

Canadians' perspectives on how much space nature needs

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Abstract

Determining how much to set aside in a system of protected areas has been widely discussed. In the past, targets that have been set internationally and domestically are best described as politically driven. In recent years, there has been a call to shift towards evidence-based targets for conservation. One element that has been largely missing from this dialogue is public perception of how much to protect. We conducted an online, regionally balanced survey of just over 2000 Canadians to ask about their values for protected areas, including how much they thought was currently and should be protected. Overall, Canadians overwhelmingly agree that protected areas are necessary and think that approximately 50% of land and sea should be protected in Canada and globally. Nation-wide support for a significant increase in the amount of land/sea protected is a new finding in Canada, although consistent with applications of the same survey in other countries. As the timeline for achieving the current 2020 protected area targets approaches, countries are beginning to discuss what targets to set for the next decade. Our findings demonstrate strong public support for significantly scaling up Canada's conservation targets, consistent with ecological evidence.

Key words: conservation, protected areas, opinion poll

Introduction

Today, human activities dominate the earth and are having significant global, regional, and local impacts on ecosystems and the critical services they provide to humanity. Extinction rates are between 100 and 10 000 times evolutionary background rates (Ceballos et al. 2015) and shrinking populations and ranges are contributing to a massive anthropogenic erosion of biodiversity, which scientists have referred to as "biological annihilation" (Ceballos et al. 2015). Habitat loss and degradation is a major driver of biodiversity loss, and protected areas¹ are recognized as the cornerstone of strategies to tackle the biodiversity crisis while also providing numerous health and wellbeing benefits to humans.

Public support for protected areas has been and continues to be strong as demonstrated in numerous polls and nationwide surveys (Environics Institute 2009; Ipsos Reid 2011; Hart Research Associates and North Star Opinion Research 2012; EKOS Research Associates Inc. 2015; Probe Research Inc. 2015). A 2011 poll found that 75% of Canadians felt that preserving natural areas is important to

¹We use the term protected areas throughout this paper to encompass national parks, provincial or territorial parks, nature reserves, Indigenous protected areas, privately owned reserves, and marine protected areas consistent with the International Union for Conservation of Nature (IUCN) definition of protected areas.



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them (Ipsos Reid 2011) and a 2017 National Conservation survey found 88% of Canadians support protected areas (Earncliffe Strategy Group 2017). Although some studies have demonstrated stronger support amongst national park users than non-users (Parks Canada 2011), support for parks has been demonstrated to be strong across demographic and political lines (Kniivilä 2006).

The discussion about how much and what areas to protect globally and in Canada has its roots extending to more than 30 years ago with the UN World Commission on Environment and Development (WCED) meetings in 1987 and the publishing of *Our Common Future* (WCED 1987). At these meetings, policy-based targets were established aimed at increasing the area of the global land base protected. The first targets called for a tripling of the world's protected areas from the 3%–4% that was protected in 1988 to a modest 10%–12% target. These targets were aspirational in nature and were policy-based and not informed by science (Wiersma and Sleep 2018).

Over the last two decades, however, there has been increasing discussion and research on the inadequacy of these policy-based targets, criticized by scientists as being “arbitrary” and “hopelessly” inadequate at protecting biodiversity (Margules et al. 1994; Wright et al. 2001). Mounting evidence in conservation science supports evidence-based targets for protected areas typically three times higher (Svancara et al. 2005; Noss et al. 2012), popularized as the Nature Needs Half (Locke 2014) and Half Earth (Wilson 2016) movements.

Thirty years later, we are struggling to achieve revised policy-based targets set under the 2011 Convention on Biodiversity (CBD) Strategic Plan for Biodiversity. Known as the Aichi Targets, these commit CBD signatories, including Canada, to protect at least 17% of land and inland waters, and 10% of coastal and marine areas by 2020 (Convention on Biological Diversity 1992). Although Canada committed to the targets in 2010 and developed national level targets in 2015 (Environment and Climate Change Canada 2016), it is lagging most other countries, with just 10.6% of terrestrial area and 7.7% of marine area protected.²

Largely missing from the debates about the adequacy or appropriateness of policy-based and evidence-based targets, however, has been the public perspective. In 2017, a Canadian National Conservation survey found 87% support for increasing the amount of protected areas to at least 17% by 2020 supported primarily by an increase in federal funding (Earncliffe Strategy Group 2017). In 2014, the Zoological Society of London (ZSL) released the results of a global Space for Nature public survey from seven developed and developing countries (i.e., USA, UK, India, China, Brazil, South Africa, and Australia) at the 2014 World Parks Congress (Kumpel 2014). It showed strong public support internationally for much larger-scale protected area targets consistent with the growing scientific evidence, with ideal protection levels ranging between 40% and 70% of terrestrial and marine areas. The intent of the current study was to examine public support for protected areas in Canada and to specifically investigate perceptions about what proportion of the country should be in protected areas.

Materials and methods

In April of 2018, we administered a short online “Space for Nature” questionnaire targeting a national-level, regionally-balanced cross-section of society through the market research company

²According to Canada's official Conservation Areas Tracking System (CARTS 2017). However, numerous organizations have significant concerns that many of the marine areas do not meet the minimum standards of protection (Agardy et al. 2016; Jessen 2016).

Ipsos—Canada’s largest market research firm. For this survey, a sample of $n = 2004$ people were interviewed online, in either French or English, via the Ipsos I-Say panel supplemented with river sampling (non-panel sources).³ This sample size enabled us to detect small effect sizes (Cohen’s $d = 0.11$) with statistical power levels of 0.80 at a 0.05 probability level. Pre-stratification quotas and weighting were employed to balance gender and age of the Canadian population and to ensure that the sample’s composition reflected Canada’s adult population according to Census data (Statistics Canada 2016), and to provide results intended to approximate the sample universe. To reduce social desirability bias the survey questions were integrated within the larger Ipsos omnibus survey and neither the study proponents nor a specific study title was included. Because the Ipsos omnibus survey is balanced by region it would not adequately represent residents of the northern territories and thus they were not included in this study.

The reliability of Ipsos online polls is measured using a credibility interval. In this case, the poll is valid to within ± 2.5 percentage points, 19 times out of 20 of the findings had all Canadians aged 18+ been polled. The credibility interval will be wider among subsets of the population.

The survey contained 11 core questions supplemented with standard Ipsos demographic variables. After a section on informed consent, the survey introduced a definition of protected areas (the term used throughout the survey) consistent with that used in the international Space for Nature survey, with minor modifications to the examples to align them with terminology used for Canadian protected areas. This definition was made available as a pop-up box throughout the survey wherever the term was used, and is as follows:

“Protected areas are areas on land or at sea which receive recognized protection from the government or another official organisation due to their natural, ecological or cultural value. Examples would include national parks, provincial or territorial parks, nature reserves, Indigenous protected areas, privately owned reserves, and marine protected areas”.⁴

The first suite of questions asked about respondents’ opinions regarding the necessity of protected areas and the reasons why they are important. Respondents were also asked to indicate their perceptions of government priorities for protected areas. A second suite of questions asked about personal involvement with protected areas including self-reported level or knowledge or involvement, frequency of visitation, and barriers to visitation. At the core of the survey was the suite of questions focused on what proportion of the country and world should be protected. The survey first asked respondents to indicate the proportion of land and sea, in Canada, and on the planet as a whole, that they perceive is currently protected. Respondents were then asked to indicate what proportion of land and sea they thought should be protected. Follow-up questions asked about opinions on how costs for designating, protecting, and managing protected areas should be met and what they perceive as barriers or challenges to increasing protected areas beyond current (e.g., Aichi) targets (see Table 1).

Because the ordering of questions was critical, the questions were revealed in a specific order and respondents were not allowed to return and edit previous responses. We made few modifications to the original ZSL survey with the exception of substituting Canadian terminology (e.g., for types/ownerships of protected areas) as appropriate. The French translation was coordinated by Ipsos but then verified by French-speaking conservation specialists for subject-matter-specific language concerns. Analysis was conducted using IBM SPSS Statistics 23.

³Detailed methods involved in the Ipsos panel have been described recently in another FACETS publication (<https://doi.org/10.1139/facets-2016-0054>) and thus are not repeated here.

⁴Protected area definition adapted from IUCN (Dudley 2008).

Table 1. Description of respondents.

Characteristic	Proportion of respondents (%)
Gender	
Male	49
Female	51
Age	
18–34	27
35–54	34
55+	39
Education	
<High school	8
High school	37
College/some university	39
University graduate	15
Income	
<\$40K	29
\$40K–\$60K	19
\$60K–<\$100K	26
\$100K+	15
Household composition	
Kids	23
No kids	77

Results

Study respondents reflected the Canadian population with respect to gender, age, and region and tended to oversample those with higher levels of education and mid-range levels of income. Of the participants, 51% were female. Respondents were fairly educated with more than 50% holding a university degree. Forty-one percent of the sample reported an average annual household income of above \$60 000 CAD (Table 1).

The sample was distributed regionally, excluding the territories, in proportions emulating the 2016 census (Table 2).

Table 2. Regional distribution of sample.

Region	Number of respondents
British Columbia	249
Alberta	212
Saskatchewan/Manitoba	172
Ontario	742
Quebec	440
Atlantic Provinces	189

Protected areas are very important to Canadians

Ninety-three percent of respondents agreed (27%) or strongly agreed (66%) that protected areas are necessary, with few respondents indicating any disagreement with the statement ([Table 3](#)). There were no statistically significant differences in responses to the question based on region, gender, education, income, or level of use of protected areas.

Respondents considered protecting wildlife and areas of scenic or natural beauty as the leading reasons for having protected areas. The provision of income, employment, or other economic benefits associated with protected areas were rated as important, but ranked lower than their role in protecting nature.

Level of protection perceived and desired

On average, Canadians perceived that the amount of the country (land and sea) and planet that is currently protected ranges between 23% and 25%. Respondents thought that, on average, between 45%

Table 3. Importance of protected areas.

Variables	SD		D		N		A		SA		Mean	Standard deviation
	Number of respondents	%	Number of respondents	%	Number of respondents	%	Number of respondents	%	Number of respondents	%		
How strongly do you agree or disagree that:												
It is necessary to protect such areas (protected areas)?	5	0.2	4	0.2	106	5.3	549	27.4	1340	69.9	1.40	0.62
What do you personally think are the most important reasons for having protected areas?												
They protect wildlife	6	0.3	10	0.5	125	5.5	630	31.4	1223	61	1.45	0.64
They protect areas of scenic or natural beauty	3	0.1	13	0.6	167	8.3	783	39.1	1028	51.3	1.56	0.66
They provide space to enjoy leisure time	15	0.7	46	2.3	327	16.3	900	44.9	706	35.2	1.85	0.80
They provide space to enable a sense of wellbeing (e.g., relief from stress)	16	0.8	53	2.6	371	18.5	925	46.2	629	31.4	1.92	0.82
They control the planet’s water cycle	13	0.6	63	3.1	452	22.5	785	39.2	681	34	1.92	0.86
They hold spiritual and (or) cultural value for people	46	2.3	82	4.1	531	25.5	783	39.1	552	27.5	1.94	0.93
They provide local people with a source of food or fresh water	12	0.6	90	4.5	446	22.3	827	41.3	617	30.8	1.99	0.87
They reduce the effects of natural disasters (e.g., storms, floods, and droughts)	24	1.2	99	4.9	522	26.0	738	36.8	611	30.5	2.05	0.93
They reduce the impacts of climate change (e.g., by storing carbon)	37	1.8	64	3.2	436	21.7	737	36.8	720	35.9	2.11	0.95
They provide income, employment, or other economic benefits	50	2.5	128	6.4	714	35.6	765	38.2	337	16.8	2.37	0.94

Note: Both items were scored on a scale where 1 = strongly agree and 5 = strongly disagree. SD, strongly disagree; D, disagree; N, neither agree or disagree; A, agree; SA, strongly agree.

Table 4. Perceived and desired proportions of land and sea protected.

Variables	Mean (%)	Standard deviation
What proportion of Canada and the planet as a whole do you think is currently protected as an identified protected area? (% of land or sea)		
Canada, land	25.01	20.76
Canada, sea	22.66	21.36
The planet, land	23.64	21.63
The planet, sea	23.22	22.62
What proportion of both Canada and the planet as a whole do you think should be protected? (% of land or sea)		
Canada, land	45.35	29.09
Canada, sea	48.26	31.48
The planet, land	46.58	29.60
The planet, sea	50.80	31.36

and 51% of the country (both land sea) and planet should be protected. As with amount of land perceived protected there was wide variability in the results; however, the most frequently occurring response (mode) in each of these cases was 50 (Table 4).

There are significant gaps between reality, perceptions, and desires for protection

We investigated the gaps between participants' perceptions of how much of Canada is currently in protected areas and the proportion that Canadians feel should be protected. We then compared the results to the actual percentage of Canada's land and sea that is designated in protected areas (CARTS 2017). Results revealed considerable gaps between people's perceptions of how much of Canada is currently protected, how much should be in protected areas, and the actual percentages of protected areas in Canada. We asked the same questions about protected areas at the global scale and found similar results. *t* tests were utilized to examine the statistical significance of the gaps between the means. The results revealed that all the differences between the means of the responses were statistically significant ($p < 0.001$) with the magnitude of the gaps confirmed through calculation of effect size (see Table 5 and Fig. 1).

Table 5. *t* test results: proportion of land and sea protected perceived currently protected compared to what they think should be protected (desire).

Pair	Item	Mean difference	<i>t</i>	<i>p</i>	η^2
1	a. Perceived protected: Canada, land b. Should be protected: Canada, land	-20.339	-36.48	<0.001	0.39
2	a. Perceived protected: Canada, sea b. Should be protected: Canada, sea	-25.597	-39.43	<0.001	0.43
3	a. Perceived protected: the planet, land b. Should be protected: the planet, land	-22.942	-37.81	<0.001	0.41
4	a. Perceived protected: the planet, sea b. Should be protected: the planet, sea	-27.579	-40.27	<0.001	0.44

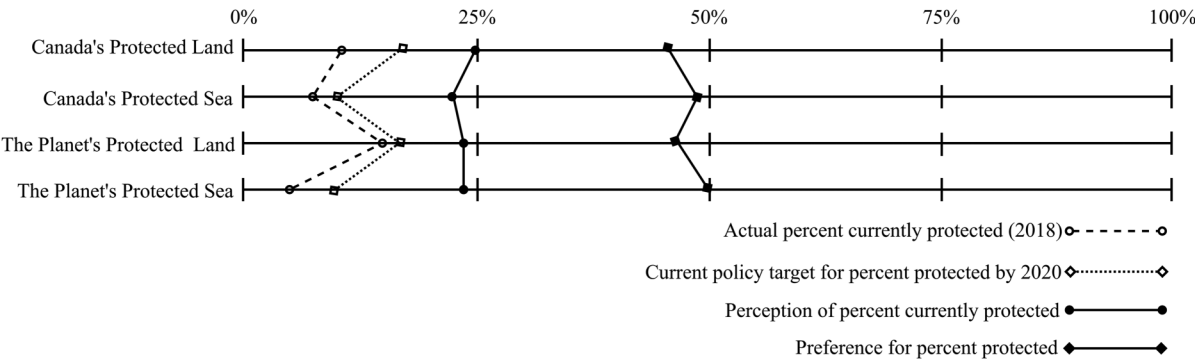


Fig. 1. The gap between the perceived protected land and sea, desired protected land and sea, and the actual proportion of protected land and sea in Canada and the world.

The effect size statistic (Eta squared) provides a better understanding of the relative magnitude of the differences. We used Cohen’s (Cohen 1992) guidelines for effect sizes for ANOVAs for comparative purposes (i.e., an η^2 of 0.1 is small, an η^2 of 0.06 is medium, and an η^2 of 0.14 is large). The gap between all four pairs was very large.

Challenges to moving beyond the Aichi 2020 targets

Finally, we asked respondents what they thought were the barriers in Canada to increasing the targets beyond the Aichi targets of 17% terrestrial and 10% marine protected area by 2020. Roughly half of respondents identified inadequate understanding of the value of these areas (54%), insufficient funding (49%), and low government priority (47%) as the key challenges to increasing the targets. Interestingly, although respondents identified insufficient funding as a key barrier, few (17%) thought that protected areas cost too much (Table 6), or thought the target should not be increased.

Discussion

This study aimed to examine Canadians’ support for protected areas. We investigated perceptions and preferences of the amount of areas protected in the country and compared the findings to actual

Table 6. Challenges to increasing protected area targets beyond the Aichi levels.

Variables	Percent
What are the biggest barriers to increasing the target further (beyond 17% terrestrial and 10% marine) for Canada?	
There is inadequate understanding of the value of protected areas	54
There is insufficient funding available for protected areas	49
Protected areas are a low government priority	47
There is a lack of public support for protected areas	41
There is too much competition for space (e.g., with urban development or food production)	40
Protected areas cost too much	17
Don't have an opinion	12
I don't think this target should be increased	2

Note: Respondents could select all options that applied.

percentage of protected area and to current policy-driven targets for protection. Support for protected areas was very strong (93%) consistent with a number of national polls on protected areas and green space more generally in Canada (Baker and Jedwab 2003; Environics Institute 2012; Husqvarna Group 2013; Probe Research Inc. 2015; Earncliffe Strategy Group 2017). In our study, support for protected areas was consistently strong across gender, age, education, income, and region, demonstrating the overwhelming support that exists for protected areas among Canadians. These findings indicate that there is no need for policy-makers to target only certain groups of people in Canada for obtaining support for the protection of natural resources. Moreover, it reveals that current policies and public awareness campaigns have been effective in targeting diverse sections of the population.

Although some studies have found a correlation between support for, and levels of use of, Canadian national parks (Parks Canada 2011), our study reinforced the findings of other recent surveys (e.g., Earncliffe Strategy Group 2017), which found no correlation between support for protected areas and how often people visit these areas. In other words, our study reinforced that Canadians support protected areas regardless of whether or how frequently they visit them. This is an important finding given the high levels of investment by parks agencies to encourage Canadians to visit parks with the rationale that this will increase levels of public support for these parks. Moreover, this finding indicates that current efforts not only have been successful in targeting park users but have also effectively attracted the attention of less frequent users of parks and protected areas. This is a great achievement in increasing public awareness. Further investigation, however, is needed to understand the discrepancies in these findings.

Respondents' perceptions of the amount of land and sea currently protected both in Canada and globally were widely over-estimated. These over-estimations are not surprising, but are challenging. Public perceptions of conservation and other resource activities are likely a mix of various factors including demographics, proximity to the activity, and worldviews, amongst others (Boudet et al. 2014). In addition to personal demographic differences, the overestimates of conservation protection by respondents may, in part, be associated with the prominence of protected areas, particularly iconic ones like Banff National Park and Algonquin Provincial Park, in the Canadian psyche (Baker and Jedwab 2003). Additionally, public perception that Canada is relatively ecologically intact and misunderstandings of the nature of the term protected area may contribute to over-estimations. Moreover, the proportion of protected land in Canada is not significantly high, despite being the second largest country on earth with an area of 9.985 million km². This causes a bias in Canadian's understanding of the proportion of the land and sea that is already protected. This overestimation, while consistent with the global ZSL study (Kumpel 2014), presents a challenge in the formulation of education and communications strategies for organizations responsible for meeting protected areas targets (Pidgeon and Fischhoff 2011; de Bruin and Bostrom 2013). Convincing the public of the urgency of the response needed will be difficult with this level of misperception.

Consistent with the finding of widespread agreement that protected areas are necessary, previous research also demonstrated public support for the creation of new protected areas. For example, in-house research conducted by Parks Canada found that more than half of national park users (56%) and 30% of national park non-users supported the creation of new national parks (Parks Canada 2011). More recently, a national conservation study found that the majority of respondents felt that Canada's performance in protected area designation is inadequate, and that Canada is not a world leader in this regard and should do more (Earncliffe Strategy Group 2017). Possible actions include more public reporting, not just on the designation of new protected areas, but also on truthful reporting of Canada's performance to date (ranked 129th globally⁵), particularly in comparison with global progress, and on the gaps that remain.

⁵data.worldbank.org/indicator/ER.LND.PTLD.ZS?locations=CA&year_high_desc=true.

Canadians' preferences for the amount that should be protected was consistent with the ZSL global survey, which found preferences ranging from 40% (Australia, UK, India, and China) to 70% (Brazil) for terrestrial protected areas, with similar results for marine protected areas. These results were also consistent with two Canadian regional studies (IISD 2015; Probe Research Inc. 2015). These public calls for a significant increase in space protected for nature is consistent with the growing scientific evidence of the need to scale up conservation efforts to effectively reverse the dramatic and ongoing decline of biodiversity. Additionally, a recent global survey of 363 conservation scientists conducted in 81 countries reported that over 70% found the existing Aichi targets too low and expressed strong support of significantly larger-scale conservation targets (Bhola et al. 2018). These findings indicate that public support, as one of the first steps in the expansion of protected areas, has already been obtained. The next steps fall to the political and bureaucratic realms to advance protected area strategies and proposals.

Major barriers to protected area expansion, such as low government priority and funding, recognized in our study and previous studies (Earncliffe Strategy Group 2017) are currently receiving national political attention and funding (Canadian Press 2018; National Advisory Panel 2018) associated with the Aichi targets of protecting at least 17% of terrestrial and 10% of marine areas; it remains to be seen whether there is political will at all levels of government and sufficient support to achieve these interim targets. Policy discussions regarding moving beyond the Aichi targets to the more ambitious targets desired by Canadians, and supported by scientific evidence, are just beginning to move beyond the non-governmental sector and into the policy realm. In 2017, a report to the House of Commons by the Standing Committee on Environment and Sustainable Development made a unanimous recommendation to set even more ambitious targets for protected areas than those established under Aichi. Likewise the IUCN World Commission on Protected Areas established a "Beyond the Aichi Targets Task Force" to assist signatories to the CBD in considering conservation goals to considerably scale up conservation.⁶ At the subnational level conversations about moving beyond (and in some cases even meeting) the Aichi targets are in their infancy. This study suggests strong public support for engaging in these conversations now.

Another issue raised in this study was the difference between people's perceptions of what proportion of land versus sea should be protected. In stark contrast with reality, the results showed that people perceive that the same percentage of sea and land is currently designated as protected area. However, when asked about their preferred percentage of protected land versus sea, preferences for amount of sea to be protected were higher, both in Canada and globally. Numerous studies (Tibbetts 2005; Mora and Sale 2011; Galland et al. 2012) reported the undervaluing to society of the oceans and, thus, we found the results of our study surprising. This suggests a strong appetite for marine conservation in Canada that may be, in part, be the result of recent media coverage of marine issues like marine mammal declines and the discovery of unique marine features such as glass sponge reefs. Alternatively, however, preferences for increased levels of marine conservation may result from misperceptions that there are fewer conflicts with other resource users than in the oceans and, thus, marine conservation may be perceived as "easier". Some recent policy responses such as new regulations and increased funding to protect whales⁷ and the broader government initiative associated with the Oceans Protection Plan⁸ are consistent with this marine conservation appetite. However, recent marine protected area proposals and designations that do not prohibit resource use such as oil and gas development are inconsistent with public perspectives, and likely will contribute to

⁶iucn.org/theme/protected-areas/wcpa/what-we-do/beyond-aichi-targets.

⁷Whales initiative: protecting the southern resident killer whale (Government of Canada 2018a).

⁸Ocean Protection Plan (Government of Canada 2018b).

misunderstandings and lack of trust in Canada's marine conservation performance (Robb et al. 2011; Matveev 2018).

Our study identified that Canadians perceive a lack of understanding about the value of protected areas as the leading barrier to increasing the current targets of 17% and 10% protection. We wonder whether respondents' lower rankings of ecosystem services provided by protected areas such as climate change mitigation, clean water, and flood/drought disaster mitigation may be indicative of a lack of understanding or awareness of benefits provided by protected areas. Some research (Kniivilä 2006) suggests that strong support by non-users is attributed to non-use values (e.g., ecosystem services and biodiversity conservation). Although we did not test this idea we note that the primary reasons respondents supported protected areas were to protect wildlife and for natural and scenic environments.

Limitations

The core questions in the study focused on the value of protected areas to respondents and the proportion that they perceived was already protected and desired to be protected. To help aid understanding we provided a definition of protected areas illustrated by Canadian examples at the beginning of the survey and available as a floating definition throughout the survey wherever the term was used. However, we recognize that understanding what is, and what isn't a protected area is still a difficult concept and recognize that this may have affected responses. Considering the congruence of the responses to the primary questions (importance of protected areas) with numerous other studies, in particular a recent study by Earncliffe Strategy Group (2017) that specifically identified protected areas as areas in which resource extraction were excluded, we think any misinterpretation is likely to be small. Future research could investigate this understanding in more detail. In addition, although summary data for the global application of the ZSL survey (Kumpel 2014) was available to us and informed the discussion, we did not have access to the original data from that study and, thus, more complex comparisons were not possible.

It is also important to note that the Space for Nature survey did not present support for, or targets for, protected areas within the context of understanding potential costs, in all senses of the term, of protecting significantly large portions of terrestrial and marine areas (Mora and Sale 2011). Further research that investigates the potential tradeoffs between conservation and use for other (e.g., resource extraction) purposes along with the costs associated with the loss of ecosystem services, biodiversity and other ecological co-benefits would help inform these discussions.

As with all studies, although the sample size was sufficiently large and provided a high power of analysis, it does not reflect the Canadian population perfectly. As noted in the methods, the Ipsos panel does not include territorial respondents.⁹ Additionally, although our study reflected the recent census (Statistics Canada 2016) for gender, age and region it did not do so perfectly for other characteristics such as income and education (Table 1).

Finally, we chose to apply the ZSL Space for Nature survey originally developed in 2014 with only limited changes to make it consistent with Canadian terminology (e.g., provincial/territorial protected areas). As a result, there were some potential questions that were not included or were asked in ways that prevented us from more complex analytical procedures such as structural equation modeling examining intrapersonal constraints, interpersonal constraints, and structural constraints as they

⁹Given the regional sampling limitations we conducted a parallel separate sample (an oversample) of territorial residents using a different polling panel; however, differences in methodology meant that we did not include them in this analysis.

relate to the importance and amount of areas to be protected. This study can serve as a benchmark of these issues over time and questions could be revised or supplemented in future surveys.

Conclusions

Protected areas are important to Canadians and their support for these areas is consistently strong across demographic and geographic variables. This study also demonstrates that Canadians feel that about half of land and seascapes should be protected. Although previous research has demonstrated support for significantly increasing the extent of protected areas in some regions of Canada, this study confirms the pan-Canadian support that exists for much more expansive protection of land and sea in Canada and globally.

As the 2020 “deadline” for countries to meet the current policy-based targets of protecting at least 17% of land and 10% of the ocean approaches, discussions are beginning in Canada and internationally about what targets should be set beyond 2020 to reverse the decline of biodiversity. There is growing interest in identifying measurable targets that will motivate action and be grounded in scientific evidence of what’s needed to reverse the decline of biodiversity.

Our findings suggest that Canadians, like their global counterparts from previous applications of the survey, support a significant increase in the amount of land and sea protected both in Canada and globally that is consistent with the dialogue around “nature needs half” and “half earth”. This suggests that public perception is in line with the growing scientific evidence that scaled up protected area targets are necessary to protect biological diversity, and ecosystem services that humanity relies on.

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Author contributions

PAW and AW conceived and designed the study. PAW performed the experiments/collected the data. PAW and FM analyzed and interpreted the data. AW contributed resources. PAW, FM, and AW drafted or revised the manuscript.

Competing interests

The authors have declared that no competing interests exist.

Data availability statement

All relevant data are within the paper.

References

- Agardy T, Claudet J, and Day JC. 2016. “Dangerous Targets” revisited: old dangers in new contexts plague marine protected areas. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 26: 7–23. DOI: [10.1002/aqc.2675](https://doi.org/10.1002/aqc.2675)
- Baker C, and Jedwab J. 2003. Patriotism and Canadian identity [Press Release]. Environics Research Group and Association for Canadian Studies, Toronto, Ontario [online]: Available from acs-aec.ca/pdf/polls/Poll40.pdf.

Bhola N, Woodley S, and Locke H. 2018. Global survey: area-based conservation post-2020. Paper Presented to the 5th International Marine Conservation Congress, Kuching, Sarawak, Malaysia, 24–29 June.

Boudet H, Clarke C, Bugden D, Maibach E, Roser-Renouf C, and Leiserowitz A. 2014. “Fracking” controversy and communication: using national survey data to understand public perceptions of hydraulic fracturing. *Energy Policy*, 65: 57–67. DOI: [10.1016/j.enpol.2013.10.017](https://doi.org/10.1016/j.enpol.2013.10.017)

Canadian Press. 2018. Canada Budget 2018 boosts conservation funding. HuffPost, 27 February [online]: Available from huffingtonpost.ca/2018/02/27/canada-budget-2018-conservation-funding_a_23372642/.

CARTS. 2017. Report of protected areas in Canada [online]: Available from ceea.org/carts-reports/.

Ceballos G, Ehrlich PR, Barnosky AD, García A, Pringle RM, and Palmer TM. 2015. Accelerated modern human-induced species losses: entering the sixth mass extinction. *Science Advances*, 1(5): e1400253. PMID: [26601195](https://pubmed.ncbi.nlm.nih.gov/26601195/) DOI: [10.1126/sciadv.1400253](https://doi.org/10.1126/sciadv.1400253)

Cohen J. 1992. A power primer. *Psychological Bulletin*, 112: 155. PMID: [19565683](https://pubmed.ncbi.nlm.nih.gov/19565683/) DOI: [10.1037/0033-2909.112.1.155](https://doi.org/10.1037/0033-2909.112.1.155)

Convention on Biological Diversity (CBD). 1992. Convention on biological diversity. CBD, Montréal, Québec [online]: Available from cbd.int/doc/legal/cbd-en.pdf.

de Bruin WB, and Bostrom A. 2013. Assessing what to address in science communication. *Proceedings of the National Academy of Sciences*, 110: 14062–14068. PMID: [23942122](https://pubmed.ncbi.nlm.nih.gov/23942122/) DOI: [10.1073/pnas.1212729110](https://doi.org/10.1073/pnas.1212729110)

Dudley N (ed.). 2008. Guidelines for applying protected area management categories. IUCN, Gland, Switzerland.

Earnscliffe Strategy Group. 2017. National conservation survey. Earnscliffe Strategy Group, Vancouver, British Columbia [online]: Available from earnscliffe.ca/wp-content/uploads/2017/11/National-Conservation-Survey.pdf.

EKOS Research Associates Inc. 2015. Priorities for land use and development in the Northwest Territories [Press Release]. Ducks Unlimited, Ottawa, Ontario [online]: Available from ducks.ca/assets/2015/11/F1.02x_FINALNWTPUBLICOPINIONBRIEF-PRIORITIESFORDEVELOPMENT.docx1_.docx.pdf.

Environics Institute. 2009. 2009 National Survey of Canadians. Prepared for Parks Canada.

Environics Institute. 2012. Focus Canada 2012 [online]: Available from environicsinstitute.org/projects/project-details/focus-canada-2012.

Environment and Climate Change Canada. 2016. 2020 biodiversity goals and targets for Canada. Environment and Climate Change Canada, Ottawa, Ontario.

Galland G, Harrould-Kolieb E, and Herr D. 2012. The ocean and climate change policy. *Climate Policy*, 12: 764–771. DOI: [10.1080/14693062.2012.692207](https://doi.org/10.1080/14693062.2012.692207)

Government of Canada. 2018a. Whales initiative: protecting the southern resident killer whale [online]: Available from tc.gc.ca/en/campaigns/whales-initiative-protecting-southern-resident-killer-whale.html.

Government of Canada. 2018b. The Oceans Protection Plan [online]: Available from canada.ca/en/transport-canada/news/2017/10/the_oceans_protectionplan.html.

Hart Research Associates and North Star Opinion Research. 2012. Strong bipartisan support for national parks [Press Release]. Findings from a National Survey Conducted on Behalf of the National Parks Conservation Association and National Park Hospitality Association [online]: Available from npca.org/resources/2566-poll-strong-bipartisan-support-for-national-parks.

Husqvarna Group. 2013. Global green space report Canada [online]: Available from greenspacereport.com/.

IISD. 2015. NWT residents link conservation to prosperity before heading to the polls [Press Release]. Ducks Unlimited Canada, Winnipeg, Manitoba [online]: Available from ducks.ca/stories/policy/nwt-residents-link-conservation-to-prosperity/.

Ipsos Reid. 2011. Nine in ten Canadians say that when connected to nature they feel happier [Press release]. Ipsos Reid, Toronto, Ontario.

Jessen S. 2016. Dare to be deep: SeaStates report on North America's marine protected areas (MPAs). Canadian Parks and Wilderness Society, Ottawa, Ontario.

Kniivilä M. 2006. Users and non-users of conservation areas: are there differences in WTP, motives and the validity of responses in CVM surveys? *Ecological Economics*, 59: 530–539. doi [10.1016/j.ecolecon.2005.11.017](https://doi.org/10.1016/j.ecolecon.2005.11.017)

Kumpel N. 2014. Global public opinion survey on space for nature. *In* Paper Presented to the IUCN World Parks Congress, Sydney, Australia, 12–19 November 2014.

Locke H. 2014. Nature needs half: a necessary and hopeful new agenda for protected areas in North America and around the world. *The George Wright Forum*, 31(3): 359–371.

Margules CR, Nicholls AO, and Usher MB. 1994. Apparent species turnover, probability of extinction and the selection of nature reserves: a case study of the Ingleborough limestone pavements. *Conservation Biology*, 8: 398–409. DOI: [10.1046/j.1523-1739.1994.08020398.x](https://doi.org/10.1046/j.1523-1739.1994.08020398.x)

Matveev E. 2018. “Perfectly reasonable” to drill for oil in area closed to fishery, Liberal MP says. CBC News, 1 May [online]: Available from cbc.ca/news/canada/newfoundland-labrador/nick-whalen-protected-areas-1.4641252.

Mora C, and Sale PF. 2011. Ongoing global biodiversity loss and the need to move beyond protected areas: a review of the technical and practical shortcomings of protected areas on land and sea. *Marine Ecology Progress Series*, 434: 251–266. DOI: [10.3354/meps09214](https://doi.org/10.3354/meps09214)

National Advisory Panel. 2018. Canada's conservation vision: a report of the National Advisory Panel. Pathway to Canada Target 1 [online]: Available from conservation2020canada.ca/home/.

Noss RF, Dobson AP, Baldwin R, Beier P, Davis CR, Dellasala DA, et al. 2012. Bolder thinking for conservation. *Conservation Biology*, 26: 1–4. PMID: [22280321](https://pubmed.ncbi.nlm.nih.gov/22280321/) DOI: [10.1111/j.1523-1739.2011.01738.x](https://doi.org/10.1111/j.1523-1739.2011.01738.x)

Parks Canada. 2011. The VALUE of visiting national parks. Social Science Branch: External Relations and Visitor Experience, April.

Pidgeon N, and Fischhoff B. 2011. The role of social and decision sciences in communicating uncertain climate risks. *Nature Climate Change*, 1: 35–41. DOI: [10.1038/NCLIMATE1080](https://doi.org/10.1038/NCLIMATE1080)

Probe Research Inc. 2015. Manitobans' views regarding boreal forest conservation. IISD, Winnipeg, Manitoba.

Robb CK, Bodtke KM, Wright K, and Lash J. 2011. Commercial fisheries closures in marine protected areas on Canada's Pacific coast: the exception, not the rule. *Marine Policy*, 35: 309–316. DOI: [10.1016/j.marpol.2010.10.010](https://doi.org/10.1016/j.marpol.2010.10.010)

Statistics Canada. 2016. Census Profile, 2016 Census. Statistics Canada, Ottawa, Ontario.

Swancara LK, Ree BJ, Scott M, Groves CR, Noss RF, and Pressey RL. 2005. Policy-driven versus evidence-based conservation: a review of political targets and biological needs. *BioScience*, 55: 989–995. DOI: [10.1641/0006-3568\(2005\)055\[0989:PVECAR\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2005)055[0989:PVECAR]2.0.CO;2)

Tibbetts J. 2005. America's oceans: a blueprint for the future. *Environmental Health Perspectives*, 113: A106–A109. PMID: [15687036](https://pubmed.ncbi.nlm.nih.gov/15687036/) DOI: [10.1289/ehp.113-a106](https://doi.org/10.1289/ehp.113-a106)

WCED. 1987. Report of the World Commission on Environment and Development: our common future. UN Documents Gathering a Body of Global Agreements.

Wiersma YF, and Sleep DJ. 2018. The effect of target setting on conservation in Canada's boreal: what is the right amount of area to protect? *Biodiversity and Conservation*, 27: 733–748. DOI: [10.1007/s10531-017-1461-2](https://doi.org/10.1007/s10531-017-1461-2)

Wilson EO. 2016. Half-earth: our planet's fight for life. WW Norton & Company, New York, New York.

Wright RG, Scott JM, Mann S, and Murray M. 2001. Identifying unprotected and potentially at risk plant communities in the western USA. *Biological Conservation*, 98: 97–106. DOI: [10.1016/S0006-3207\(00\)00146-4](https://doi.org/10.1016/S0006-3207(00)00146-4)