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Perspective

Limitations of threatened species lists in Canada: A federal and provincial perspective

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ABSTRACT

Threatened species lists are valuable tools used to inform conservation decisions when developed appropriately. However, inherent problems associated with current listing and recovery processes exist in Canada (bias, legislative requirements, and data discrepancies). Canadian Species at Risk lists (national) and Nova Scotia's Endangered Species lists (regional) were assessed to determine i) coverage of International Union for Conservation of Nature (IUCN) (global) listed vulnerable, endangered, and critically endangered species; ii) recovery compliance; and iii) recovery plan completeness. Results indicated that many globally threatened species lack adequate protection nationally and regionally in Canada. Different taxonomic groups received different listing and recovery priorities. Mammals received the highest likelihood of listing and recovery action time, while fish were less likely to be listed. Many nationally threatened and endangered species have recovery plans, though most (141 species) were developed later than legislated. Environmental management related to biases, economic considerations, and late recovery planning (i.e., non-compliance) needs serious improvement in listing and recovery processes to enhance protection of biodiversity nationally and regionally within Canada.

1. Introduction

Threatened species lists provide an overall risk of extinction based on the most recently available ecological data for that species internationally, nationally and regionally (Possingham et al., 2002; Keith et al., 2014). They provide tools to inform conservation decisions, resource allocation and appropriate national and regional management action (Breininger et al., 1998; de Grammont and Cuarón, 2006; Farrier et al., 2007). The International Union for Conservation of Nature (IUCN) Red List of species is a powerful tool to inform biodiversity conservation, policy change, and for protecting natural resources (IUCN, 2016a). The IUCN Red List of species is utilized by international governments for prioritizing conservation actions and assessing conservation status of threatened species (de Grammont and Cuarón, 2006; Rodrigues et al., 2006; Mace et al., 2008). For example, the US Government often uses IUCN evaluations when assessing species under the *US Endangered Species Act* (Parsons, 2016). The IUCN assesses species by global populations and has developed assessment criteria that can be implemented at national and regional population scales (Rodrigues et al., 2006; Schipper et al., 2008; IUCN, 2015). For example, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is required to assess species nationally and provide status recommendations for legal listing under the Canadian *Species at Risk Act*

(SARA) (*Species at Risk Act*, S.C., 2002). COSEWIC adopted the IUCN Red List criteria, allowing Canadian national assessments to be broadly comparable to international assessments in its determinations as to whether a species is endangered or threatened (Farrier et al., 2007; COSEWIC, 2015). The IUCN and COSEWIC criteria consider both qualitative and quantitative data for species range, population size, habitat, ecology, threats and current conservation action to determine if a species meets a certain threshold, indicating a level of threat requiring a vulnerable, endangered, or critically endangered status (IUCN SPS (International Union for the Conservation of Nature Standards and Petitions Subcommittee), 2016; IUCN, 2016b). However, quantitative criteria are not incorporated directly into legal instruments. For example, under Canadian federal legislation, there are five alternative pathways to listing a species in one of the threatened categories, broadly equivalent to the IUCN categories, but quantitative data are replaced by qualitative evaluations (Farrier et al., 2007). The first step to a legal SARA listing is COSEWIC assessments where a status recommendation is provided to the Minister of Environment and Climate Change Canada (Government of Canada, 2016a, 2016b). The Minister then considers the social and economic implications of listing (Supplementary Material Fig. 1). Once a decision is made, justification in a response statement is provided from the Minister. More detail on the SARA listing process can be found on the SARA website [<http://www>.

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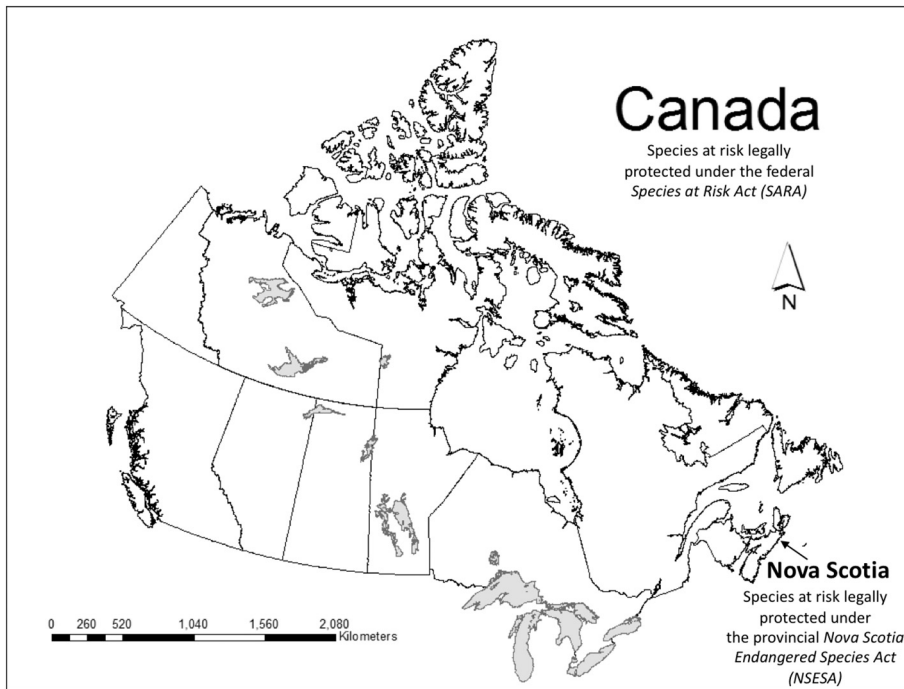


Fig. 1. Coverage of legal protection for Species at Risk in Canada (nationally) and in Nova Scotia (regionally).

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Though the intention is to aid species recovery, many threatened species lists are developed to fulfill legislative requirements (e.g., SARA) (Possingham et al., 2002), assess the conservation status of species and for prioritizing conservation actions on these species (de Grammont and Cuarón, 2006). These requirements place socio-economic values on species when determining status, which can lead to inadequate protection (Farrier et al., 2007), but threatened species lists must consider all data in a species assessment. However, there are many uncertainties associated with ecological data including natural variation, interpretation, observational effort and availability (Akçakaya et al., 2000; Harris et al., 2012; NCASI (National Council for Air and Stream Improvement), 2013; Bland et al., 2015). Further, there are gaps between assessments, legislation, and action preventing status listings from making substantial conservation change (Rodrigues et al., 2006; Findlay et al., 2009; Bottrill et al., 2011; Ortega-Argueta et al., 2011).

Section 32 of the SARA states “with respect to individuals of a listed wildlife species that is not an aquatic species or a species of birds that are migratory birds protected by the *Migratory Birds Convention Act, 1994*, sections 32 and 33 do not apply in lands in a province that are not federal lands ...” (Species at Risk Act, S.C, 2002). Since provinces in Canada have jurisdiction over natural resources, public lands, and private property, SARA only extends mandatory protection to species on federal lands, aquatic species or migratory birds (which covers only 5% of all land in Canada outside the Northern territories) (Olive, 2015). This responsibility requires provinces to identify endangered species within their jurisdiction to ensure species are protected on provincial lands; meaning provinces must also have adequate listing processes and provide appropriate recovery action (Wojciechowski et al., 2011). However, there are still four provinces, British Columbia, Alberta, Saskatchewan and Prince Edward Island, with no stand-alone species at risk legislation. This creates problems in provinces lacking species at risk legislation, where SARA only offers discretionary protection to species on non-federal lands (Olive, 2015). To mitigate societies future effect on declining species populations, decision-makers and conservation managers have developed threatened species lists towards prioritization of recovery. Three problems that prevent threatened species lists from being effective include: i) biases; ii) legislative requirements; and iii) data discrepancies and uncertainties (Farrier et al.,

2007; Mooers et al., 2007).

1.1. Biases

Threatened species lists, as well as action required through legislation, are known to be highly biased towards charismatic, well-known species (e.g., birds and mammals) (Findlay et al., 2009). Threatened species lists rely heavily on compiled ecological knowledge and are often biased towards species that attract interest and funding and are accessible to study. Decisions to list species based on species information can complement anthropocentric perspectives, such as economic and social values (Farrier et al., 2007; Heise, 2016). However, threatened species lists required through legislation, receiving management and protection after listing, can be biased towards species that are less likely to affect industry and society. For example, Ministerial decisions to list species are often based on economic and social implications (e.g., Canadian population of Atlantic cod, *Gadus morhua* and Porbeagle shark, *Lamna nasus*) (Myers et al., 1997; Mooers et al., 2007; Elgie, 2008). In Canada, when threatened species lists are required from legislation there are follow-up recovery plans mandatory within one year of listing endangered species and two years of listing threatened species (Nova Scotia Endangered Species Act, 1998; Species at Risk Act, S.C, 2002; Wojciechowski et al., 2011). The literature also states, species receiving financial resources to implement recovery plans after being listed, are also biased. Body size, taxonomic group, and economic value also influences whether a species has a recovery plan (Bottrill et al., 2011). However, in certain cases biases can have positive impacts when recovery actions are implemented for focal or keystone species, which are wide-ranging and considered habitat-quality indicators. Thus, protection for focal species would result in protections for many species (Beazley and Cardinal, 2004).

1.2. Legislative requirements

Many national and regional threatened species lists are required by legislation, including Canada's SARA and *Nova Scotia's Endangered Species Act* (NSESA) listings (Nova Scotia Endangered Species Act, 1998; Species at Risk Act, S.C, 2002). For example, SARA uses the best available information on the status of a wildlife species, including

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