other provinces and territories in Canada, with a public government and land claim agreement that influences every aspect of Nunavut management. As a result, Inuit appointees and Nunavut government representatives cooperate (co-manage) in the administration of different government bodies, such as the Nunavut Wildlife Management Board (NWMB), which is of special relevance to species at risk management in Nunavut (Nunavut 99 n.d.; NWMB n.d.-b).

Species at risk are governed under the Nunavut Wildlife Act (Consolidation of Wildlife Act, S.Nu. 2003, c.26). Under this Act, the NWMB may designate a species as extirpated, endangered, threatened, or of special concern. The Nunavut Species at Risk Committee (NSRC) is responsible for making recommendations concerning species at risk to the NWMB, supplying status reports, and creating priority lists of species warranting further investigation. Individuals or groups outside of NSRC may make requests to the NWMB concerning designations. Further, the Minister of Environment may make emergency requests that the NWMB designate a species as at risk in accordance with the precautionary principle. Any species at risk assessment for species in Nunavut must go through the NWMB (NWMB, n.d.-a).

Once a species' risk status has been agreed upon by the NWMB, the Minister must officially designate the species as "at risk" under the Wildlife Act. After designation, recovery and management planning provisions are triggered, with specific timeline requirements. These include the preparation of recovery plans by The Superintendent of Wildlife for species listed as endangered and threatened within two years of designation and management plans for species listed as special concern within three years of listing. There is a five-year review to determine the progress on recovery for species at risk in Nunavut.

The species at risk assessment process in Nunavut is relatively new and regulations to support the Act are still in development. It is unknown what criteria Nunavut intends to use to classify species at risk. The Nunavut Conservation Data Centre opened in 2015 and is still in the process of establishing baseline data on species in Nunavut.

3.0 DISCUSSION

Under the Accord for the Protection of Species at Risk (here after referred as the Accord), each province agrees to create complimentary species at risk legislation and processes, although the tools and processes may vary by jurisdiction (see Table 3.1). Thus far, six provinces and one territory (Northwest Territories), have developed targeted species at risk legislation to complement SARA. The extent of provisions provided through each provincial or territorial legislation varies, with some provinces/territories having Acts specifically for species at risk and others including provisions for species at risk within existing legislation. Timelines for recovery vary, and in some cases, are not included within provincial frameworks.

The species at risk assessment process at all jurisdictional scales can be divided into six stages: (1) baseline monitoring and preliminary assessment, (2) detailed status assessment, (3) review, (4) legal designation, (5) recovery planning, and (6) implementation. Species at risk assessments are a product of threat assessment (stages 1-3) and priority setting (stages 4-6). Generally, the first three stages of the assessment process (baseline monitoring, detailed status assessment, and review) are where there is the largest contribution from scientific data and analysis.

All provinces participate in some kind of baseline population monitoring. On a national level, every province and territory participates in the National General Status Assessment process. This is a process that occurs in five year intervals and contributes to the report *Wild Species: The General Status of Species in Canada* (Government of Canada 2015).

Table 3.1 Jurisdictional Application of Species at Risk Assessment Laws and Processes

Jurisdiction	Dedicated Species at Risk Act (year)	Independent Assessment Body	Risk Rankings	Use of NatureServe or CDC data for priority setting	Timelines for Recovery Planning	Comments
AB	No	Yes	Yes	No	Yes	
BC	No	No	Yes	Yes	No	
MB	Yes (2011)	Yes	Yes	Yes	No	
NB	Yes (2012)	Yes	Yes	Yes	No	NB has a separate process to determine protection for listed species.
NL	Yes (2001)	Yes	Yes	Yes	Yes	
NS	Yes (1998)	Yes	Yes	Yes	Yes	
NU	No	Yes	Yes	No	Yes	
NWT	Yes (2009)	Yes	Yes	Yes	Yes	
ON	Yes (2007)	Yes	Yes	Yes	Yes	
PEI	No	Yes*	Yes	Yes	No	No species have been designated as at risk of extinction in PEI.
QC	Yes (1989)	Yes	Yes	Yes	No	
SK	No	Yes	Yes	Yes	No	
YT	No	No	No	Yes	No	
CAN	Yes (2002)	Yes	Yes	No	Yes	

*Participation and activities of this group are not identified, and no species have yet been assessed.

In addition, each province and territory is part of the NatureServe Conservation Data Centre network. This national network provides jurisdictional managers of species at risk with consistent ecological information that is not restricted by jurisdictional boundaries (NatureServe Canada n.d.). NatureServe uses standardized methodologies to collect data and conduct assessments to ensure data may be used to do broad-scale analyses. A key assessment that NatureServe CDCs conduct is a conservation status

assessment, which evaluates the risk of extirpation of species and ecosystems at a subnational scale and the extinction risk of species and elimination risk of ecosystems at a global scale (Conservation Status Assessment | NatureServe n.d.). The purpose of conservation status assessments is to produce conservation status ranks, which measure extinction and extirpation risk at the global, national, and subnational scales (Conservation Status Assessment | NatureServe n.d.).

Every province and territory uses these assessments to calculate conservation status ranks for species and ecosystems within their jurisdiction. In all but two jurisdictions, these ranks are used to flag species for detailed status assessments and set conservation priorities, and often offer a first glimpse of population trends. The NatureServe methodology involves a specific protocol for determining a conservation status rank that involves numerical scoring of 10 conservation status factors that are grouped into three categories: rarity (six factors), threats two factors), and trends (two factors) (Faber-Langendoen et al. 2012). All these factors are based in the scientific literature. As data can be limited in some cases, the process requires information on two of the 10 factors to be able to determine a conservation status rank (Faber-Langendoen et al. 2012). Each of these factors has specific thresholds or numerical zones that enter into the rank calculation. Because of the use of NatureServe throughout most Canadian provinces and territories, the first step in most regional assessment processes (baseline monitoring and deciding which species to assess) starts with a science-based decision-making process.

The detailed status assessment process in Canada at both the federal and provincial levels (where it exists) is a compilation of the available knowledge concerning species that are suspected of being at risk. This includes information about the species' biology and ecology as well as a detailed examination of the threats and trends in population, distribution, and habitat. A key aspect of this process is the assessment and classification of the species into a threat category, and the subsequent recommendation to the competent Minister for legal designation. In most jurisdictions, this recommendation is made based on specified and published criteria, usually based on either the COSEWIC or IUCN criteria, which are used to determine the level of risk of extinction assigned to a species.

Depending on the jurisdiction in question, detailed status assessments are triggered based on trends in population and/or distribution, rarity, and threats. Jurisdictions in Canada vary in terms of the criteria used to determine the need for a detailed assessment of a species in decline (see Table 3.2 below). Status assessments can be qualitative assessments where threat level is inferred based on geographic range, population size, and trends based on expert judgment, or they can be objective assessments that use specific rules/criteria or scoring methods to infer threat (Regan et al. 2005). Most of the jurisdictions in Canada (9 out of 13) use an objective method to assess and designate species at risk. Quebec is the exception, as it uses a loosely defined set of criteria that involve scientific analysis of the key factors in threat assessments but does not have a standardized methodology, which is more indicative of a qualitative rather than objective assessment. The majority of provinces (8 out of 10) use criteria to define species at risk status derived from the COSEWIC and/or the IUCN criteria (see Table 3.1 above). Due to the restricted spatial scales of provinces and territories, as compared to national (COSEWIC) or global assessments (IUCN), modifications to the criteria are sometimes appropriate. However, most use a repeatable, standardized methodology for using the best available data to produce detailed status assessments and recommended threat status for species at risk.

Table 3.2 Criteria Used in Threat Assessment to Determine Legal Status and Species at Risk Category

Province/Territory	Criteria
BC	NatureServe
AB	IUCN
SK	COSEWIC
MB	COSEWIC
ON	IUCN and COSEWIC
QC	QC criteria
NB	IUCN and COSEWIC
PE	Unknown
NS	COSEWIC
NL	COSEWIC
YT	None
NWT	NWT biological criteria (based on COSEWIC/IUCN)
NU	Unknown
CAN	COSEWIC

The COSEWIC criteria are based on the IUCN process for assessing the threat status of species. IUCN uses five criteria (see Section 1.1) to determine whether a species is threatened with extinction. COSEWIC uses these same five criteria in species at risk assessments. As mentioned above, NatureServe uses three criteria (comprised of 10 factors each), all of which are included in both the COSEWIC and IUCN criteria. NatureServe and IUCN have jointly standardized their ratings for shared information fields to facilitate information sharing between organizations (Conservation Status Assessment | NatureServe n.d.). Furthermore, the thresholds for the criteria are the same for each protocol (e.g., the time scale used to measure short-term population trends is 10 years or three generations).

All three systems strive to be as objective as possible. However, there is a key difference in how the IUCN/COSEWIC and NatureServe processes apply the criteria to define threat categories. NatureServe uses a rank calculator in the conservation status assessment, which involves systematically scoring the conservation factors with numerical values and then inserting these values into the rank calculator spreadsheet. The factors are weighed differently, with certain factors given higher extinction risk importance than others (e.g., the rarity factor is weighed higher than the threats factor and the areas of occupancy factor is weighted higher than the range extent factor). These weightings are based on current scientific thought that rarity features higher for risk of extinction than threats (Faber-Langendoen et al. 2012; Mace et al. 2008; Master et al. 2012). IUCN/COSEWIC do not weigh their criteria, nor do they use a calculator to generate an overall rank. Instead, they determine species status in each criterion and either accept the overall status as that of the criterion determined to have the highest risk status, or modify the final assessment by a small degree (e.g., one

threat level up or down) based on a discussion among the experts present. A study comparing the NatureServe and IUCN criteria for defining species threat status saw similarities in species classification for categories of the highest (critically endangered or imperiled) and the lowest (special concern) threat status but found that the middle categories varied depending on methodology used (Mehlman et al. 2004). A similar study by Trout (2013) determined that COSEWIC deliberations tended to have more higher and lower assessments (endangered and special concern) than mid-level assessments (threatened), as compared to assessments generated using an automatic threat calculator. Thus, even though the different methodologies used among the provinces and territories could result in differing threat statuses, it is likely all processes assign the highest status to those species with the highest theoretical threat of extinction or extirpation.

The IUCN uses more detailed threat categories (nine in total) than do other protocols (e.g., COSEWIC has seven categories), including categories of extinct, extinct in the wild, critically endangered, endangered, vulnerable, near threatened, least concern, data deficient, and not evaluated in its classification system. Within these, the three categories that are considered as “at risk of extinction” include critically endangered, endangered and vulnerable. These designations are based on quantitative IUCN criteria (International Union for the Conservation of Nature Standards and Petitions Subcommittee 2016). NatureServe categories are similar to those of IUCN with slight variation in terminology, and include critically imperiled, imperiled, vulnerable, apparently secure, and secure. The first three of these categories define a species as being at risk of extinction. The classification system used by those provinces or territories with species at risk legislation is the simpler version offered by COSEWIC to categorize species at risk (extinct, extirpated, endangered, threatened or vulnerable, special concern, data deficient, and not at risk), with the categories of endangered and threatened having legal protection.

Most Canadian jurisdictions conduct detailed species status assessments. However, some provinces are moving towards classifying and protecting ecological communities and ecosystems. For example, Manitoba includes ecosystems in their species at risk legislation. British Columbia has included conserving ecosystems and assessing ecological communities in their conservation framework, which is a policy document outlining BC’s plan to prioritize conservation actions (British Columbia Ministry of Environment 2009). These approaches are in line with research that suggests moving conservation focus towards an ecosystem-based approach to conservation is a key step in preserving biological diversity (Franklin, 1993).

A key component that impacts the assessment process is data quantity and quality. Understanding the ecology of a species and monitoring the dynamic changes in a population is a complex endeavour that is a culmination of years of study. Therefore, it is not uncommon to have missing information and different types and quality of data when examining the status of a species. For example, COSEWIC incorporates aboriginal traditional knowledge (ATK) and community knowledge into status reports and species designations. Some provinces and territories are transparent in their inclusion of ATK and community knowledge within species at risk legislation (Ontario, New Brunswick, Newfoundland and Labrador, Northwest Territories, and Nunavut). Integrating ATK, community knowledge, and scientific knowledge into conservation actions like species at risk assessment has been found to aid and improve effectiveness of biodiversity conservation (Fraser et al. 2006).

A common component of provincial/territorial species at risk legislation includes establishing an independent oversight body, similar to COSEWIC at the federal level, to either create or review threat assessments and/or set priorities. Most provinces have specific groups comprised of scientific experts to ensure assessments are scientifically sound (Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Newfoundland and Labrador, Prince Edward Island, Northwest Territories, and Nunavut), providing a peer review process for species at risk assessment. Some provinces also include groups made up of stakeholders (e.g., industry, landowners, non-governmental

organizations) to review assessments (Alberta, Saskatchewan, and Quebec), including public consultation within the assessment process.

All but one jurisdiction, the Yukon Territory, has a legal mechanism for regulating species at risk, and seven provinces/territories and the federal government have dedicated species at risk legislation. For most jurisdictions, legal designation (for species listed as endangered or threatened) offers protection from harm or harassment of the individual species and its nest or den. The exception to this is in New Brunswick, where an additional protection assessment is needed to determine whether activity restrictions or habitat protection is warranted. In all jurisdictions with legal designation, the independent oversight body recommends species to be listed, with final governmental approval required by legislation.

Recovery planning is a key step in the species at risk assessment and management process. Each province and territory has agreed to incorporate recovery planning into species at risk legislation through the Accord for the Protection of Species At Risk (1995). Under this agreement, jurisdictions have also agreed to set specific deadlines for recovery strategies (to be completed within one year of designation for endangered species and two years for threatened species), and to implement strategies within a timely fashion (Government of Canada n.d.). Despite this agreement, three provinces have no recovery planning requirements (British Columbia, Saskatchewan, Prince Edward Island); however, this does not mean that recovery planning is not included in these jurisdictional processes (e.g., British Columbia creates and implements recovery strategies despite no regulatory requirement). Most jurisdictions include recovery planning within species at risk legislation and include specific deadlines for these strategies (Alberta, Ontario, Nova Scotia, Newfoundland and Labrador, Northwest Territories, and Nunavut).

National-level recovery strategies/plans and management plans outline the conservation actions needed to recover or prevent the decline of species at risk. The Ministers responsible for the relevant departments review these plans and have them implemented based on whether they are deemed technically or economically feasible, and the degree of scientific evidence indicating that the species is becoming extirpated from the relevant jurisdiction. At the provincial/territorial level, some jurisdictions assign recovery teams (Alberta, Quebec, Nova Scotia, Newfoundland and Labrador), comprised of species experts, to assist in the development and implementation of recovery strategies. Additional plans, referred to as action plans (New Brunswick) or implementation plans (British Columbia), are required in some areas to outline the measures needed to implement the recovery strategy goals (action plans in New Brunswick) or to address concerns in cases where there could be significant socioeconomic implications (British Columbia).

4.0 CONCLUSIONS

In general, the species at risk assessment processes across Canadian jurisdictions are similar. For the majority of jurisdictions, the assessment process follows the same six stages of the federal process. This is to be expected, as every jurisdiction has agreed to the Accord for the Protection of Species at Risk (1995), which outlines specific commitments to protecting species at risk. However, there are some key areas where jurisdictions vary in their practices. First, it should be noted that there are some jurisdictions that do not have dedicated provincial species at risk legislation (Alberta, British Columbia, Nunavut, Saskatchewan, Yukon Territory) or programs (Prince Edward Island). The Nunavut process is still in development and some of the regulations needed to protect species at risk have yet to be enacted. The remaining jurisdictions have existing legislation that act in a parallel fashion to the federal Species at Risk Act.

Several key differences between the provinces and territories stem from the differences in their governing structures. The provinces differ from the territories in their approval process of species listings, as Wildlife Management Boards have considerable influence over the process. The territorial

processes for legal designation are reviewed and finally approved by the Lieutenant Governor in Council and/or the Minister responsible for species at risk designation, and then there is an additional approval body (in the Northwest Territories, the Conference of Management Authorities, and in Nunavut, the Nunavut Wildlife Management Board) that has the final approval power over final species at risk designation.

Most jurisdictions (11 of 13) conduct the initial conservation status assessment using the NatureServe methodology and this assists in forming a candidate list for a detailed status assessment. The criteria used to inform status designation recommendations are based on the COSEWIC or IUCN criteria. The NatureServe methodology and conservation status ranks hold no legal standing, but are widely used as indicators for species that may warrant a detailed assessment and possible legal protection. British Columbia does not follow this process, however, and instead uses the NatureServe conservation status assessments and ranks to inform recommendations for threat status. Therefore, BC conducts detailed assessments for every species, and arguably offers a more thorough species at risk assessment process overall. In addition, BC has additional natural resource regulations such as the ability to designate special habitat areas for species of concern through the Forest and Range Practices Act and the Private Managed Forest Lands Act, giving the province multiple avenues through which it can manage species at risk.

Species at risk assessment and designation is a complex process. The threat assessment process involves a compilation of information and scientific analysis to inform decisions on threat status. While threat assessments and status designations are key steps to species at risk management, the recovery planning, implementation, and monitoring stages are all important components to conservation and eventual species recovery. All Canadian jurisdictions (federal, provincial, and territorial) include a scientific peer-review process within their status assessments, although the extent differs. Some jurisdictions also include stakeholder involvement in the decision-making process. For most jurisdictions, the Minister (who is the responsible government official for species at risk assessment) must consider the socioeconomic aspects, along with the feasibility of recovery when declaring a species at risk. The New Brunswick process is the only provincial process in which species designated as “at risk” under provincial legislation are not necessarily given protection or for which designation does not necessarily enact activity prohibitions. While designation as “at risk” is based solely on the scientific basis of the species at risk threat assessment, New Brunswick requires a separate protection assessment that offers a third-party examination of socioeconomic effects and requirements of protecting the habitat of a species at risk. One potential approach to reducing potential biases in the listing process is to separate the socioeconomic analysis from the listing process (Findlay et al. 2009). By having an independent third party conduct the socioeconomic analysis, New Brunswick removes Ministerial discretion in the legal designation of risk status to species at risk.

The use of science in the assessment process is where the strongest similarities between jurisdictions are found. Scientific data and ATK are applied during baseline monitoring, the detailed status assessment and status recommendation, and the review stage of the process. Most jurisdictions use an objective, internationally accepted method to categorize species into threat status, such as the IUCN criteria, which have featured prominently in methodologies for threat status designation in Canada. Furthermore, all jurisdictions that manage species at risk use a peer review process to ensure that assessments have a solid scientific foundation.

In conclusion, most Canadian jurisdictions have species at risk assessment programs that complement the federal system and share criteria and frameworks (e.g., COSEWIC or IUCN) for legal designation. The process for designating species at risk varies, with some jurisdictions requiring more complex approval processes (e.g., Northwest Territories and Nunavut) and some having more thorough assessments of wildlife, whether or not they are likely at risk (e.g., British Columbia). The

provisions provided for in legislation across Canada vary, with some jurisdictions having strict timelines for completing the various stages in species at risk process, and others having no legislated timelines. This report does not examine the effectiveness of the different species at risk assessment processes across Canada. Risk assessment is a complex process both scientifically and politically. Ensuring the process is transparent, unbiased, and based on a scientifically rigorous process is important to ensuring there is a solid foundation for legal protection and preserving Canada's species and biodiversity.

REFERENCES

- Alberta Environment and Parks. 2016. Alberta's Species at Risk Strategies. Retrieved May 26, 2016 from <http://aep.alberta.ca/fish-wildlife/species-at-risk/albertas-species-at-risk-strategy/default.aspx>
- Alberta Government. n.d. Alberta Conservation Information Management System: Alberta Parks Overview. Retrieved May 31, 2016 from <http://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/overview/>
- British Columbia Ministry of Environment. 2009. *Conservation framework: Conservation priorities for species and ecosystems primer*. British Columbia: Ecosystem Branch, Environmental Stewardship Division, British Columbia Ministry of Environment. https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/species-ecosystems-at-risk/species-at-risk-documents/cf_primer.pdf
- . 2016. Endangered Species and Ecosystems - Red and Blue Lists. <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data>
- . n.d.(a) Frequently Asked Questions. <http://www.env.gov.bc.ca/wld/faq.htm#18>
- . n.d.(b) Identified Wildlife Management Strategy – Wildlife Habitat Areas. <http://www.env.gov.bc.ca/wld/frpa/iwms/index.html>
- Benidickson, J. 2009. *Environmental law* (3rd ed.). Toronto, ON: Irwin Law Inc.
- Committee on the Status of Endangered Wildlife In Canada (COSEWIC). 2012a. *Technical summary and supporting information for an emergency assessment of the Little Brown Myotis Myotis lucifugus in Canada*. Ottawa, ON: Committee on the Status of Endangered Wildlife in Canada.
- . 2012b. *Technical summary and supporting information for an emergency assessment of the Northern Myotis Myotis septentrionalis in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa, ON: Committee on the Status of Endangered Wildlife in Canada.
- . 2012c. *Technical summary and supporting information for an emergency assessment of the Tri-colored Bat Perimyotis subflavus in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa, ON: Committee on the Status of Endangered Wildlife in Canada.
- Conservation Branch Province of Manitoba. n.d. About the Manitoba Conservation Data Centre. <http://www.gov.mb.ca/conservation/cdc/index.html>
- Conservation Status Assessment | NatureServe. n.d. Retrieved June 15, 2016, from <http://www.natureserve.org/conservation-tools/conservation-status-assessment>
- Environment and Climate Change Canada. 2016. Habitat Stewardship Program (HSP) for Species at Risk. <https://www.ec.gc.ca/hsp-pih/>

- Environment Canada. 2001. The Accord for the Protection of Species at Risk. http://www.ec.gc.ca/media_archive/press/2001/010919_b_e.htm
- Encyclopedia of Saskatchewan | Details. n.d. <https://uofrpress.ca/Books/E/Encyclopedia-of-Saskatchewan-The>
- Faber-Langendoen, D., J. Nichols, L. Master, K. Snow, A. Tomaino, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay, A. Teucher, and Young, B. 2012. *NatureServe conservation status assessments: Methodology for assigning ranks*. Arlington, VA: NatureServe.
- Findlay, C.S., S. Elegie, B. Giles, and L. Burr. 2009. Species listing under Canada's Species at Risk Act. *Conservation Biology* 23(6): 1609–1617. <https://doi.org/10.1111/j.1523-1739.2009.01255.x>
- Fitter, R., and M. Fitter (eds.) 1987. *The road to extinction: Problems of categorizing the status of taxa threatened with extinction*. Proceedings of a symposium held by the Species Survival Commission, Madrid, November 7-9, 1984. Gland, Switzerland and Cambridge, UK: International Union for the Conservation of Nature.
- Franklin, J.F. 1993. Preserving biodiversity: Species, ecosystems, or landscapes? *Ecological Applications* 3(2): 202–205. <https://doi.org/10.2307/1941820>
- Fraser, D.J., T. Coon, M.R. Prince, R. Dion, and L. Bernatchez. 2006. Integrating traditional and evolutionary knowledge in biodiversity conservation: A population level case study. *Ecology and Society* 11(2): 4. <https://doi.org/10.5751/ES-01754-110204>
- General Status of Wild Species | novascotia.ca. n.d. <http://novascotia.ca/natr/wildlife/biodiversity/general-status.asp>
- . 2012. About COSEWIC. <https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife.html>
- . 2015. Wild species: The general status of species in Canada. https://www.registrelep-sararegistry.gc.ca/document/default_e.cfm?documentID=3174
- . n.d. National Accord for the Protection of Species at Risk. <https://www.registrelep-sararegistry.gc.ca/6B319869-9388-44D1-A8A4-33A2F01CEF10/Accord-eng.pdf>
- Government of Ontario. 2015a. How species at risk are listed. <https://www.ontario.ca/page/how-species-risk-are-listed>
- . 2015b. How species at risk are protected | Ontario.ca. <https://www.ontario.ca/page/how-species-risk-are-protected>
- . 2015c. Natural Heritage Information Centre. <https://www.ontario.ca/page/natural-heritage-information-centre>
- Government of Prince Edward Island. 2014. Forests, fish and wildlife: Species at risk. <http://www.gov.pe.ca/forestry/index.php3?number=78046>
- Government of Quebec. 1992. Quebec Policy on Threatened or Vulnerable Species 1: Designation. <http://legisquebec.gouv.qc.ca/en/ShowDoc/cs/E-12.01>
- Government of Saskatchewan. 2013. Biodiversity: Species at risk. <http://www.environment.gov.sk.ca/Default.aspx?DN=c2e39ae8-cbf1-4f07-8d9a-b50ce3f4fd01>
- Government of the Northwest Territories. 2016. *Species at risk in the Northwest Territories 2016*. http://www.nwtspeciesatrisk.ca/sites/default/files/speciesatriskinthenwt_english.pdf

- Hooper, D.U., E.C. Adair, B.J. Cardinale, J.E.K. Byrnes, B.A. Hungate, K.L. Matulich, A. Gonzalez, J.E. Duffy, L. Gamfeldt and M.I. O'Connor. 2012. A global synthesis reveals biodiversity loss as a major driver of ecosystem change. *Nature* 486: 105-108. <https://doi.org/10.1038/nature11118>
- International Union for the Conservation of Nature (IUCN). 2001. IUCN Red List categories and criteria: Version 3.1. Gland, Switzerland and Cambridge, UK: IUCN Species Survival Commission. <http://www.iucnredlist.org/technical-documents/categories-and-criteria>
- . 2012. IUCN Red List categories and criteria: Version 3.1 (2nd ed.). Gland, Switzerland and Cambridge, UK: International Union for the Conservation of Nature.
- International Union for the Conservation of Nature Standards and Petitions Subcommittee. 2016. *Guidelines for using the IUCN Red List categories and criteria* (No. Version 12). Prepared by the Standard and Petitions Subcommittee. <http://www.iucnredlist.org/technical-documents/red-list-documents>
- Mace, G.M., N.J. Collar, K.J. Gaston, C. Hilton-Taylor, H.R. Akçakaya, N. Leader-Williams, E.J. Milner-Gulland, and S.N. Stuart. 2008. Quantification of extinction risk: IUCN's System for classifying threatened species. *Conservation Biology* 22(6): 1424–1442. <https://doi.org/10.1111/j.1523-1739.2008.01044.x>
- Mace, G.M., and R. Lande. 1991. Assessing extinction threats: Toward a reevaluation of IUCN threatened species categories. *Conservation Biology* 5(2): 148–157. <https://doi.org/10.1111/j.1523-1739.1991.tb00119.x>
- Master, L.L., D. Faber-Langendoen, R. Bittman, G.A. Hammerson, B. Heidel, L. Ramsay, K. Snow, A. Teucher, and A. Tomaino. 2012. *NatureServe conservation status assessments: Factors for evaluating species and ecosystem risk*. Arlington, VA.: NatureServe.
- Mehlman, D.W., K.V. Rosenberg, J.V. Wells, and B. Robertson. 2004. A comparison of North American avian conservation priority ranking systems. *Biological Conservation* 120(3): 383–390. <https://doi.org/10.1016/j.biocon.2004.03.013>
- Ministère des Forêts, de la Faune et des Parcs (MFFP). 2016. Species conservation. <http://mffp.gouv.qc.ca/the-department/?lang=en>
- National Council for Air and Stream Improvement, Inc. (NCASI). 2013. *A review of the history and scientific basis of species at risk assessments in Canada*. Technical Bulletin No 1005. Research Triangle Park, N.C.: National Council for Air and Stream Improvement, Inc.
- . 2004. *Managing elements of biodiversity in sustainable forestry programs: Status and utility of NatureServe's information resources to forest managers*. Technical Bulletin No. 885. Research Triangle Park, N.C.: National Council for Air and Stream Improvement, Inc.
- NatureServe Canada. n.d. About NatureServe Canada. <http://www.natureserve.org/natureserve-network/canada/about-natureserve-canada>
- New Brunswick Natural Resources. 2012. New act will protect species at risk. http://www2.gnb.ca/content/gnb/en/news/news_release.2012.04.0291.html
- . 2016. *General status of wild species in New Brunswick: Introduction*. http://www2.gnb.ca/content/gnb/en/departments/erd/natural_resources/content/wildlife/content/GeneralStatusWildSpecies.html

- Newfoundland and Labrador Department of Environment and Conservation. 2016. General status of species | Environment and Conservation.
http://www.env.gov.nl.ca/env/wildlife/all_species/general_status.html
- Newfoundland Department of Environment and Conservation. 2016. Species Status Advisory Committee | Environment and Conservation.
<http://www.env.gov.nl.ca/env/wildlife/endangeredspecies/ssac/index.html>
- Nova Scotia's Species at Risk. n.d. Municipal and community stewardship.
http://www.speciesatrisk.ca/municipalities/sar_ns.htm
- Nunavut 99 - n.d. A public government. http://www.nunavut.com/nunavut99/english/public_gov.html
- Nunavut Wildlife Management Board (NWMB). n.d. (a). About NWMB - Frequently asked questions. <http://www.nwmb.com/en/about-nwmb/faqs#q-11-what-role-does-the-nwmb-play-in-federal-species-at-risk-act-listings>
- . n.d.(b). NWMB. <http://www.nwmb.com/en/>
- Northwest Territories Species at Risk. n.d. Northwest Territories General Status Ranking Program.
<http://www.nwtspeciesatrisk.ca/generalstatusprogram>
- Possingham, H.P., S.J. Andelman, M.A. Burgman, R.A. Medellín, L.L. Master, and D.A. Keith. 2002. Limits to the use of threatened species lists. *Trends in Ecology and Evolution* 17(11): 503–507. [https://doi.org/10.1016/S0169-5347\(02\)02614-9](https://doi.org/10.1016/S0169-5347(02)02614-9)
- Province of Manitoba. 2015. FAQs Wildlife and Ecosystem Protection.
<https://www.gov.mb.ca/conservation/wildlife/faq/act.html>
- Regan, T.J., M.A. Burgman, M.A. McCarthy, L.L. Master, D.A. Keith, G.M. Mace, and S.J. Andelman. 2005. The consistency of extinction risk classification protocols. *Conservation Biology* 19(6): 1969–1977. <https://doi.org/10.1111/j.1523-1739.2005.00235.x>
- Saskatchewan Conservation Data Centre. 2016. Species conservation rankings.
<http://www.biodiversity.sk.ca/ranking.htm>
- Species Status Advisory Committee. 2013. Newfoundland and Labrador in *SSAC annual report 2013-2014*, 29.
<http://www.assembly.nl.ca/business/electronicdocuments/SSACAnnualActivityReport2013-2014.pdf>
- Tardif, B., G. Lavoie, and Y. Lachance. 2005. *Québec biodiversity atlas. Threatened or vulnerable species*. Québec, ON: Gouvernement du Québec, Ministère du Développement durable, de l'Environnement et des Parcs, Direction du développement durable, du patrimoine écologique et des parcs.
- Trout, L. 2013. Uncertainty and decision-making for species-at-risk assessments in Canada. Thesis. University of Guelph. <http://hdl.handle.net/10214/7498>
- Wildlife Branch Province of Manitoba. n.d. Manitoba's Endangered Species and Ecosystems Act (ESEA) FAQ's. Retrieved May 25, 2016, from
<http://www.gov.mb.ca/conservation/wildlife/faq/act.html>

Working Group on General Status of NWT Species. 2011. *NWT species 2011-2015 - General status ranks of wild species in the Northwest Territories*. Yellowknife, NT: Department of Environment and Natural Resources, Government of the Northwest Territories.

https://www.researchgate.net/publication/259753257_NWT_Species_2011-2015

Yukon Conservation Data Centre. 2016. Rare species database. <http://www.env.gov.yk.ca/animals-habitat/cdc.php>

APPENDIX

GLOSSARY OF TERMS

Designation	The legal categorization of a species into a classification denoting the level of extinction risk to the species.
Endangered	A species at heightened risk of becoming extinct or extirpated if causes are not eliminated or reversed.
Extinction	The permanent disappearance of a species from the planet.
Extirpation	The disappearance of a species from the wild within a given geographic area.
Special Concern	A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.
Threat Assessment	An objective assessment to determine the likelihood of species going extinct based on scientific information and analysis.
Threatened	A species at heightened risk of becoming endangered if causes are not eliminated or reversed.