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The biodiversity crisis in Canada: failures and challenges of federal and sub-national strategic and legal frameworks

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Abstract

Negative biodiversity trends are evident in Canada, in spite of its ecological and economic wealth and high governance capacity. We examined the current implementation of Canada's national biodiversity strategy—the planning instrument to the United Nations Convention on Biological Diversity—through its existing legal framework. We did this by evaluating biodiversity-related strategies and plans and 201 federal, provincial, and territorial laws. We found that while most jurisdictions claim dedicated attention to biodiversity, there is little evidence of an integrated approach within provinces and territories and across the federation. Biodiversity conservation led by governments underscores the need for considerations of species and ecosystem services to be mainstreamed into economic and development decision-making. Key challenges to this include Canada's unusual degree of decentralized constitutionally ascribed authority over natural assets and its historical and continued economic emphasis on extraction of natural resources—a conflict of interest for jurisdictions. Transitioning to scale-appropriate planning and integrated decision-making that can address the pressures and causes of biodiversity conservation in Canada will require transformative change. Law reform, while necessary, will not succeed unless accompanied by a whole-of-government approach, a shift to a bio-centric mindset, innovative governance (particularly Indigenous-led conservation), and federal leadership with strong levels of financial investment.

Key words: biodiversity, federalism, governance, natural resources, species at risk, protected areas

Introduction

The ground-breaking Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) global assessment of the condition of biodiversity—the variety of life on earth at all levels, from genes to ecosystems—was delivered to the public in IPBES (2019) with a call for transformative change. It marked the first report issued by this independent intergovernmental panel of experts as an analogue to the five by the International Panel on Climate Change since 1988. Overall, 150 scientists distilled an enormous number of studies (~15,000) into an integrated global synthesis that was subject to extensive peer review during the IPBES first work programme, from 2014 to 2018. According to the IPBES assessment, the overall trends as they relate to the health and functioning of species and ecosystems and the Earth's support systems are overwhelmingly negative and

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permeate the world everywhere. These deteriorating trends have been accelerating and intensifying since about the 1970s, at a remarkable pace and rate of change relative to the last 10 million years and are projected to continue or worsen into the future under business-as-usual scenarios.

As the world's second largest country, Canada encompasses about 10 million km^2 of terrestrial and freshwater ecosystems with almost 9% of the world's total forest area and 25% of the world's wetlands (NWWG 1997). From a marine perspective, Canada is responsible for the care of more than 243,000 km of Arctic, Atlantic, and Pacific coastlines and marine ecosystems that encompass more than 56,000 km^2. Although not included among the 17 "megadiverse" countries of the world, Canada is home to an estimated 80,000 species (CESCC 2016), over 300 of which occur nowhere else in the world (Enns et al. 2020). Even while containing the second highest remaining area of intact ecosystems in the world (Watson et al. 2018), many of the global trends highlighted in the IPBES report are mirrored in Canada.

Of 30,000 species in Canada for which there is sufficient information, 20% are imperilled to some degree (CESCC 2016). From 1970 to 2014, about half of 903 monitored wildlife species in Canada declined in abundance (WWF 2018), many of which belong to species groups highlighted in the IPBES global assessment, i.e., amphibians and reptiles (CESCC 2016), birds (NABCIC 2019), and freshwater fish (Chu et al. 2015). Certain ecosystems, such as wetlands and grasslands, have experienced particularly significant and continuing loss in Canada (FPTGC 2010). The drivers of biodiversity loss and degradation—land conversion, overfishing, climate change, pollution, and invasive alien species (Woo-Durand et al. 2020; WWF 2020)—mirror those reported by IPBES (2019) for the rest of the world.

In spite of Canada's ecological and economic wealth and a stable democratic system, several issues related to the governance of biodiversity in Canada prevent the effective mitigation of the negative impacts of anthropogenic change on the distribution and abundance of species and the erosion of ecosystem services and ecological functions. Biodiversity is formally protected and managed through a bewildering array of policy instruments administered by different levels (federal, provincial, and territorial) or scales of government. While we acknowledge that governance includes other actors, such as Indigenous communities, landowners, industry, and civil society organizations, our focus is to provide a clear snapshot of the extent to which Canada's national and subnational governments are taking responsibility from the standpoint of legislated commitments—a key starting point for assessing how Canada is prioritizing biodiversity.

Brief timeline of Canadian legal framework

In a geo-political context, Canada is a relatively young country as its colonial settler statehood dates to only 1867. The Canadian Constitution distributes legislative powers (jurisdiction) between the federal government and the provinces and territories, conferring them with the right to make laws and policies that apply to public lands and resources (Kwasniak 2016). When it comes to biodiversity, legal authority exercised through these governments for terrestrial, marine, and freshwater species and ecosystems stems largely from land ownership. Exceptions to this are marine and inland fisheries, ocean mammals, and migratory birds over which the federal government has legislative authority (Kwasniak 2016). Canada has always struggled with fragmented jurisdiction, especially as 89% of natural assets (ecosystem goods including natural resources) are under the legislative authority of the various provinces. This inevitably generates inconsistencies between jurisdictions in policies and priorities, including those related to natural resource extraction and its biodiversity-related impacts.

Biodiversity protection is a relatively recent area of policy and law. In 1992, Canada was the first industrialised nation to sign and ratify the United Nations Convention on Biological Diversity

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(UN CBD; Kumpf and Hughes 2016). This multilateral treaty with three components—conservation of Earth's biological diversity, the sustainable use of that biodiversity, and the fair and equitable sharing of benefits arising from biodiversity—recognises biodiversity as a valuable asset that must be conserved for future generations. As Parties to the CBD, each of the 196 countries is required to prepare a national biodiversity strategy and action plan (NBSAP) as its principal implementation instrument.

By 1995, Ottawa developed a Canadian Biodiversity Strategy (Government of Canada 1995a) outlining how Canada intended to fulfill the objectives of the CBD. Although it was written with an explicit assumption that Canada already had a strong foundation of existing laws and policies for responding to its CBD commitments, attention did turn immediately to addressing policy gaps for the recovery of species at risk across the country. Recognizing that provincial cooperation would be critical for successful implementation of Canada's new international commitments (Olive 2014), the federal government, in 1996, hosted a gathering at which the federal government and all provinces and territories except Québec (and Nunavut, which did not yet exist), agreed to create consistent legislation for species at risk in a National Accord for the Protection of Species at Risk (Government of Canada 1995b). Progress on this front has been slow: Yukon, British Columbia, Alberta, Saskatchewan, and Prince Edward Island have yet to pass stand-alone legislation. The federal government enacted the *Species at Risk Act* in 2002, with its application largely limited to federal lands, aquatic species, and to some extent, migratory birds (Olive 2014).

At the 2010 CBD meeting of the Conference of the Parties (Nagoya, Japan), Canada signed onto the CBD 2010-2020 Strategic Plan for Biodiversity. This included the *Aichi Biodiversity Targets*, comprising five strategic goals and 20 targets (CBD 2010). Each signatory was expected to devise national and regional targets in response to the global targets by 2015. That year, the *2020 Biodiversity Goals and Targets for Canada* were released (Biodivcanada n.d.). Although the Canadian Biodiversity Strategy has not been revised since its original formulation 25 years ago, Canada has produced six reports on its implementation of the Convention on Biological Diversity—the last one in 2018. In 2017, governments launched the Pathway to Canada Target 1 initiative to facilitate coordination among jurisdictions to fulfill the terrestrial component of Target 1 committed to in 2015 ("By 2020, at least 17% of terrestrial areas and inland water, and 10% of coastal and marine areas, are conserved through networks of protected areas and other effective area-based conservation measures"), with corresponding work led by the federal government in marine protection (ECCC 2019a).

Simultaneously, Canada worked on parallel efforts responding to recommendations from the World Commission on Environment and Development (1987). This came about first through modifications to the *Auditor General Act* in 1995 and ultimately the enactment of the *Federal Sustainable Development Act* in 2008, the latter imposing new obligations on large federal departments to prepare, table, and update departmental sustainable development strategies. In 2015, Canada became a signatory to the new United Nations 2030 Agenda for Sustainable Development, a framework comprised of 17 Sustainable Development Goals (SDGs) and associated targets and indicators (UN SDG n.d.). Lauded for the explicit integration of environment with social and economic aspects across the entire framework (Stafford-Smith et al. 2016), biodiversity was included as two goals of sustainability—Goal 14 (Oceans) and Goal 15 (Land)—and acknowledged in other goals. In response, the Trudeau government focused immediately after its election in late 2015 on amending the *Federal Sustainable Development Act* in support of the United Nations 2030 Agenda for Sustainable Development, enabling the development of a Federal Sustainable Development Strategy that sets federal sustainable development goals and measurable targets (*An Act to amend the Federal Sustainable Development Act 2019)*.

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Objectives

In this paper, we examine the current implementation of Canada's responsibilities under the CBD, with particular focus on strategy, legislation, leadership, and general capacity of the Canadian federation to attend to myriad dimensions of the escalating biodiversity crisis within its own borders. Our main research question asks: Is Canada's legal framework adequate to meet the challenge? If not, why not?

To answer these questions, we examined two aspects of Canada's approach. First, the implementation of the objectives of the CBD, through the principal planning and reporting instruments of the Convention—National Biodiversity Strategic Action Plan (NBSAP) and National Reports (NR)—and parallel strategic approaches by provinces and territories that characterize both independent and coordinated approaches to addressing the biodiversity crisis. Second, we looked at the domestic laws that are relevant to addressing biodiversity loss, implementation of the NBSAP, and Canada's delivery of the Aichi Targets. Here we examined the different ministries responsible for statutes related to biodiversity, as well as the different kinds of biodiversity-related statutes that exist in each jurisdiction (i.e., wildlife, fisheries, species at risk, forestry, and so on). Overall, this systematic approach enabled us to uncover, at a high level, the extent and scope of biodiversity governance across the entire country.

We are primarily interested in legislation as a manifestation of government commitment, because this can contain "binding and enforceable tools constraining human impacts on the environment" (Chapron et al. 2017). With no Canadian jurisdiction having any statutes in force specifically devoted to biodiversity conservation at the time of this analysis, we evaluated existing statutes based on their relevance to the constituent elements included in the CBD definition of biodiversity (IUCN 2016): genes, species, and ecosystems. The broad scope of this exercise only allows us to examine the *de jure* situation (i.e., what is "on the books"), which can and does differ from the *de facto* reality that exists "on the ground" (i.e., the strength of implementation). We use legislation as a proxy for the capacity for government leadership on this issue, under the assumption that these should serve as an important foundation for environmental governance (Chapron et al. 2017). For this part of the exercise, we restrict our analyses to the statutes themselves, and do not consider regulations, policies, guidelines, and codes of conduct, as well as incentives such as funding and partnerships, all of which are important to governance. This is because statutes set out what statutory delegates must do (mandates) and may do (discretions), while also providing a context for setting subordinate legislation, which must be consistent with statutes (Government of Canada 2001).

Methods

To examine Canada's broad approach to implementing the CBD objectives, we first compiled jurisdictional biodiversity strategies, plans, or policies that have been developed to meet Canada's CBD obligations, all of which sit outside legislation (i.e., are nonbinding). We conducted this independently for the federal government, the 10 provinces, and three territories. We searched each government website for evidence of a strategic approach to conserving biodiversity. We looked for content that was reflective of the *Canadian Biodiversity Strategy* goals and targets, and in turn those of the Aichi Targets, and evidence of approach, e.g., whole-of-government, ministry or department-led. We examined jurisdictional strategic documents that were either wholly or partly devoted to biodiversity (or nature) conservation.

To examine domestic statutes for the implementation of the NBSAP (*Canadian Biodiversity Strategy*) and the delivery of Aichi Targets, we did a manual search for all legislation relevant to biodiversity and major threats to biodiversity from the federal, provincial, and territorial governments of

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Canada. The key threats to biodiversity—habitat loss/degradation, overexploitation, invasive species, climate change, and pollution—were those identified by the IPBES (2019) assessment as well as similar literature in Canada (Currie and Marconi 2020, Woo-Durand et al. 2020; McCune et al. 2013). We collected these data in two phases: first, through a broad search of government websites for relevant laws and, second, a more systematic search of each law as accessed through the Canadian Legal Information Institute (CanLII: canlii.org/en/). We inspected each statute for a stated purpose or set of objectives and included them in further analysis if some element of biodiversity or threat to biodiversity was central or included in some fashion. We were aided in our search by legal reviews that have been conducted by federal departments (e.g., ECCC 2019b) and natural resource law reviews (e.g., Hughes et al. 2016). We also consulted occasional reviews and evaluations of NBSAPs by the CBD Secretariat and the published literature to gain perspective on Canada's progress on the implementation of CBD objectives relative to the other 195 parties to the Convention. For each statute, we gathered the same set of information and summarised these within and across jurisdiction according to stated purpose, type of statute and implementing agency (**Supplementary Material 1**).

We categorized each statute within each jurisdiction into one of five categories:

1. **Protection of biodiversity**. Legislation with the primary purpose of protecting some element(s) of biodiversity, e.g., species or land/sea (ecosystems). In this category, the primary purpose is conservation.

2. **Management of exploited biodiversity**. Legislation with provisions for protecting constituent element(s) of biodiversity in the context of human benefit/exploitation (i.e., hunting and fishing). In this category, the purpose of managing certain elements of biodiversity used by humans is the primary purpose. While forestry involves direct exploitation of some timber species, we considered this as natural resource development given impacts on wildlife habitat.

3. **Mitigation of biodiversity impacts from development**. Legislation with provisions for protecting or restoring some element(s) of biodiversity in the context of development, including extraction of natural resources. In this category, human use is the primary purpose, and provisions for biodiversity protection/restoration are subordinate. Some explicit mention of environmental protection, sustainable development, and (or) management must be included in the statute to be included in this category.

4. **Indirect mitigation of biodiversity loss**. Legislation regarding threats to both biodiversity and the health and socio-economic wellbeing of people, e.g., abiotic threats like pollution and climate change and invasive species that to agriculture and forest industries are pests and weeds. The statutes in this category are designed for the benefit of human communities, with biodiversity receiving little, if any, explicit provisions, but perhaps benefitting indirectly by implementation of the law.

5. **Protection of biodiversity unique to the jurisdiction**. Legislation with the primary purpose of protecting a specific piece of geography and (or) other element of biodiversity (e.g., species or ecosystem) within and unique to the jurisdiction.

For laws governing resource extraction (e.g., forestry, mining, oil and gas, coal, water management) and other development (e.g., land planning, agriculture and farm laws), we analyzed each individually for provisions aimed at the protection and management of biodiversity using keywords that represented biodiversity or its constituent elements, or key threats, e.g., biodiversity, fish, wildlife, species, habitat*, ecosystem*, forest*, environment*, pollution, climate change, emissions, invasive species, pest*, exploitation, sustain[able]. We removed from consideration those statutes for which the exclusive purpose was economic development and either contained no mention of biodiversity and related terms or deferred to other pieces of legislation, especially impact assessment. Although we included many land-use planning laws, we did not include statutes used to convey land to the public for nonconservation purposes, e.g., community, industrial, and business use. We also did not

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include laws that concerned domestic, farm, or display of animals. Left completely out of this analysis were the many laws that exist in each jurisdiction that may have profound (and exacerbating) if inadvertent impacts on biodiversity, such as corporate, tax, property, trade, etc. laws.

With the Government of Canada as a Party to the CBD, our focus here is on settler governments as the implementation agents. Although Indigenous legal orders governed long before settlers arrived and continue as such, we have not provided any data about the scope or breadth of such legal orders that benefit biodiversity created by Indigenous governments, and we know of no existing data set or systematic review that contains such information. From a methodological standpoint it is necessary to note that we have purposefully excluded from this analysis legislation implementing the 25 modern treaties in a number of Canadian jurisdictions that have been signed with Indigenous Peoples since 1975 (Government of Canada n.d.), although we discuss this later.

Results

Part 1: Jurisdictional approaches to CBD implementation

Almost all provinces and territories make some reference to biodiversity on their government webpages, and eight of 13 have a webpage devoted to biodiversity (**Table 1**; **Supplementary Material 2**). Of these, three (Québec, Newfoundland and Labrador, and Nova Scotia) are constructed as gateways to dedicated programs on wildlife, species at risk, protected areas, and in some cases ecosystem conservation. The biodiversity pages of British Columbia and Manitoba provide broad-level descriptions or generic lists of activities the government is undertaking, whereas Northwest Territories and Ontario place most emphasis on the jurisdictional biodiversity strategy, the latter of which was devised by a council outside government. The majority of the Ontario biodiversity webpage is taken up by "what you can do", referring to the actions of citizens in the province. Alberta's "Biodiversity and Land" webpage is wholly devoted to monitoring, with a link to the Alberta Biodiversity Monitoring Institute, a nongovernment not-for-profit entity that is unique in Canada as a large-scale, systematic, multi-taxon monitoring programme (ABMI n.d.).

Seven of 13 provinces and territories have had, at one point since the Convention was ratified, some kind of action plan or strategy dedicated to biodiversity conservation, with reference to CBD objectives and (or) the *Canadian Biodiversity Strategy*. Most were developed in 2012 and 2013, with several (New Brunswick and Saskatchewan) no longer available on existing websites. A draft biodiversity policy for Alberta was released for public review in 2015, but was never finalized (AESRD 2014). Only two provinces—Nova Scotia (NSDNR 2011) and Ontario (OMNR 2012)—have biodiversity strategies, both of which ended in 2020. In all cases where biodiversity is acknowledged as a government priority, it is under the jurisdiction of individual ministries or departments. Several provinces have developed "partnerships" or "councils" of government and nongovernment entities.

More extensively available among jurisdictions are plans or strategies dedicated to area-based conservation, most of which have been developed in recent years. This is reflective of provincial interest in implementing Target 1 of *2020 Biodiversity Goals and Targets for Canada*, which corresponds with Aichi Target 11. Although many governments have not explicitly integrated these targets into jurisdictional policies, the Pathway to Canada Target 1 process initiated by the federal government has served to increase the overall level of ambition in this dimension of biodiversity conservation, aided by federal budget investments (ECCC 2019a).

Other than a few jurisdictions that have strategies focused on species at risk (**Table 1**), other Aichi goals and targets have been largely ignored. Some, e.g., mainstreaming (Aichi Strategic Goal A) or elimination of subsidies (Aichi Target 3) are not included in the *Canadian Biodiversity Strategy*; these

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Table 1. Strategic approaches to biodiversity conservation by individual jurisdictions in Canada[a].

	Jurisdiction													
	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL	YK	NWT	NU	FED
Webpage devoted to biodiversity[a]	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Biodiversity strategy/ plan/policy	None	None	2004–2009	2012[b]	2012–2020	2013	2009	2011–2020[b]	None	None	None	2006	None	2015–2020
Area-based conservation strategy	1993	2009–2019	None	2015	2018	None	None	2013	None	None	1998	2016–2021	None	Yes; no date
Species at risk/wildlife strategy/plan	2020	2009–2014	None	None	None	None	None	None	None	None	None	None	None	1996
Sustainable development strategy w/ biodiversity as an element	None	None	None	None	None	2015–2020	Yes; no date	2014	2012	None	None	2014	None	2019–2022

Note: BC, British Columbia; AB, Alberta; SK, Saskatchewan; MB, Manitoba; ON, Ontario; QC, Québec; NB, New Brunswick; NS, Nova Scotia; PEI, Prince Edward Island; NL, Newfoundland and Labrador; YK, Yukon; NWT, Northwest Territories; NU, Nunavut; FED, Federal.
[a]All references for this table available in Supplementary Material 2.
[b]Chapter/section in larger environmental strategy/plan.

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concepts receive no mention in the latest reports by Canada to the CBD (ECCC 2019a), other than in reference to integrating biodiversity into the elementary and secondary school curricula (Canada Target 18). Apart from area-based conservation, few provinces and territories have ever developed any specific jurisdictional measurable targets related to biodiversity (**Supplementary Material 2**).

Part 2: Biodiversity-related legislation

There are currently 201 laws across all jurisdictions in Canada that directly consider biodiversity in some fashion (**Table 2**; **Supplementary Material 1**). The federal government has 21 such statutes, whereas the 10 provinces range from 11 (New Brunswick and Prince Edward Island) to 25 (Ontario) and the territories 6 (Nunavut) to 9 (Northwest Territories). Although the number of statutes *per se* is not generally indicative of overall quality or potential effectiveness of any legal framework for protecting biodiversity, the assignment of each statute into one of the five categories (**Table 2**) and distribution across the 14 jurisdictions uncovered significant variability in approaches and limitations to legal biodiversity protection in Canada.

Protection of biodiversity

Just over 25% of the 201 laws had some degree of biodiversity protection as the chief stated purpose. These types of laws focus on either (*i*) the creation and management of protected areas or (*ii*) protection of species at risk and their habitats. Some jurisdictions have multiple pieces of legislation governing area protection, often associated with varying degrees of protection (e.g., conservation easements, ecological reserves, wilderness areas). Ontario is the only province that employs a statute to guide the management of invasive species to protect biodiversity.

Management of exploited biodiversity

Comprising about 10% of biodiversity-related statutes in Canada, wildlife and, in most jurisdictions, separate fisheries laws focus on a subset of species that are harvested through hunting, trapping, and fishing activities. With a primary purpose of managing populations and preventing their overexploitation, the fundamental interests involved are recreation and food for humans. The provincial and territorial statutes of this nature are similar in scope, dealing with licensing, regulation, and restriction of activities. Nunavut also includes provisions for land-based management in its *Wildlife Act* (2003), while some other wildlife laws (see below) offer specific provisions for species at risk. Federal laws in this category include those devoted to subjects of distinct federal authority, such as fisheries, and to the implementation of various international treaties signed by Canada, such as the *Convention on International Trade of Endangered Species* (1973) and the *Migratory Bird Convention* (1916) with the United States.

Mitigation of biodiversity impacts from development

Of the five categories, the highest number of statutes (61 or 30%) were those that contain provisions for biodiversity through mitigation of impacts in various natural resource sectors. Many sector-specific laws, especially energy and mining, were not included because biodiversity elements received no explicit consideration; forestry and water laws are the most common statutes in this category. Also included are land-use planning statutes and impact assessment laws that while development-centred by nature, contain provisions that seek to ameliorate the threat of habitat loss and degradation from specific human activities.

Indirect mitigation of biodiversity loss

There are 40 statutes in the country that provide some indirect benefit to biodiversity through their focus on threats related to pollution, climate change and invasive species to agriculture (pests and weeds). Albeit of varying strengths and vintages, all jurisdictions in Canada have at least one

Table 2. Statutes in each jurisdiction in Canada categorized by purpose and objectives of legislation relative to biodiversity conservation[a].

Jurisdiction (no.)	Statute Category				
	Protection of biodiversity	Management of exploited biodiversity	Mitigation of biodiversity impacts from development	Indirect mitigation of biodiversity impacts	Protection of biodiversity unique to the jurisdiction
Federal (21)	8	1	1	7	4
British Columbia (21)	5	1	5	7	3
Alberta (12)	3	2	4	2	1
Saskatchewan (14)	4	2	5	3	0
Manitoba (20)	5	3	5	4	3
Ontario (25)	6	1	7	4	7
Québec (16)	3	1	5	3	4
New Brunswick (11)	4	1	3	3	0
Nova Scotia (15)	6	2	6	0	1
Prince Edward Island (11)	1	2	4	4	0
Newfoundland and Labrador (12)	3	2	5	2	0
Yukon (8)	1	1	6	0	0
Northwest Territories (9)	4	1	2	2	0
Nunavut (6)	2	1	3	0	0
Total (201)	55	21	61	41	23

[a]Statute details in Supplementary Material 1.

environmental protection law that covers pollution and waste management. Laws devoted to climate change are by now in place in most jurisdictions; none has been designed to explicitly address impacts of climate change on biodiversity, although successful implementation may give rise to indirect benefits. Moreover, mitigation and (or) elimination of threats and impacts associated with land use modification, pollution, and other threats indirectly dampen the overall effect of climate change. Similarly, implementation of weed control legislation in seven provinces in support of agriculture may ameliorate threats to biodiversity from at least some invasive species.

Protection of biodiversity unique to the jurisdiction

Several provinces have laws that provide management attention to particular pieces of geography that require special consideration, such as the Muskwa Kechika Management Area (64,000 km^2) in northern British Columbia, the Willmore Wilderness Park (4,597 km^2) in Alberta, the Far North in northern Ontario (450,000 km^2), or the area covered by Plan Nord in Québec (1.2 million km^2). Ontario is most notable for this, with seven (e.g., the *Niagara Escarpment Planning and Development Act* (1990), the *Greenbelt Act* (2005), etc.). Manitoba has a unique statute devoted to peatland stewardship, focusing on a both protection and regulation of commercial development of this carbon-rich ecosystem.

The general types of statutes with some relationship to biodiversity are similar across jurisdictions (Table 3). While there are apparent differences among the individual laws with respect to their purposes, relative emphases, and comprehensiveness, all jurisdictions have statutes devoted to wildlife

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Table 3. Number ($n = 201$) and types of statutes within each jurisdiction that directly consider (i.e., contain provisions for) biodiversity or a threat to biodiversity[a].

	Jurisdiction													
Type of statute	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL	YK	NWT	NU	FED
Total number	21	12	14	20	25	16	11	15	11	12	8	9	6	21
Wildlife/fish	1[bc]	2[b]	2[b]	3	1[b]	1[c]	1[c]	2	2[b]	2	1[c]	1[c]	1[bc]	3
Species at risk	—	—	—	1	1	1	1	1	—	1	—	1	—	1
Land protection	4	3	4	4	3	2	3	5	1	2	1	2	1	2
Land planning	1	1	1	1	2	1		1	1	1	—	—	—	—
Forestry	2	—	1	—	1	1	1	1	1	1	1	—	—	—
Other natural resources	1	—	1	—	—	—	—	—	—	1	3	—	—	—
Sustainable development	—	—	—	—	—	1	—	1[d]	—	1	—	—	—	1
Water	1	1	—	2	2	2	1	1	1	1	—	—	1	1
Marine	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Environment assessment	1	—	1	—	1	—	—	—	—	—	1	1	1	1
Environmental protection	1	1[e]	1	3[e]	4	1[e]	2[e]	1[e]	2[e]	1[e]	1	4	2	2
Climate change	4	2	2	2	—	1	1	—	1	1	—	—	—	2
Invasives/weed management	2	1	1	1	3	1	1	1	2	—	—	—	—	1
Special places	3	1	—	1	7	4	—	—	—	—	—	—	—	4
Other special elements	—	—	—	2	—	—	—	1	—	—	—	—	—	—

Note: BC, British Columbia; AB, Alberta; SK, Saskatchewan; MB, Manitoba; ON, Ontario; QC, Québec; NB, New Brunswick; NS, Nova Scotia; PEI, Prince Edward Island; NL, Newfoundland and Labrador; YK, Yukon; NWT, Northwest Territories; NU, Nunavut; FED, Federal.
[a]Statute details in Supplementary Material 1.
[b]Wildlife laws contain provisions for species at risk.
[c]Fisheries included in wildlife law.
[d]Climate change included.
[e]Environmental Protection acts contain regulations for environmental (impact) assessment.

and fisheries management, protected areas, and general environmental protection that mention or even emphasize biodiversity conservation. The territories have very few laws in these categories as compared with the provinces, but this speaks to the short periods of time that each territorial government has been in control of its lands and resources since devolution (Yukon in 2003 and Northwest Territories in 2014) or creation (Nunavut in 1999).

Six of 13 provinces and territories have no specific laws devoted to conservation of species at risk. Seven jurisdictions combine provisions for environmental assessment with those for air quality, waste, and contaminants within a single law, whereas the other seven have stand-alone environmental assessment laws. While several provinces (e.g., British Columbia, Ontario, Québec, New Brunswick and Prince Edward Island) embed consideration for some biodiversity elements in their forestry statutes, others have forestry laws that limit any discussion of sustainability to timber extraction with no apparent biodiversity-related considerations. In such cases, while forest license agreements or plans enabled by such legislation might consider biodiversity aspects through regulation, policy and (or) guidance, protection of biodiversity in these provinces and territories is not legally and explicitly

Table 4. Distribution of responsibility among agencies within each of 11 jurisdictions in Canada (Yukon, Northwest Territories, and Nunavut excluded) for 178 statutes with direct relevance to biodiversity[a].

Jurisdiction	Number of agencies responsible for biodiversity-related laws	Number of Statutes		
		Agencies responsible for environment, parks	Agencies responsible for forestry, agriculture, other resources	Other Agencies
Federal (21)	6	13	4	4 (Transport, Health, Finance, Public Works)
British Columbia (21)	4	8	12	1 (Finance)
Alberta (12)	3	10	2	Transportation (shared)
Saskatchewan (14)	5	11	2	1 (Municipal/ Indigenous)
Manitoba (20)	5	11	7	2 (Finance, Municipal, Indigenous)
Ontario (25)	4	11	11	3 (Municipal)
Québec (16)	3	11	3	2 (Municipal/Regional Affairs)
New Brunswick (11)	3	5	5	1 (Heritage/Tourism)
Nova Scotia (15)	4	4	10	1 (Heritage/Tourism)
Prince Edward Island (11)	4	7	3	1 (Finance)
Newfoundland and Labrador (12)	3	6	5	1 (Heritage/Tourism)

[a]Statute details in Supplementary Material 1.

mandated in the statutes. Four jurisdictions (Québec, Nova Scotia, Newfoundland and Labrador, Federal) have acts devoted to sustainable development with relevance to biodiversity.

Provincial and federal statutes relevant to biodiversity are the responsibility of between three and six ministries or departments in each jurisdiction (Table 4). Although the organization of ministries is quite different from one province to the next (and often shifts between governments within the same jurisdiction), governance of these biodiversity-related laws is generally split between agencies with primary responsibility for environment, climate change, and (or) protected areas, and those that focus on natural resources, including forestry, agriculture, energy, etc. Other agencies (e.g., municipal, Indigenous affairs, and transportation) are primary administrators of < 10% of provincial and federal laws related to biodiversity. All provinces consider wildlife and fish as natural resources, with such laws administered by natural resource agencies. However, dedicated species at risk laws are administered by environment ministries in most jurisdictions where they exist. The majority (58%) of provincial laws with biodiversity as a primary focus (excluding exploited species) are administered by environmental agencies; seven of eight federal laws of this nature fall under the responsibility of Environment and Climate Change Canada.

Discussion

Canada's implementation of the CBD

Continued global cooperation to address the alarming degradation of biodiversity will remain essential, yet implementation of this societal imperative will largely rest on the shoulders of individual

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nations and their domestic actions and agendas. This study represents a test of what is likely a widespread assumption that high-governance countries should be well positioned to protect and conserve biodiversity, by asking if the prevailing legislative framework in Canada is adequate to meet the challenge of biodiversity loss. To address this, our analysis has focused mainly on the legislative framework for biodiversity as it exists in 2020. There is no temporal component to indicate whether things are getting better or worse. Indeed, this presentation is a snapshot in time, and must be understood as such. Nevertheless, declining biodiversity trends in many areas of the country provide a clear indication that Canada is not displaying particular effectiveness at confronting or addressing the biodiversity crisis within its borders in spite of the many statutes that include provisions to do so. Our analysis has revealed a general picture of biodiversity protection through laws that emphasize land protection of varying strengths, while species and ecosystems in remaining unprotected lands and waters are managed through hunting and fishing limits and impact mitigation provisions associated with individual activities or projects that impinge on natural habitats. A small number of species (relative to the estimated 80,000 in Canada; CESCC 2016) that are formally recognised as species at risk receive extra protections through a handful of dedicated laws and other provisions of varying strength and unevenly distributed across the geography of Canada. In jurisdictions where their consideration is limited to wildlife management statutes, protections are weak, particularly for habitat (Ecojustice 2012).

The CBD envisions NBSAPs—the principal planning tool required by Article 6 of the CBD—as necessarily strong instruments of implementation, intended to be whole-of-government policies that facilitate "biodiversity mainstreaming at all relevant levels within political, economic and social sectors", (see CBD Subsidiary Body on Implementation 2018, p. 1). The first strategic goal of the Aichi 2020 biodiversity targets is to "Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society"; the CBD recognizes "that the objectives of the Convention would be impossible to meet until consideration of biodiversity is fully integrated into other sectors" (SCBD 2005) as a means to address the myriad direct pressures and causes of global biodiversity loss. Achieving this will necessitate that biodiversity be addressed not by environmental agencies alone, but through "institutional changes in various policy sectors towards taking biodiversity into the core agenda and objectives of their decision-making" (Sarkki et al. 2015, p. 1378).

In one recent update of key findings from an internal analysis of 158 NBSAPs, Canada was not among the 49 countries that have adopted their NBSAPs as "whole of government instruments"; nor was it among those that did any kind of assessment of their previous NBSAP(s) (CBD Subsidiary Body on Implementation 2018). Canada received a relatively low score in a recent study (Whitehorn et al. 2019) that evaluated the performance of 144 NBSAPs for incorporating biodiversity mainstreaming. This study concluded that biodiversity strategies of developing countries demonstrated a higher awareness of the importance of biodiversity mainstreaming and were likely to give specific details about the monetary contributions of biodiversity to their economies than developed nations.

For Canada, responsibility for both the *Canadian Biodiversity Strategy* and *Federal Sustainable Development Strategy* falls within one federal ministry—Environment and Climate Change Canada. We found that in its position as the National Focal Point for the CBD, the federal government role is primarily devoted to coordination and reporting on the progress on implementation of the biodiversity strategy. There are, however, numerous bodies responsible for biodiversity matters across the Canadian federation, ranging from the Canadian Council of Ministers of the Environment and the Federal/Provincial/Territorial Ministers Responsible for Conservation, Wildlife and Biodiversity to the lower-level Canadian Wildlife Directors Committee and Canadian Endangered Species Conservation Council. Similarly, the National Steering Committee of Pathway to Canada Target 1 (Conservation2020 n.d.) has provided a recent platform whereby Federal leadership has been

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exercised through budget investments and the development of common standards (e.g., National Steering Committee of Pathway to Canada Target 1; Conservation2020 n.d.), although its mandate is concluding.

Leadership and coordination of biodiversity conservation in Canada

A lack of leadership by the federal government in environmental matters has been highlighted in several recent reports on the performance of the federal government (e.g., ENVI 2016; CESD 2011, 2018). All have pointed out that federal government documents representing self-reporting on nonbinding strategies do not come with any requirement for the Canadian government to review and comment on progress. Nor do they include any mechanism to ensure that the provinces and territories are contributing to the overall federal effort. As with many collations of information from provinces and territories, e.g., progress reports on protection of critical habitat under the *Species at Risk Act* (e.g., ECCC 2019b), reporting is generally conducted without any accompanying analysis of the reasons why relevant targets have not been effectively met.

At least two major related factors help explain the lack of an integrated approach between jurisdictions in Canada and tepid federal leadership: (*i*) the country's unusual degree of decentralized constitutionally ascribed authority over natural assets and resources (Cairns 1992) and (*ii*) continued economic emphasis on extraction of natural resources (NRCAN 2018) since the earliest years of European colonization and development (Hughes 2016a).

Regarding the first point, with so many aspects of biodiversity protection being directly related to land management, much of the constitutional responsibility for all aspects of terrestrial biodiversity falls on provinces and territories (Olive 2019), where land "ownership" was intended at Confederation in 1867 to provide their main source of revenue (Cairns 1992). Across the complicated geography of this vast land base, our results emphasize fragmented governance of biodiversity conservation between and within jurisdictions, which have guarded their powers over natural assets, especially resources like timber, fish, furs, oil and minerals. The underlying barrier of federal–provincial intergovernmental relations to meeting Canada's international commitments to biodiversity became immediately clear following the ratification of the CBD (Campbell and Thomas 2002) and is likewise apparent in a multi-decadal examination of policy failures related to climate change (Macdonald 2020).

On the second point, the biblical phrase "hewers of wood and drawers of water", applied to Canada by Innes (1930), does much to describe the originating mindset of early explorers and colonizers of Canada as one focused on their entitlement to the unbridled exploitation of seemingly unlimited lands, waters, and wildlife. Later, provincial control of natural resources and revenues derived from them have been enormously important drivers of economic development decisions and concomitant land use change. This has meant that laws governing natural resource development were originally designed to facilitate development and resource extraction activities under the assumptions that the vast scale and availability of natural assets in Canada translated to few, if any, negative consequences from their extraction. Such attitudes were later replaced by assumptions that any impacts could be successfully mitigated under largely separate processes and that public land can simultaneously meet the needs of multiple users (Hughes 2016a). With biodiversity and other environmental considerations left out of the mainstream of planning and decision-making, the primacy of revenue generation in the context of profit maximisation in competitive markets has traditionally driven land use decisions (M'Gonigle and Takeda 2013; Bond et al. 2020).

Exacerbating this, is the reality that responsibilities for terrestrial and freshwater biodiversity in each jurisdiction are distributed across a subset of government agencies, often with conflicting or even incompatible mandates. "Coordination" is generally left to those responsible for environment that

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often include climate change and protected areas, but are distinctly separate from those in charge of natural resources (including management of game and fish species). Invariably, however, environmental agencies have little financial bargaining power at the cabinet table relative to revenue-generating ministries responsible for the natural resource development. For example, the 2019–2020 operating expenses of the Ontario Ministry of Environment, Conservation and Parks was about $322 million compared with $4.4 billion for Energy (Government of Ontario n.d.). Thus, when the bulk of responsibility for biodiversity rests with small and under-funded agencies, the capacity for instilling effective multi-sectoral leadership and coordination of biodiversity conservation is severely constrained. When it comes to marine biodiversity, the federal government does not have the same shared responsibilities with provinces and territories. However, the conflicting regulatory responsibilities inherent within the one responsible agency (Fisheries and Oceans Canada) between promoting economic activities and conserving marine life create significant barriers for Canada in fulfilling national and international commitments to sustain marine biodiversity (Hutchings et al. 2012).

Additional challenges come from the subsidies that create perverse incentives for extraction activities that degrade ecosystems. In Canada these come in different forms, often from overt measures like tax credits, incentives, and rebates to flow-through shares to indirect measures like building of public infrastructure to provide access (Johnson et al. 2020). Elimination of harmful subsidies is included as an Aichi target under the CBD in 2010, given the propensity of these incentives created by governments to encourage the unsustainable use of natural resources. Intended to drive expanded business activity and result in benefits to the overall economy and to society, subsidies are, however, difficult to identify and track, as well as to account for benefits relative to costs (Allan et al. 2020; Dempsey et al. 2020). Indeed, the elimination of harmful subsidies receives no mention in the *2020 Biodiversity Goals and Targets for Canada* or the *Federal Sustainable Development Strategy*. In Canada, subsidies are most common in agriculture, fisheries, transportation, water, and industry sectors such as oil and gas (Kenny et al. 2011). Additional examples include a federal tax incentive for mineral exploration issued through the Department of Finance (NRCAN 2019) and provincial funding for forest access roads (e.g., OMNRF 2019).

Reliance on mitigation of development impacts

The underlying premise of all Canadian natural resource and development statutes is that each individual project or impact can be managed in such a way as to reduce or even eliminate any harm to biodiversity elements that may be negatively affected by the activities in question. Even statutes that have biodiversity protection as a primary stated purpose, such as species at risk laws, enable additional incremental harm through the use of permitting regimes. Overall declining trends in myriad biodiversity indicators make it clear that in a collective sense, impacts are not being successfully ameliorated (see Bond et al. 2020). Reasons for this are likely to be highly variable, but we can point to at least three prevailing challenges.

First, land use decisions are being made in most cases one project at a time on a sector-by-sector basis with little eye on regional-scale loss and degradation of species and their habitats (McCune et al. 2019; Olive 2018; CCA 2019). An increasing number of small projects are escaping any sort of consideration because they are deemed to have low or negligible impacts on their own, while cumulative effects are largely ignored (Sinclair et al. 2017; Gannon 2021). A particular illustration of this is offered by linear infrastructure projects designed to facilitate development often fly under the radar, even though such projects represent keystone decisions that can lead to the opening of ecologically intact landscapes (Johnson et al. 2020). Without attention to the long-term picture and the overall landscape at a more regional or ecosystem level, biodiversity decline is inevitable.

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Second, mitigation is generally being executed in far too limited a fashion by placing undue focus on measures meant to reduce harm. Mitigation in the full sense should be conducted as a prescribed sequence of measures—a "mitigation hierarchy"—that places clear priority on avoiding impacts, then minimizing, and then, as a final resort, offsetting residual impacts. Although the mitigation hierarchy is widely recognized in offset guidelines and policies around the world (Maron et al. 2016), and there are examples in Canadian policies and practices (Poulton 2014), the only statutes where we found mention of aspects of the mitigation hierarchy (including explicit mention of avoided loss), is in the federal *Fisheries Act* (1985) and *Ontario Endangered Species Act* (2008), the latter of which was weakened in this and other respects in 2019 (Bergman et al. 2020). The new federal *Impact Assessment Act* (2019) defines "mitigation" to include (directly or by synonyms) avoidance, minimization, restoration, and offsetting, but does not prescribe any hierarchy or systematic application of them. Indeed, Gannon (2021) reviewed environmental impact statements for 14 projects conducted under federal impact assessment (IA) legislation in Canada and uncovered substantial deficiencies regarding how impacts of various project types to biodiversity were addressed, all of which have been discussed for decades as weaknesses of IA regimes in Canada and elsewhere.

Finally, a third challenge relates to the reality of the "profound and pervasive discretion" (Collins and Sossin 2019) that is exercised at all levels of decision making in environmental laws in Canada (Boyd 2015; Hutchings et al. 2012), compounding cumulative impacts from the weak consideration of biodiversity in resource sector laws. This, for example, seems to have thwarted the Alberta *Land Stewardship Act* from living up to its potential to serve as a true integrated decision-making framework that recognizes ecological limits and trade-offs between functioning ecosystems and economic benefits (Bankes et al. 2014). Studies have shown that regulatory discretion is usually exercised in favour of commercial interests, ranging from exempting industry from requirements to overruling scientists who provide evidence of adverse effects (e.g., Bond et al. 2020; Collard et al. 2019; Collins and Sossin 2019). Even while regulatory processes can be lengthy and involve a large number of steps, the outcome of most development proposals is a foregone conclusion (see Collard et al. 2019). Decision-making that consistently favours "state-supported resource regimes (energy, forestry, agriculture, water use)" (M'Gonigle and Takeda 2013, p. 2) is often characterised by overconfidence that impacts to biodiversity can always be managed and limits are unnecessary.

Potential solutions and pathways

Resolving the biodiversity crisis will require transformative change that takes a long-term perspective and confronts and addresses the root causes of biodiversity loss—"namely a fundamental, system-wide reorganization across technological, economic, and social factors, making sustainability the norm rather than the altruistic exception" (Diaz et al. 2019, p. 7). Our focus in this paper has been on governance instruments and approaches, only one of several fundamental components of sustainable pathways (Chan et al. 2020). Transitioning to scale-appropriate planning and integrated decision-making that can address the pressures and causes of biodiversity loss in Canada will require a shift in governance systems to those that are coordinated, integrated, pre-emptive, adaptive, and precautionary (Chan et al. 2020). It will not only require reform of some existing policies (particularly those that are harmful to biodiversity), but also consideration of species and ecosystem services to be mainstreamed into economic and development decision-making. Yet the fragmented nature of governance of biodiversity that persists across and within Canadian jurisdictions today, with multiple agencies and departments in each jurisdiction responsible for various facets of biodiversity, present formidable challenges.

Habitat loss and degradation as the primary cause of terrestrial species loss (Woo-Durand et al. 2020) points to the imperative of area-based conservation as a major cornerstone of action. This is one arena where Canada has made significant progress in the past few years, centred on its intention to meet its

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Aichi Target 11 for land and marine protection within its borders and commitment to further, post-2020 increases (ECCC 2020). However, Article 8 of the CBD makes clear that there are many additional needs apart from in situ protection of biodiversity, including (but not limited to) sustainable development in unprotected areas. Achieving this will require recognition of biodiversity needs and integration across all sectors, such that the safeguarding of species and ecosystems does not remain a boutique issue for environmental agencies to address on their own (Sarkki et al. 2015). Accordingly, our examination of Canada's biodiversity-related laws provides support to calls for a concerted evolution of regulatory regimes towards truly integrated approaches to terrestrial and marine planning and management of development activities that foster cross-sectoral approaches and coordinated planning at appropriately large scales and long-term timeframes, with the aim of creating strong links among landscape- or regional-level plans and targets and project-level decisions (NAP 2018; CCA 2019).

Moving away from the attractive but unrealistic notion that use of lands and resources by many entities can be achieved for the maximum benefit of humans ("multi-use"), trade-offs between various interests, and uneven power relations among actors would have to reconciled (Hughes 2016b; CCA 2019). Successful implementation across the board will require a rethinking of natural resource decision-making in Canada, including actual implementation of sustainable development as originally conceived (Hughes 2016b)–or, perhaps more importantly, Canada's self-identity as a resource-intensive economy driven by short-term economic priorities (Boyd 2003, 2015).

Serious attention to the implementation of the UN Framework Convention on Climate Change led to a series of new federal, provincial, and territorial laws (**Table 3**; **Supplementary Material 1**). The obvious question is: should this also happen with biodiversity? Species at risk legislation in Canadian jurisdictions to date provides a cautionary tale for law reform. The laws are politically contentious and often weakly implemented (Ecojustice 2012; Olive 2014). The latest example is the weakening of the *Endangered Species Act* (2008) in Ontario, where amendments to the Act in 2019 introduced major delays and reductions to protections (Bergman et al. 2020). Unless the government is willing to put finances behind strong laws and treat imperiled species as primary considerations in decision-making, the experience to date suggests entrenchment of business-as-usual approaches. Westwood et al. (2019) call for new species at risk legislation in British Columbia, but absent a whole-of-government commitment to adopt a fundamentally different approach along with adequate funding, a new law—layered upon existing laws—may not make a needed difference, particularly if administered by an environment ministry that is dwarfed in power by other natural resource agencies.

While it is beyond the scope of this exercise to evaluate the extent to which failures of ambition have been undermined by the design of the each of the 201 laws we examined, we can be certain that attention must be paid to the reform of existing laws in all jurisdictions and the potential creation of new statutes to fill gaps. We caution, however, that transformation of Canada's approach to biodiversity conservation will require more than the mere enactment of new laws. Instead, it will require innovative styles of governance and an altogether different mindset from conventional approaches to resource management and land use decisions (Sinclair et al. 2017; CCA 2019).

Governing resource extraction involves a constant tug-of-war between business interests concerned about unnecessary regulatory barriers and those who would like to see strong environmental safeguards. This polarization reminds us that strong biodiversity laws and policies can easily be torn down. As already mentioned, Ontario's *More Homes, More Choices Act* (2019) made major changes to its *Endangered Species Act* (Bergman et al. 2020) to provide "efficiencies" for development interests. Perhaps more blatantly, Alberta's 2019 "Cut Red Tape" initiatives include panels of businesses and industry representatives making regulatory recommendations to the province about oil and gas, agriculture, forestry, and other environmentally harmful sectors (see Government of Alberta n.d.).

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More recently, under its COVID-19 economic recovery plan, Alberta's government also rescinded its 1976 Coal Development Policy, thereby removing protections in the Rocky Mountains to allow for open-pit coal mining in environmentally sensitive lands (Fletcher et al. 2020).

Notwithstanding promising (and recent) expressions of ambition and collaboration for meeting biodiversity targets (e.g., Conservation2020 n.d.; ECCC 2020), the governance system in Canada today that is available to address the biodiversity crisis at a national scale relies on diplomacy among 14 jurisdictions, with the federal government "historically restrained in exercising authority in the environmental field" (MacKay 2004 p. 30). Although much is made of the limits to federal jurisdiction relative to the provinces on biodiversity-related matters, cooperative federalism (which has been institutionalized to a certain extent through cooperative agreements and Interministerial Councils (Campbell and Thomas 2002)), tends to serve as a pathway to lowest-common denominator protections (MacKay 2004). It follows that along with a high degree of interest and commitment, a federal government must be willing to skillfully use some of its available power to play an effective leadership role (Macdonald 2020). For example, the federal government regularly deploys fiscal levers to stimulate action on policy priorities in lieu of exerting jurisdictional authority, (e.g., in areas like health, education, and infrastructure). The recently initiated Pathway to Canada Target 1 process (ECCC 2019a) represents a promising example of how this can be applied to biodiversity conservation, whereby a relatively small amount of federal money (>$200 million) and coordinated ambition has incentivised some provinces and territories and many Indigenous governments to make commitments to initiate or complete protected area projects. Along with meaningful levels of financial investment, the notion brought forward by NAP (2018) of a "new nature conservation architecture," consisting of a new federal Nature Conservation Department and associated federal law, merits thoughtful consideration as a means to enable delivery of the complete set of nature and sustainability goals and targets in a coordinated and integrated fashion.

Although Indigenous individuals and communities in Canada are not formally responsible for implementing the country's international commitments to biodiversity, consideration for the resurgent role of Indigenous-led conservation is nevertheless essential for confronting the crisis. Most opportunities for future conservation gains in Canada lie within Indigenous territories, where increasing recognition of Indigenous jurisdiction means that both natural resource development and conservation initiatives are less and less likely to succeed without Indigenous consent, in accordance with Article 19 of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP; Artelle et al. 2019). In their recent landmark report, the Indigenous Circle of Experts (2018) put forward a case for how Indigenous Protected and Conserved Areas (IPCAs) represent a long-term commitment to conservation, while elevating Indigenous rights and responsibilities and supporting meaningful reconciliation and implementation of the principles of UNDRIP (Artelle et al. 2019). There is room for substantial growth for this model of governance, particularly in as-yet ecologically intact northern regions where there are opportunities at appropriate scales for complete ecosystem conservation and where Indigenous communities are already demonstrating leadership, supported in part by federal government expenditures (Zurba et al. 2019; Artelle et al. 2019). Particularly in areas covered by modern land claim agreements since 1971, as well as in the territories, there have been and will be opportunities to create new pathways for integrated planning and decision-making around and protected areas and development. The government of the Northwest Territories provides an example of this kind of opportunity in its recent efforts to develop post-devolution legislation (*Environmental Rights Act, 2019* and *Protected Areas Act, 2019*) and strategies (**Table 1**; **Supplemental Materials 1**) that reflect integrated management of largely intact northern landscapes in the context of co-governance realities. Similarly, species conservation will benefit from an increasing recognition of how management approaches grounded in traditional Indigenous systems that are

multi-generational in scope as alternatives to contemporary resource management that emphasize extraction for short-term profits (Atlas et al. 2020).

Conclusions

The world's nations have been pledging to cooperate on global environmental issues ever since the Stockholm Declaration in 1972 that emerged from the United Nations Conference on the Human Environment. This, and a number of subsequent Multilateral Environmental Agreements ratified by most countries of the world, have created a collective societal imperative towards the achievement of a common set of goals for nature and sustainability (Chan et al. 2020). Alongside these regular discussions over the decades, evidence has been accumulating regarding both the urgency of the problem facing biodiversity and nature's critical supportive role for humanity. The sustainable future of biodiversity as a crisis receives less attention than climate change (e.g., Legagneux et al. 2018), but the condition of the world's lands and oceans as functional carbon sinks will be critical for combating the climate crisis (Le Quéré et al. 2018). Moreover, the IPBES (2019) assessment and the COVID-19 pandemic have placed biodiversity, and human connections to wildlife, on the public agenda worldwide. Indeed, the pandemic has not only exposed once again the links between zoonotic disease risk and environmental degradation (Everard et al. 2020), but the enormous economic consequences of failing to invest in preventative actions (Dobson et al. 2020) and the essential role of natural areas and green spaces for human wellbeing (WHO 2020).

As a wealthy and stable democracy, Canada has both a responsibility and an important opportunity to be a global leader in conserving biological diversity, yet the pathway it has developed thus far is clearly inadequate for achieving that status. Patterns of biodiversity loss within Canada along with its strategic planning and governance framework suggest that, similar to the rest of the world (Diaz et al. 2019), transformative change is needed. Based on our research, we suggest that statutory reforms, while critical, will not succeed unless accompanied by: (*i*) a whole-of-government approach to sustainability (ENVI 2016), characterised by a mainstreaming of biodiversity considerations into economic development decision-making; (*ii*) confronting the cultural ethos of prioritizing the "development" aspect of sustainable development, shifting from a short-term profit maximization motive to one with explicit consideration of future generations; (*iii*) innovative governance, including embracing Indigenous-led conservation and management systems; and (*iv*) bold federal leadership and coordination that overcomes jurisdictional fragmentation, along with financial resources enabled by a deliberate shift from harmful subsidies. Collectively, Canada's 10 million km^2 of terrestrial and freshwater ecosystems and its three marine coasts (the longest in the world), are too precious a global asset to accept anything short of such transformation.

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Author contributions

JCR conceived and designed the study. JCR and JG performed the experiments/collected the data. JCR, JG, and AO analyzed and interpreted the data. JCR and AO contributed resources. JCR, JG, and AO drafted or revised the manuscript.

Competing interests

Andrea Olive is a Guest Editor on this collection.

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Data availability statement

All relevant data are within the paper and in the Supplementary Material.

Supplementary materials

The following Supplementary Material is available with the article through the journal website at doi:10.1139/facets-2020-0075.

Supplementary Material 1

Supplementary Material 2

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