

Science, Policy and Species at Risk in Canada

The Scientific Committee on Species at Risk in Canada: A.O. Mooers^{1*}, D.F. Doak², C.S. Findlay³, D.M. Green⁴, L.L. Manne⁵, M.A. Rudd⁶, & J. Whitton⁷

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A. Executive Summary

Summary.- At the legal listing stage, *SARA* was designed to separate the science of determining whether a species is at risk from the policy of deciding to award it legal protection. However, following legal listing, science and policy are not transparently and completely separated. We fear that this situation has contributed to the unfortunate fact that, of the 176 species given legal protection in 2003, only *one* has a legal implementation plan for its recovery.

We argue that it is necessary to change the process so as to transparently and completely separate the science from the policy at *all* stages: socio-economic analyses associated with listing, strategizing for recovery, defining the critical habitat required for species persistence and recovery, and producing a recovery action plan. The public needs to know what aspects of at-risk species identification, recovery planning and implementation reflect the best-available science, and how this scientific input has been considered when government makes decisions regarding competing objectives. The public also needs to be told the full costs and benefits of government decisions.

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What follows is a revised text of a short article that is in review at the international journal *BioScience*. Those of you most familiar with the legislation may want to proceed from the Introduction (Section B) to the Critique (Section D), Conclusions (Section E), Tables and Figures (Section F) and Recommendations (Section G).

B. Introduction

Canada was the first major industrialized country to ratify the 1992 UN Convention on Biological Diversity. Canada's *Species at Risk Act* (SARA 2002) arose from obligations under this convention, and the first government review – currently being conducted - of the Act offers multiple lessons for other countries creating or improving legal frameworks to protect biodiversity. *SARA* is too young to judge its overall success in improving the status of imperiled species. However, despite several costly and well-publicized recovery successes (RENEW 2006), the poor progress in formulating and implementing plans for recovery (Auditor General of Canada 2008; Figure 1) brings the efficacy of key parts of this modern environmental legislation into question.

Here, we outline one important strength and several important shortcomings of *SARA*, both in terms of the statute itself and its implementation, and offer suggestions as to how these shortcomings might be addressed. Our main conclusion is that a very clear separation is needed between *all* scientific input to endangered species protection and the socio-political trade-offs made when deciding on what to do.

C. The Current Process: design and intent

Assessment of species.- The *SARA* process (Figure 2A, box A) begins with assessment of species by the independent Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC uses biological criteria, aboriginal and traditional knowledge and input from many stakeholders to prioritize and assess Canadian wildlife species as extirpated, endangered, threatened, of special concern or not at risk. The criteria for status assessment are patterned after the IUCN scheme (Mace et al. 2008), and delineate legally-defined “wildlife species” using the concept of a “designatable unit” (Green,

2005). These designatable units meet the same criteria of discreteness and evolutionary significance used to identify distinct population segments in the United States (Hutchings and Festa-Bianchet 2009).

COSEWIC identifies wildlife species suspected of being at risk and commissions status reports for those given highest priority. Draft reports are first reviewed by the relevant jurisdictions (i.e. federal agencies or provinces and territories), by scientists in the relevant species specialist subcommittees of COSEWIC and by aboriginal traditional knowledge holders. The subcommittee's final draft recommendation is then discussed by all COSEWIC members before COSEWIC makes a status recommendation for the species to the federal government. The government ultimately decides whether to add that species to the SARA registry. This process thus draws on broad input and over 100 people generally comment on any one report. COSEWIC status assignments are made public on their website following wildlife species assessment meetings. Thus SARA incorporates a science-based prioritization and assessment of wildlife species independent of legal listing decisions. Note that COSEWIC does not consider the feasibility or cost of recovery, or the social or political ramifications of its assessment decisions. At time of writing 598 wildlife species are on COSEWIC's list of wildlife species at risk. While COSEWIC's list of wildlife species at risk has grown steadily (Figure 3), the rate of growth is primarily a reflection of the rate at which COSEWIC can assess those wildlife species requiring examination.

Under SARA, COSEWIC's recommendations impose no federal duty to list a wildlife species. The Government of Canada has three options: accept COSEWIC's recommendation to legally list a wildlife species; decline the recommendation, in which case the responsible Minister must provide reasons; or return the issue to COSEWIC for further clarification. In making listing decisions, the federal government considers input from public consultations and internal economic assessments in addition to COSEWIC's scientific assessment (Figure 2A, box B).

After listing.- As soon as a wildlife species is listed as endangered or threatened, individuals and their dwelling places are automatically protected on Federal Land. SARA typically applies only to federally-managed lands and waters and species; the responsibility for protecting wildlife species on lands managed by provinces and territories usually falls to the province/territory, although aquatic species and migratory birds are managed by the federal government under other, pre-existing statutes.

Listing also initiates a two-step recovery planning process, the first step of which is development of a Recovery Strategy (RS; Figure 2A, box C). This identifies threats to the wildlife species and its needs, as well as population and distribution objectives for recovery. Recovery strategies can be contentious because of their potential socio-economic implications. The next step is development of a Recovery Action Plan (RAP) (Figure 2A, box D). RAPs put the strategy into action by specifying concrete recovery measures and evaluating potential socio-economic impacts of these actions. Both the Recovery Strategy and the Recovery Action Plan must identify critical habitat, the habitat that is necessary for a listed species' survival or recovery (*SARA*, s.2.(1)), to the extent possible. Once defined, the federal government must protect critical habitat on Federal land (which totals 4% of Canada's 10 southern provinces as well as most of the three northern territories) and the Act is clear that the government can move to protect critical habitat outside of Federal lands if it chooses to (though notably it has never chosen to). The government must report on recovery progress for each species every five years.

There is no separate process for de-listing wildlife species under *SARA*; in Canada, wildlife species at risk are simply reassessed by COSEWIC at least every ten years. Such reassessments offer one window into the trajectory of Canada's imperiled wildlife: since the inception of COSEWIC in 1977 (pre-dating *SARA*), wildlife species that have been assessed more than once have moved to a more imperiled status nearly twice as often as they have moved to a less imperiled status (52:27, $P < 0.01$, sign-test; Table 1). Though deteriorating status could in particular cases be due to changes in available information, the pattern is consistent with a need for concerted action.

D. Critique

Independent assessment and legal listing.- There are limits to administrative capacity and SARA instructs that priority for assessment should be given to those species that are more likely to become extinct. Candidate species for assessment are themselves prioritized by COSEWIC according to a combination of probable threat, taxonomic distinctiveness, geographic extent and endemism, all of which require data. Furthermore, an assessment of “data deficient” triggers neither more research under SARA nor automatic reassessment. Such designations may be more common for taxa for which there is less taxonomic expertise and this taxonomic deficit may become a more acute problem in the future as attention turns to invertebrates.

The separation of assessment from legal listing has implications. It can provide government with an opportunity to avoid or delay the costs and consequences of protecting imperiled wildlife species: as of December 2007, the federal government has chosen not to list a taxonomically and geographically non-random 23% (60/252) of wildlife species recommended by COSEWIC since SARA was enacted in 2002 (Findlay et al. 2009). However, the framework also allows a time window for stakeholders and civil society to become more involved in the legal listing process when consultations take place. Most importantly, the framework allows for a transparent separation of science and policy, providing the opportunity both for accurate and science-based assessments and for an unequivocal government *response*. We see this as the primary strength of *SARA*. Significant weaknesses in later stages of listing and recovery are described below.

Incomplete economic considerations in listing decisions.- While *SARA* makes no mention of economic analyses at the listing stage, it is Canadian government policy to review the economic implications of any regulatory change such as a listing (Government of Canada 2007). A key component of reviews under Canadian legislation is the Regulatory Impact Assessment Statement (RIAS). When developing a RIAS prior to a listing decision, government policy analysts are directed to work with scientists and resource managers to develop plausible scenarios for economic cost-benefit and impact analyses based on the best available information. The depth of analysis is dictated by the

potential economic consequences of regulatory change. Government guidelines recognize the need to account for the economic value of public environmental goods (Government of Canada 2007). Economic impact analyses, which address short-term distributional issues regarding jobs and economic spin-offs at the regional level may also be conducted when sufficient data are available. Thus there is a framework for making evidence-based, informed economic *SARA* decisions, and such economic concerns have been given as an explicit reason in 50% of the cases (10 out of 20) where listing has been denied outright (Findlay et al. 2009).

In spite of the clear RIAS framework, there are several challenges to informed decision-making, all compounded by the nine-month legally mandated timeline for making a listing decision (*SARA* s.27.(3); note, this timeline is often extended due to an apparent loophole in the legislation, see Mooers 2004). The initial choice of plausible scenarios to analyze is unclear. There is also substantial uncertainty about the potential impacts of listing vs. not listing under any scenario and significant technical challenges with economic cost-benefit analyses for RIASs.

For species listings with potential impacts on industry or economic interests, there has been a focus on short-term, regional economic impacts (e.g. local jobs, business spin-offs). As is typical in policy analyses focused on regional impacts, attention is deflected from long-term, national benefits to Canadian society as a whole (Vining and Boardman 2007).

This is evident in *SARA* listing decisions. In one egregious example, listing was denied for the porbeagle shark, *Lamna nasus*, in part due to the costs to a single community that derived 2% of its total landings value and two fishers who earned <25% of their gross revenue from the porbeagle shark fishery (DFO 2006): preliminary data available at the time of the non-listing decision estimated the porbeagle shark's non-use value to Canadian society at tens of millions of dollars annually (Rudd 2009).

While we see the explicit incorporation of economic analysis as a reasonable part of the *SARA* process, it has often failed to live up to its potential. This is perhaps because it comes too early (Findlay et al. 2009), perhaps because of a lack of general policy analysis capacity within government (Lindquist and Devereaux 2007), or perhaps because economic analysis is not supplied as independent science advice but is embedded in a non-scientific policy-based framework (Figure 2A, box B).

Recovery Strategies: ineffective meshing of science and policy.- The production of Recovery Strategies has been slow (Figure 1) and problematic. The problems may flow from having science input that is too deeply embedded in a policy framework (Figure 2A, box C). While a choice of minimal conservation goals may be a legitimate societal decision, there should be clarity as to whether the goals are arrived at based on science or socio-economic considerations.

As mandated under *SARA*, population and distribution objectives are crucial goalposts for species recovery, and must be specified in Recovery Strategies (*SARA* s.41.1.(d)). Transparent conservation decisions are dependent on clarifying the biological meaning of key terms that are not defined in the Act, such as *survival* and *recovery*. Because *critical habitat* is defined as the habitat “necessary for the survival or recovery” of a listed wildlife species (*SARA*, s.2.(1)), the quantity and location of critical habitat (and associated socio-economic impacts) will be sensitive to the biological interpretation of *survival* and of *recovery*. One standard interpretation of survival from the scientific literature based on minimum viable populations (which are widely viewed as the minimum unit for species conservation, see, e.g. Traill et al. 2007) would, following IUCN criteria, characterize *survival* as >90% chance of species persistence over at least 100 years. Not meeting the definition of the minimum viable population for survival would trigger listing of a species as at-risk in Canada, in the US, and internationally (COSEWIC 2006; Doremus 1997; Mace et al. 2008). The Federal Government of Canada has suggested policy whereby *survival* would mean maintaining the current population in the “short term” (DFO 2005). It is therefore important to ask whether a benchmark of 100 years is considered “short term” in Canadian policy: for a species already listed as at-risk

of extinction, merely maintaining its current population size for some limited time (e.g. till the next COSEWIC re-assessment, in 10 or fewer years) would provide little assurance of continued survival.

Recovery has been defined in Canadian policy as “long-term persistence” (DFO 2005) or simply where decline is “arrested *or* reversed” (italics added; NRWG 2005). The definition of long-term must be clarified here. The ‘or’ in the second definition is potentially important, as the easier goal (arresting decline) could become a policy default. Arresting decline may be enough action for the few species with large population sizes that are still widely distributed, but nonetheless considered imperiled. However, recovery as restoration, rather than merely the arrest of decline, implies higher benchmarks with respect to population size and distribution.

Critical habitat designation has been hampered for several reasons. To begin, though the law is clear that the precautionary approach must be followed (*SARA* s. 38), and that critical habitat must be identified to the extent possible based on the best available information (*SARA*, s.41.(1)(c)), such habitat has been identified for just 23 of the 104 species with finalized recovery strategies (see also Figure 1), and so for only 23/447 or roughly 5% of listed species.

Recovery Strategies for two species (the Greater Sage Grouse and the Nooksack Dace) that omitted known critical habitat were successfully challenged in court in 2009 (Alberta Wilderness Association et al. vs. Minister of the Environment, 2009 FC 710; Environmental Defense Canada et al. vs. Minister of Fisheries and Oceans, 2009 FC 878). Although these precedent-setting lawsuits may lead to the official identification of some critical habitat in other Recovery Strategies, we wonder whether litigation or the fear of litigation is the most efficient approach for identifying the critical habitat needed to achieve recovery.

Currently, the government oversees the preparation of Recovery Strategies, though it usually has sought some outside scientific advice. However, the government ministries

involved may have conflicting interests that could impact the final scientific content of these strategies. We suggest that the process of writing an official recovery strategy could benefit from being made more like the two-step listing process, with unbiased scientific proposals that meet clear goals being followed by clear government responses.

Recovery Action Plans: lost in the fog.- RAPs detail the specific recovery projects and activities that need to be implemented to recover species, and also analyse potential costs and benefits. They are intended to be developed and implemented by biologists, managers, economists and stakeholders, with scientific guidance from the Recovery Strategy. Although voluntary recovery activities have been initiated for many species (Auditor General of Canada 2008), only *one single* wildlife species, the Banff Springs snail, *Physella johnsoni*, whose entire range is in a National Park, has a legally-accepted RAP (Figure 1). It is important to note that if critical habitat is not described in the initial Recovery Strategy, there are no legal timelines for identifying and so protecting such habitat because RAPs themselves have no legal timeline for completion. This means that much effort can be expended in a legal process of identifying, listing, and strategizing for the eventual recovery of a species with no certainty that the process will ever lead to action on the ground.

E. General Conclusions

To ensure accountability, environmental legislation needs to clearly delineate the role independent science plays in implementation. *SARA* is one of a widening net of endangered species protection laws that have slowly spread around the world: by our count, at least 36 countries now have legislation to identify and protect species threatened with extirpation or extinction. To its credit, *SARA* was written to explicitly incorporate both scientific and economic concerns, and in a few places the law seems to limit consideration to purely scientific issues when appropriate (e.g. listing assessments, critical habitat identification, and the determination of the feasibility of recovery). In many other cases *SARA* also allows for the quantification of economic costs and benefits. This emphasis on economic analysis and planning is arguably better embodied in *SARA* than, for example, in the United States ESA (Illical and Harrison 2007). In theory, more

explicit and transparent consideration of competing governmental priorities might avoid the distorted implementation sometimes seen in environmental laws that are less realistic about competing agendas (Carroll et al. 1996).

Though the assessment process itself might be improved (see, e.g., Lukey and Crawford 2009), it does offer a clear delineation between independent science and policy.

Following COSEWIC's recommendations, however, the legal listing, recovery planning and implementation phases of *SARA* do not offer this delineation. These phases have been identified as problematic, such that hard choices are simply being put off to some indeterminate future (Auditor General of Canada 2008).

In particular, we suggest that both social and natural sciences must better inform independent social and economic analyses that are necessary to decide whether a wildlife species is listed. One simple improvement would be to subject the scenario choices and the resulting evaluations to independent, non-governmental, peer review (Mooers et al. 2007). Whether extra emphasis on this important stage would require longer mandated timelines in conjunction with interim legal protection is worth considering, as is how these evaluations would flow into the recovery phase. In the same vein, we recommend timely independent peer review and oversight both of Recovery Strategies and Recovery Action Plans, as is policy under, e.g. the United States ESA (Carden 2006).

In general, a structural separation of information gathering and interpretation (i.e. scientific advice) from strategic planning and action (i.e. policy and implementation) seems an excellent basis on which to proceed (Hutchings et al. 1997). This would be best served by extracting all the science-based aspects of the conservation process – assessments of biological status, of critical habitat and threats, population and distribution objectives, and economic analysis – as discrete modules that would produce *independent* and transparent scientific advice to feed back into a political process (Figure 2B) with attendant hard deadlines. The need for a mandated framework for the delivery of such independent scientific advice into a subsequent political process is an important hurdle in

improving *SARA*, and may be also be an important component for environmental legislation elsewhere.

E. References and notes

- Auditor General of Canada 2008. Status Report of the Commissioner of the Environment and Sustainable Development. In: Ottawa, Canada.
- Carden, K. 2006. Bridging the divide: the role of science in species conservation law. *Harvard Environmental Law Review* 30: 165-259.
- Carroll R., Augspurger C., Dobson A., Franklin J., Orians G., Reid W., Tracy R., Wilcove D., Wilson J. 1996. Strengthening the use of science in achieving the goals of the Endangered Species Act: An assessment by the Ecological Society of America. *Ecological Applications* 6, 1-11.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada) 2006 COSEWIC's Assessment Process and Criteria. Available online at: www.cosewic.gc.ca/pdf/assessment_process_e.pdf (accessed 14 December 2009).
- DFO (Department of Fisheries and Oceans) 2005. Department of Fisheries and Oceans. A framework for developing science advice on recovery targets for aquatic species at risk in the context of the Species at Risk Act. In: CSAS Science Advisory Report. Government of Canada Ottawa, Canada.
- DFO (Department of Fisheries and Oceans) 2006. Potential socio-economic implications of adding porbeagle shark to the list of wildlife species at risk in the Species at Risk Act (SARA). Fisheries and Oceans Canada, Maritimes Region, Dartmouth, NS.
- Doremus, H. 1997. Listing decisions under the Endangered Species Act: why better science isn't always better policy. *Washington University Law Quarterly* 75: 1029-1153.
- ESA (Endangered Species Act) 1973. Endangered Species Act of 1973. Public Law 93-205, 87 Stat. 884, 16 U.S.C. 1531-1544.
- Findlay C.S., Elgie S., Giles B., Burr L. 2009. Species listing under Canada's Species at Risk Act. *Conservation Biology* 23: 1609-1617.
- Green D.M. 2005. Designatable units for the assessment of endangered species. *Conservation Biology* 19: 1813-1820.
- Government of Canada. 2007. Canadian cost-benefit analysis guide: regulatory proposals.

- Treasury Board Secretariat, Ottawa.
- Hutchings, J.A., Walter, C., Haedrich, R.L. 1997. Is scientific inquiry incompatible with government information control? *Canadian Journal Fisheries and Aquatic Sciences* 54: 1198–1210
- Hutchings, J.A., Festa-Bianchet, M. 2009. Canadian species at risk (2006-2008), with particular emphasis on fishes. *Environmental Review* 17: 53-65.
- Illical M., Harrison, K. 2007. Protecting Endangered Species in the US and Canada: The Role of Negative Lesson Drawing. *Canadian Journal Political Science* 40, 367-394.
- Lindquist E., Desveaux J. 2007. Policy analysis and bureaucratic capacity: context, competencies, and strategies, in: L. Dobuzinskis, M. Howlett, D. Laycock (Eds.), *Policy Analysis in Canada: The State of the Art*, University of Toronto Press, Toronto. pp. 116-142.
- Lukey, J.R., Crawford, S.S. 2009. Consistency of COSEWIC species at risk designations: freshwater fish as a case study. *Canadian Journal of Fisheries and Aquatic Sciences* 66: 959-971.
- Mace G.M., Collar N.J., Gaston K.J., Hilton-Taylor C., Akçakaya H.R., Leader-Williams N., Milner-Gulland E.J., Stuart S.N. 2008. Quantification of Extinction Risk: IUCN's System for Classifying Threatened Species. *Conservation Biology* 22, 1424-1442.
- Mooers A.O. 2004. Why did the fish miss the boat? *The Globe and Mail* April 30, A21.
- Mooers A.O., Prugh L.R., Festa-Bianchet M., Hutchings J.A. 2007. Biases in legal listing under Canadian endangered species legislation. *Conservation Biology* 21, 572-575.
- NRWG (National Recovery Working Group) 2005. *Recovery Handbook (ROMAN) 2005-2006 Edition*, October 2005. Recovery of Nationally Endangered Wildlife, Ottawa Ont. 71 pp.
- OED (Oxford English Dictionary) 2009. *Oxford English Dictionary (online edition)*. Oxford University Press, Oxford.
- RENEW (Recovery of Nationally Endangered Wildlife in Canada) 2006. *RENEW Annual Report*. Environment Canada Ottawa, Canada, pp. 18.
- Rudd M.A. 2009. National values for regional aquatic species at risk in Canada. *Endangered Species Research* 6, 239-249.
- SARA (Species At Risk Act). 2002. Bill C-5, An act respecting the protection of wildlife species at risk in Canada. Available from <http://laws.justice.gc.ca/en/s-15.3/text.html>

- Shank, C.C. 1999. The committee on the status of endangered wildlife in Canada (COSEWIC): A 21-year retrospective. *Canadian Field-Naturalist* 113: 318-341.
- Traill L.W., Bradshaw C.J.A., Brook, B.W. 2007. Minimum viable population size: a meta-analysis of 30 years of published estimates. *Biological Conservation* 139: 159-166.
- Vining A. R., Boardman A.E. 2007. The choice of formal policy analysis methods in Canada in L. Dobuzinskis, M. Howlett, and D. Laycock, editors. *Policy Analysis in Canada: The State of the Art*. University of Toronto Press, Toronto

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F. Tables and Figures

Table 1. Changes in risk status accorded by COSEWIC. Entries below the diagonal represent deterioration, and entries above the diagonal represent improvement in cases where COSEWIC has assessed species more than once. Numbers in brackets refer to the subset of wildlife species that have been re-assessed since legal listing under *SARA*. For consistency, only reassessments using COSEWIC's IUCN-based criteria both times are used whereas emergency assessments and instances where the designatable units had changed significantly are not. Listings to more imperiled status predominate over listings to less imperiled status. Data from published COSEWIC reports (<http://www.cosewic.gc.ca>).

	to: Extirpated	Endangered	Threatened	Special Concern	Not at Risk
from:					
Extirpated	27 (4)	1			
Endangered	2	98 (24)	5 (1)	1	1
Threatened		29 (7)	43 (15)	7	3 (1)
Special Concern		3	12 (2)	28 (10)	9 (1)
Not at Risk	1	2	1 (1)	2 (2)	14 (2)

Figure 1. Listing and protection of imperiled wildlife species in Canada. For the cohort of 176 wildlife species legally listed as Threatened (open bars) or Endangered (solid bars) in *SARA* upon its full inception June 5th 2003, the numbers of species that have accepted Recovery Strategies, that have accepted Recovery Action Plans and for which critical habitat is at least partially identified, all as of March 3, 2009. Under the law, all 176 recovery strategies were to be finalized by June 5th, 2007 at the latest. There are a further 20 Recovery Action Plans that are now overdue based on the deadlines set in their respective Recovery Strategies. All data compiled from the SARA Public Registry (<http://www.sararegistry.gc.ca>).

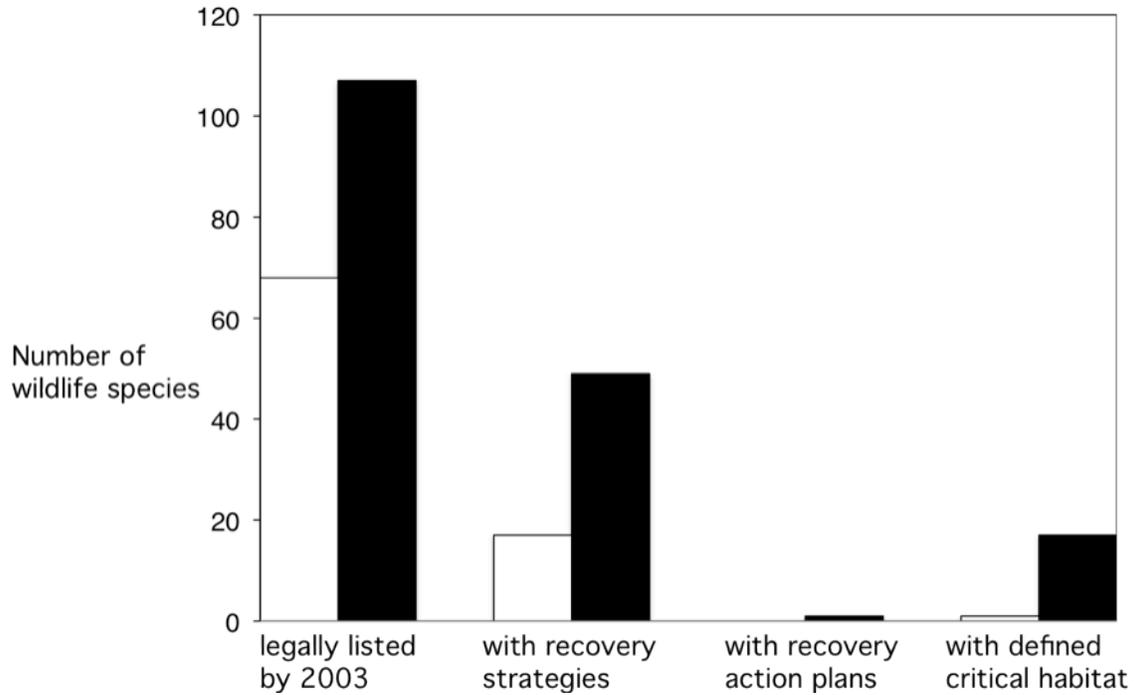


Figure 2. Schematics of the Canadian Species at Risk Act.

2A. Current structure, highlighting independent science activities (in white), and activities that are a mix of policy and science (shaded).

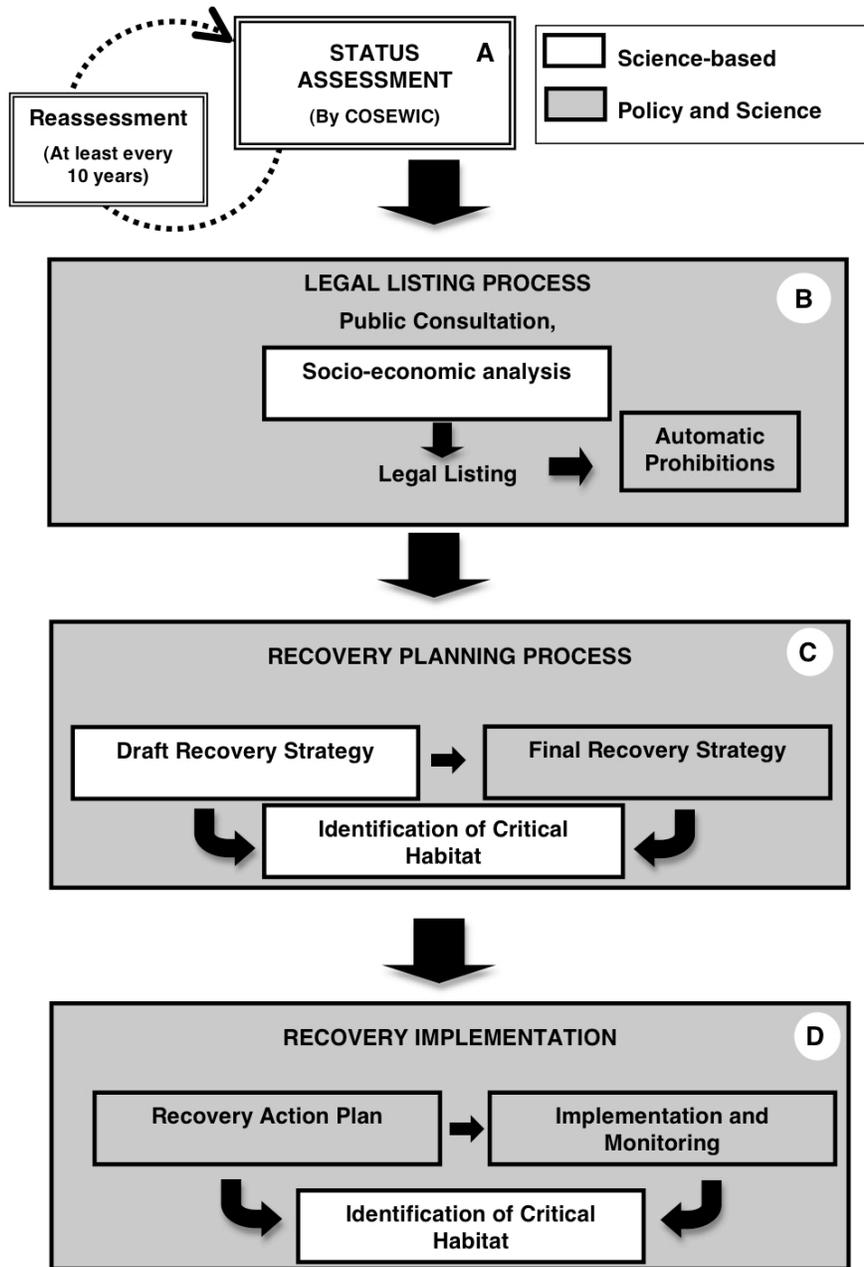


Figure 2 (con.) Schematics of the Canadian Species at Risk Act.

2B. Potential modification highlighting enhanced separation of science activities (in white) from government action (shaded). In this scheme, independent, peer-reviewed science offers transparent input to government decision-making.

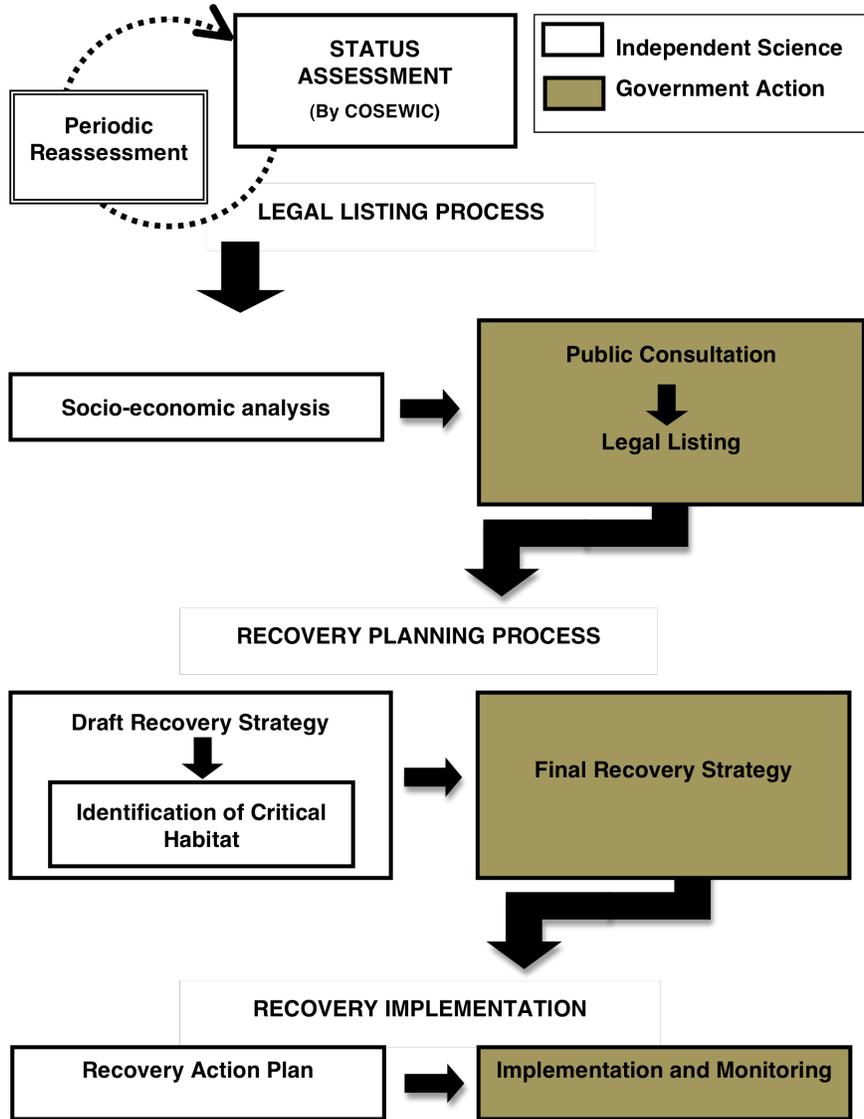
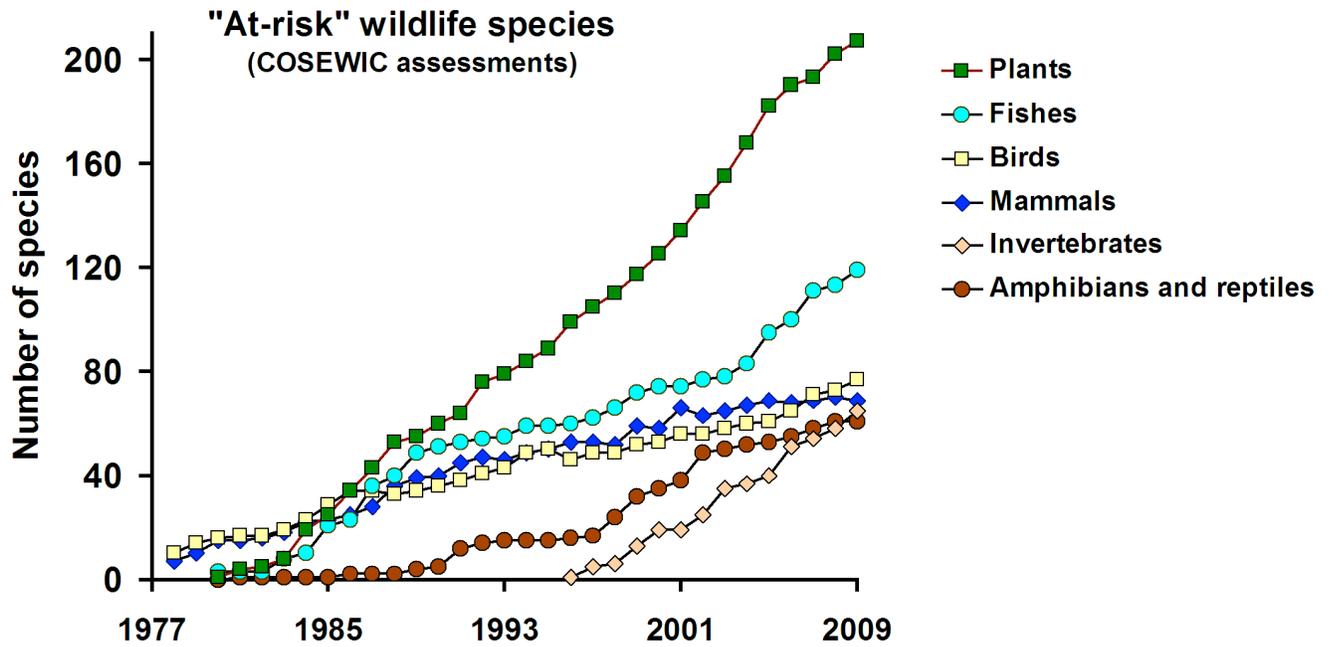


Figure 3. Assessment of imperiled wildlife species in Canada. Numbers of species designated by COSEWIC in the “At-risk” categories of Extirpated, Endangered, Threatened, and Special Concern according to taxonomic group from 1977 to the present. Data from published COSEWIC reports (<http://www.cosewic.gc.ca>)



G. Specific Recommendations

1. We recommend that the most rigorous and transparent independent biological science and social science information is used when making a listing decision, especially if a species might not be legally listed. Very specifically, the associated Regulatory Impact Assessment Statements for legal listing should: (i) use the High-Impact template for any species where a decision not to list is being considered; (ii) be externally peer-reviewed; (iii) be published in the Canada Gazette I in two clearly delineated sections: the social-science-based document plus a new section titled “Government Response.”
2. We recommend that an independent scientific board (perhaps called the Committee on the Recovery of Endangered Wildlife in Canada or COREWIC) be formed to provide ongoing scientific input to SARA implementation. The board would at the very least provide peer review of all draft Recovery Strategies and all draft Recovery Action Plans to ensure that recovery planning is scientifically rigorous and consistent with the relevant science-based sections of the Act (including sections s.38, s.41 and s.49). If the board determines that the draft Recovery Strategy or Action Plan is not based on the best-available science and/or is not consistent with the relevant science-based sections of the Act, a report detailing the board’s concerns and the government response should be posted on the SARA public registry.
3. We recommend that a further statutory review of SARA be done five years after the current one is completed, to further monitor progress of this new legislation. It may be desirable to have parts of the Act and its implementation reviewed by an outside body (e.g. the Royal Society of Canada) in anticipation of this Statutory Review.