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# Economic and social benefits of hunting in North America

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Hunting is an integral part of North American cultures, providing a powerful connection to the outdoors for millions of people and generating billions of dollars to local and national economies. Socially, hunting has been part of hominid cultures since very early in the fossil record; a tradition that contemporary North American hunters tend to pass down to subsequent generations through family and community networks. The 13.7 million American hunters and 2.1 million Canadian nature-recreationists spend more than \$38.3 billion and \$1.8 billion, respectively, on non-commercial hunting-related expenses each year. Hunting activities also yield hundreds of thousands of jobs and billions of dollars in tax and other revenues in both countries. The contributions of hunters serve as the fundamental foundation for a social and economic support system for conserving wildlife and habitats for future generations.

*Keywords:* Economics; Hunting; North America; Social values

## Introduction

Wildlife has enormous practical and social significance for North American culture, a significance intertwined with economics throughout history. Our view of wildlife today is deeply influenced by past relationships dating back to early hunters that first occupied the continent [1] and hunted for subsistence, and to participate in social rituals of sharing, gifting, and trade. Despite more than 13,000 years of exploitation by human beings, populations of most game animals are robust across the North American continent. This has not occurred by accident.

Conservation of game is suspected to date back to prehistoric people [2]. Indigenous North American practices of wildlife and landscape management were unfamiliar to colonizing Europeans, however. Relationships between indigenous people and Europeans were initially driven by the socioeconomics of trade, particularly the exchange of European goods for furs and other wildlife products. Coupled with the seemingly endless abundance of wildlife products in America and the near boundless appetite for these in Europe, revenue potential from the export of wildlife goods to Europe resulted in a well-documented [3] era of overexploitation in the mid-1800s that followed through the early 1900s. The permanent loss and/or vast depletion of resources as a result of this exploitation eventually led to public outrage and produced the fundamental underpinnings of modern day wildlife

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management and conservation ethics in North America [3,4], as well as the recreational hunter-conservation movement that supports both [3].

Today, traditions of both the old and the new world are evident in social and cultural aspects of hunting in North America. Hunting provides an avenue for social interaction and maintenance of cultural traditions, while it fosters connections within families and communities. Wild game is an important source of subsistence meat, particularly for some individuals and cultures, and especially in rural areas. Indeed, the recent expanded interest in local, natural, and humanely raised meat may be resulting in a rising hunting participation among population segments not traditionally engaged in this activity. Hunting participation in the US rose 9% between 2006 and 2011.

Recent quantification of expenditures by North American hunters has revealed enormous financial contributions to local and national economies. Hunters provide financial support to create thousands of jobs directly involved in the manufacture, sale, or provision of hunting and outdoor products and services. Additionally, expenses connected with hunting related travel support hundreds of thousands of jobs at local stores, restaurants, hotels, and manufacturers, as well as a host of other businesses. This information is fundamental in discussions concerning wildlife policy where participants must consider budgets and conservation actions in relation to the overall economy in Canada, the US, and other countries.

In addition to direct spending and job creation, hunting has further economic value in North American society. Revenues generated through excise taxes placed on hunting equipment, and through license fees, support wildlife and wilderness conservation, and sustainable wildlife management. Additionally, hunters and hunting-related conservation organizations contribute private financial resources for wildlife habitat protection and restoration, and for wildlife population management and research.

Here, we synthesize social aspects and statistics on economic impacts from hunting in Canada and the US. We have used the most recent reports available on publicly accessible websites in both countries, and also from the published literature. We consider statistics related to direct expenditures, wages and salaries from jobs created by hunting-related activities, and related tax revenue. This review and synthesis of data is not meant to be inclusive of all states, provinces, or reports generated over time, but rather to demonstrate the most recent empirical evidence of the scale of economic impacts and importance of hunting to the economies of the US and Canada. We also demonstrate the importance of revenue generated by hunting license sales, taxes, and other revenues to wildlife conservation in both countries.

### **Social aspects of hunting**

In addition to utilitarian facets, human–wildlife relationships have social, cultural, and symbolic substance [5]. Archaeological evidence of the first appearance of stone tools suggests human beings and their precursors have been hunters and gatherers, in some sense, for about 2.5 million years; thus, hunting has been a part of hominid societies for the longest portion of our evolutionary history [6]. Because hunting and gathering subsistence, even in agrarian cultures, has characterized human beings as we evolved, and because this form of subsistence has been practiced for so long [6], it seems obvious that hunting was an integral part of cultures and societies through evolutionary time. For some ancient cultures, hunting was considered divine in origin, was widely used as an educational tool,

and also frequently served as a way for men to achieve prominence and promotion [7]. Indeed, a high measure of hunting performance was perhaps once the most important route to achieving high prestige or social status among men in hunter-gatherer societies [8].

Researchers have examined various ancient cultures to evaluate social aspects of hunter-gatherer societies that could offer insights into contemporary hunting and societal views. Ancient Hellenic culture (Greek culture from the 8th century BC to approximately 600 AD) [7] provides an intriguing case study. This culture supplies one of the first examples of hunting transitioning from a subsistence activity to a primarily symbolic one. As such, it offers many parallels to modern hunting, and potential insights into the role of hunting in modern society [7]. Hellenic religion, myth, philosophy, and art became key tools for understanding the social implications of hunting in this culture, as well as for comprehending important parallels between the hunting practices of this ancient culture and “modern” ideas of fair chase, equitable hunting opportunities, and inclusion of females among hunters [7]. Hunting offered Hellas an opportunity to acquire edification, including the development of an ethic for hunting, the testing of skills, and the enjoyment of a feeling of freedom [7], social aspects that remain important parts of hunting today. Classical mythology that portrays deities punishing hunters who sought sacred animals, killed too many animals, or hunted in sacred places [9] is reflected in modern-day North American analogs of threatened and endangered species, and federal and state agencies regulating and enforcing wildlife harvests through bag limits, and rules that exclude hunting in certain places, like most national parks.

The most important roles for hunting in Hellenic culture were more symbolic (e.g. helping shape hunter identity and strengthening ties between society and nature) than practical (e.g. the provision of meat). Such characteristics as equitable access to hunting opportunities differentiated the Hellenes from other ancient people (e.g. Persian, Egyptian) who allocated hunting rights to wealthy and noble persons [7]. Greeks appeared to practice an early form of the democratic North American hunting typology, as opposed to hunting systems common historically in parts of Europe where hunting was the privilege of elites.

The symbolic dimensions of hunting described by ancient Greek culture remain relevant today. Modern hunters speak more often to the hunting experience - their connection with nature, the physical and mental challenges of hunting, and the connection with family and friends - than to the act of taking game. Hunting provides a powerful connection to the outdoors, and does so in unique ways not available in other outdoor activities. Hunting requires individuals to become intimately knowledgeable of the landscapes, habitats, and species they hunt; hunters must also gain an understanding of how these agencies interact with each other. With regard to landscapes, the detailed local ecological knowledge of hunters, particularly those inheriting cross-generational narratives, can be so profound that wildlife managers and wildlife policy makers often seek their advice on how to manage local systems. Aboriginal traditional knowledge (ATK) of wild game, habitat, and landscape-level ecological processes held by indigenous cultures with strong oral traditions can extend back many generations, and is considered sufficiently valid that Species At Risk legislation in Canada requires consideration of available ATK in species status assessments [10].

Hunters seek and enjoy social relationships and interactions inherent to the activity of hunting, connecting with one another at profound levels and carrying on traditions in social and cultural relationships with family, friends and community. Hunting traditions are often passed down within families; older generations deliberately teach skills to younger generations preparing them for either subsistence and/or recreational hunting purposes. In

addition, individuals often seek out friendships with other hunters; thus, hunting promotes social cohesion within families and across extended social networks and generations.

Modern-day hunters frequently volunteer for participation in wildlife habitat improvement projects, hunter education programs, or wildlife surveys, and engage in other conservation related activities [11]. These not only provide positive social interactions among participants, but also opportunities to connect with professional wildlife managers. Such interactions undoubtedly strengthen hunter conservation knowledge, ethics, and motivations. Such interactions greatly expand the model of knowledge transfer to children and grandchildren, widening it to include a sphere of more distant associates, thus socially expanding the 'hunting community'.

Hunting traditions are not invariable over time, but change as do wider cultural values and social attitudes. In addition to the expanded concept of community, the growing number of women in sport hunting reflects changing social values around gender roles, as well as shifting perspectives in North America on hunting, itself. In recent years, consumer interest in local, natural, and organic food, as well as humanely raised meat, has greatly increased in North America. Anecdotal reports suggest this is bringing new social segments to the hunting world; in particular, urban residents, animal welfare advocates, chefs, and other diverse public sectors for whom healthy food, and how we provide it, are personal priorities.

The desire for wild meat drives the quest of most modern hunters, as well. While for some individuals and hunting cultures this reflects a preference for healthier meat, for others, wild meat remains essential to their very subsistence. Furthermore, public support for hunting as a socio-cultural and recreational activity is critically important if it is to be sustained in the future [12,13], and public attitude surveys in North America consistently indicate that hunting for meat is considered by a vast majority of the public to be the most acceptable rationale for modern hunting. In Sweden, researchers also found that game meat consumption helps explain why hunting is so well accepted in that country [13]. The researchers noted that game-meat consumption, itself, encompasses a wide social network. Despite the commercial availability of wild game in Sweden, most non-hunting households acquire game meat from close friends who hunt. They concluded that social networks might play an important role in attitudes toward hunting because it is through social networks that game meat is made available for consumption to non-hunters [13].

In North America the commercial sale of wild meat is largely prohibited, and thus wild meat is largely unavailable to non-hunters except through gifting from hunters. Thus social networks in North America may be even more important for accessing wild meat and establishing support for hunters from the non-hunting public. Consumption and sharing of wild meat thus appear to be potentially important factors for retaining positive, or at least neutral, attitudes toward hunting [13]. While the economic value of this informal food distribution in North America is not well documented, it is substantial in some regions and cultures.

### **Economic aspects of hunting**

Information regarding economic contributions associated with wildlife recreation-based activities has played an increasingly important role in wildlife management in North America. Economic contributions have traditionally been used to demonstrate the importance of specific wildlife-based activities and these, in turn, have been used to structure

wildlife agency operating and programme budgets [14]. In the past few decades, wildlife managers and scientists have teamed with diverse disciplines, such as human dimensions and economics, to develop a more holistic and comprehensive view of hunting and its contributions to society. Hunters have long known that their efforts to conserve wildlife, including the money they spend to buy hunting licenses and equipment, are reflected in the health of wildlife today, and have helped preserve the conservation principles underpinning the North American approach to wildlife recovery and management. The most recent evaluations of hunting's economic contributions have helped support this view.

### *Economic studies*

We synthesized information provided from several Canadian provincial studies over the past decade on the economic impacts of hunting that were previously summarized in 2012 by the Canadian Tourism Commission [15]. We also gathered information from the most recently available provincial reports, those presented in the summary by the Canadian Tourism Commission, and a recent Canadian Nature Survey [16] that provides additional information on economic revenues from hunting.

For the US, we primarily used data from the 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation [17]. This survey is conducted approximately every five years by the US Fish and Wildlife Service (USFWS) and US Bureau of the Census, and provides data required by natural resource management agencies, industry, and private organizations at the local, state, and national levels to assist in optimally managing natural resources. The survey collects data on trip-related expenditures (e.g. food, lodging, fuel) made by participants where the primary purpose of each purchase was for fishing, hunting, and/or wildlife viewing. The survey also generates data on equipment expenditures (e.g. firearms, ammunition) made specifically for one activity, and those equipment expenditures made by sportsmen that can be used for both hunting and fishing (e.g. boats, camping equipment).

Specific methods used to generate economic statistics can be found in the full reports we cite in this manuscript. These reports usually generate economic impact estimates by (1) tabulating the expenditures made by recreationists; and (2) estimating the direct, indirect and induced effects of consumer spending. For the US survey data, an input-output model of the US economy and IMPLAN economic modelling software (IMPLAN Group LLC, [www.implan.com](http://www.implan.com)) [18] was used.

### *Participation and economic impact of hunting in Canada*

Past studies in Canada found that Canadians and US tourists spent a total of \$11.7 billion on nature-related activities in Canada in 1996, and that over \$800 million was spent on hunting-related activities, specifically [15,19]. In 2012, the Canadian Tourism Commission released a report summarizing available economic data on the impact of hunting and fishing for several provinces [15], but did not provide a comprehensive analysis of the provincial data, and no recent detailed national breakdown assessment exists. More recently, a repeat of the 1996 Nature Survey in Canada revealed that 2.1 million Canadians spent \$14.5 billion in 2012 on nature-related activities, of which \$1.8 billion was generated from non-commercial hunting and trapping; most of this was spent on transportation (\$666 million) and equipment, fees and supplies (\$753 million) [16].

Hunting large game animals accounted for approximately \$1 billion of the total expenditures for all hunting and trapping activities in Canada, followed by hunting for waterfowl (\$327 million), game birds (\$312 million), and small game (\$114 million) [16]. Considering all hunting activities combined, Canadians incurred annual expenditures averaging \$996/person [16]. For those pursuing large animals, average annual expenditures were \$814 as compared to \$244 for those pursuing small game. Daily expenditures by hunters averaged \$40/day for small game, \$54/day for game birds, \$78/day for large game hunters, and \$83/day for waterfowl [16].

### *Provincial statistics*

An economic study from the province of Alberta, in 2008 [20], provides one of the most recent and comprehensive efforts to evaluate hunting expenditures in a Canadian jurisdiction. Direct expenditures of resident and non-resident Canadian hunters exceeded \$113.4 million in 2008; resident Alberta hunters spent \$102.5 million of this total. Resident hunter expenditures supported a permanent increase of the Alberta Gross Provincial Income (GPI) of \$104.4 million and increased contributions to salaries and wages by \$61.4 million supporting 1054 jobs. Total direct expenditures by all hunters (resident and non-resident) in Alberta yielded a sustained GPI impact of approximately \$115 million and increased salaries and wages by \$67 million and supported 1175 jobs. In 2012, expenditures by Alberta hunters (9% of the total provincial population) for all hunting related activities rose to \$268 million. For all resident nature-related activities in Alberta, hunting generated the three highest daily expenditures, averaging \$105/day for hunting big game, \$97/day for game birds, and \$84/day for waterfowl [16].

British Columbia hunters spent an estimated \$116 million in 2003 [21]. Resident hunters spent \$70 million, and there was another \$46 million spent by non-resident hunters. Hunters contributed \$48 million to the province's GDP in 2003 – these hunters were primarily resident hunters (~\$29 million compared to \$19 million for non-residents). Based on annual averages, 960 British Columbians were employed as a result of non-resident hunting in 2003, while approximately 770 people were employed as a result of resident hunting activities. Hunting generated approximately \$30 million in salary and wages for workers in 2003; resident hunting accounted for about \$19 million of the total, while \$11 million was generated from non-resident hunters [21]. During 2012, in British Columbia, 7% of provincial residents spent \$196 million on all hunting related activities [16]. For all nature-related activities in this province, hunting for big game had the highest per person daily expenditures (\$85/day) [16].

Hunter and angler trip expenditures were merged in a 2010 assessment for the province of Manitoba, which reported that combined sportsmen expenditures for these activities were \$469.1 million in 2010 [15,22]. These expenditures generated \$312.2 million in Manitoba's GDP and provided 7499 jobs, including 6180 full-time equivalent positions, in 2010 [22]. Manitoba residents accounted for 81% of all expenditures, while US residents accounted for 12%, and the remaining 7% of expenditures were by non-resident Canadians. Hunting lodges and outfitters generated \$25.8 million in GDP and 674 jobs (543 full-time equivalents); government revenues for all levels of net subsidies and taxes were estimated at \$70.1 million [22]. Manitoba hunters (14% of the population) spent \$106 million on all hunting related activities in 2012 [16]. Similar to British Columbia,

Manitoban big game hunters had the highest per person daily expenditures (\$64/day) of all nature-related activities in this province [16].

In Ontario, in 2000, the net economic benefits associated with recreational hunting were more than \$1.5 billion in economic activity, and 20,000 jobs. Canadian hunters in Ontario generated \$1.2 billion of these expenditures and also spent approximately \$70 million for hunting licenses [15]. Additionally, federal, provincial, and municipal governments collected an additional \$140 million in taxes directly resulting from hunters' expenditures [15]. In 2012, expenditures by Ontario residents (5% of the population) for all hunting related activities were \$371 million. For all nature-related activities in Ontario, big game hunting generated the highest daily expenditures, averaging \$65/day [16].

In 2006, hunting by resident and non-resident hunters in Saskatchewan generated \$107.6 million annually in gross expenditures, \$63.4 million of which represents the marginal impact to the province's economy [23]. Based on this economic activity the hunting industry in Saskatchewan creates over 1000 jobs per year, and has an annual gross domestic product impact of \$36.5 million [23]. By 2011, hunters in Saskatchewan (18% of the provincial population) spent \$232 million for all hunting related activities, and hunting small and large game animals accounted for the two highest per person daily expenditures of all nature-related activities, amounting to \$59/day and \$79/day, respectively [16].

Other provinces in Canada also demonstrated significant annual economic contributions from hunting-related activities. Quebec hunters contribute \$332 million to that province's economy. Hunting expenditures exceeded 25% of the total nature-related expenditures in less populated provinces like the Yukon (\$10 million), Northwest Territories (\$12 million), New Brunswick (\$73 million), and Newfoundland and Labrador (\$114 million) [16].

### ***Hunting participation and economic impact in the US***

The 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation in the United States [17] reported that 13.7 million people aged 16 or older hunted that year and spent \$33.7 billion in total expenditures, which includes equipment, hunting licenses, trips, and other related expenses. This included an estimated \$10.4 billion for trip-related expenses, \$14 billion for equipment expenditures, and \$9.3 billion on other related expenses (e.g. licenses, memberships, leasing and land ownership) [17]. In addition, several billion more was spent on products used for hunting and fishing, such as vehicles, boats, binoculars, coolers, and more. Of this amount, approximately \$4.6 billion additional can be pro-rated to hunting based on survey respondents' total days spent hunting and angling, bringing the total national expenditures on hunting to \$38.3 billion. Regarding the \$33.7 billion (non-pro-rated) expenditures on hunting in the US, the top 5 states in total expenditures were Wisconsin (\$2.6 billion), Michigan (\$2.3 billion), Texas (\$1.8 billion), New York (\$1.5 billion), and Illinois (\$1.2 billion) [17].

These participation estimates do not account for expenditure by the estimated 2 million hunters under the age of 16 in the United States whose costs are incurred by a parent or guardian. Additionally, state hunting license records show that some hunters who are unable to renew their license in one year will return the next. Thus, the true number of people who hunt regularly in the United States is likely closer to 16 million (not the 13.7 million quoted above), and their total expenditures are even higher. The number of sportsmen in the US has increased recently; between 2006 and 2011, the USFWS reports that the number of hunters increased by 9%, while the population of the US increased by



only 4%. Spending on hunting-related products and services grew by more than 30% in that same time frame [18].

Money spent by US hunters in 2011 supported an estimated 680,937 jobs and \$26.4 billion in salaries and wages [17,18]. Estimated state and local taxes were \$5.4 billion, and federal taxes were \$6.4 billion for 2011. A model estimate of overall economic input from hunting expenditures, salaries, wages, and taxes was \$86.9 billion in 2011; a colossal figure even within the huge economy of the United States.

Recent studies in the US [17,18] also estimate specific contributions from deer, migratory bird, and upland game bird hunting. Deer hunting represented \$39.9 billion of the total overall economic impact, \$18.1 billion of retail sales, 12.2 billion of salaries and wages, and \$5.5 billion of the state, local, and federal taxes that were generated by hunting in 2011. Migratory bird hunting and upland game bird hunting constituted about 9% and 7% of these economic factors, respectively [18].

## Socioeconomic values of hunting

### *Conservation*

Hunters report receiving many personal, psychological, physical, nutritional, and social benefits from hunting, but the most powerful social benefit is the collective stewardship effort to purchase, preserve, and improve habitats used by all species of wildlife [11]. While some financial contributions from hunters are voluntary, most are built into a 'user-pay' system of licensing and taxes designed to aid wildlife conservation in North America [11]. In the US, firearms and ammunition manufacturers have paid a federal excise tax (11%) on their products since 1932 [24]. Those funds were held in the general US Treasury until the Federal Aid in Wildlife Restoration Act of 1937 [25] (the Pittman–Robertson Act) was established, and then enacted on 21 July 1938. In the 1970s, amendments to the Act placed a 10% tax on handguns and ammunition and an 11% tax on archery equipment [26]. This programme, which continues today, redirects these taxes to invest in wildlife populations and their habitats. The funds are distributed to the states by the Secretary of Interior to conduct approved activities such as research, monitoring, management of wildlife and habitats, and acquisition or leasing of lands for conservation. The programme pays up to 75% of project costs, while the states provide the remaining 25% from either their own funds or through partnerships [26].

This Federal Aid in Wildlife Restoration Act provides assurance of continuous earmarked funds for wildlife and habitat conservation in the US (no comparable programme exists in Canada). Since the programme began, hunters have directly contributed, through their designated taxes, over \$7.2 billion to state wildlife conservation efforts. From 2005 to 2009, taxes from the hunting industry generated an annual average of \$335,226,416 to the various states for wildlife conservation [24]. In 2009 alone, \$484,765,728 was generated from this programme [24].

The sale of hunting licenses and permits is an additional critical source of funding in support of state (and some provincial) wildlife management efforts. In 2011, hunters in the US spent \$796 million on licenses and permits that go directly to the respective state wildlife agency [16]. License and permit sales allow state and provincial fish and wildlife agencies to restore and manage wildlife and their habitats, monitor and study populations, open and maintain access to lands for public recreation, build shooting ranges, and support hunter education programs. The sale of Federal Duck Stamps in the US, for example, has

Table 1. Examples of financial contributions for wildlife conservation, research and management from seven sportsmen's-based organizations in the US and Canada.

Organization	Time frame	Financial contribution
British Columbia Conservation Foundation <sup>a</sup>	1969–2013	\$123,000,000 <sup>b</sup>
Mule Deer Foundation <sup>c</sup>	1988–2013	\$80,000,000 <sup>d</sup>
National Wild Turkey Federation <sup>c</sup>	1973–2013	\$412,000,000 <sup>d</sup>
Rocky Mt. Elk Foundation <sup>c</sup>	1984–2013	\$911,932,989 <sup>d</sup>
Ruffed Grouse Society <sup>c</sup>	1998–2013	\$10,000,000 <sup>d</sup>
Wild Sheep Foundation <sup>c</sup>	1978–2013	\$95,000,000 <sup>d</sup>
Wildlife Habitat Canada – Habitat Conservation Stamp <sup>e</sup>	1985–2013	\$50,000,000 <sup>b</sup>

<sup>a</sup>Source: [http://www.bccf.com/sites/default/files/BCCF\\_40\\_Years.pdf](http://www.bccf.com/sites/default/files/BCCF_40_Years.pdf).

<sup>b</sup>Canadian dollars.

<sup>c</sup>Source: obtained directly from each organization.

<sup>d</sup>US dollars.

<sup>e</sup>Source: <http://whc.org/about/who-we-are/>.

generated over \$800 million dollars since 1934, and 98% of those funds have gone toward acquiring and protecting more than 6 million acres of wetlands habitat as part of the National Refuge System [27].

In addition to license sales, hunters and hunting-related conservation organizations contribute financial resources for wildlife habitat and population management. In 2011 alone, hunters and their related organizations contributed \$440 million in annual donations and contributions, most of it directly to conservation efforts. Over multiple decades, sportsmen's conservation organizations have provided billions of dollars toward wildlife conservation. Between 1969 and 2013, a small sample of these organizations in Canada and the US ( $n = 7$ ) contributed nearly \$1.7 billion (Table 1) toward wildlife conservation efforts. For example, the National Wild Turkey Federation estimates that over the past 40 years its members and contributors have generated \$412 million that directly conserved more than 17 million acres of wildlife habitat. The Ruffed Grouse society has contributed an estimated \$10,000,000 to forest conservation and management over the past 15 years. Collectively, sportsmen's organizations and hunters contribute an estimated \$1.6 billion annually to conservation [17]. Hunting is without peer in relation to funding the perpetuation and conservation of wildlife and their habitats in North America.

A primary motivation for hunter contributions, both mandatory and voluntary, may be to support the sustainability of hunting itself through formal management of game populations and the protection of habitat for game species. The cumulative conservation efforts funded by hunting-related revenues and donations, however, extends much wider benefits than simply the perpetuation of hunting. All citizens enjoy wildlife, after all, and benefit from its conservation and protection. Furthermore not only (the relatively few) hunted wildlife species benefit from the habitat protection and other conservation initiatives supported by hunters' expenditures; so does all of biodiversity. At the same time, contributions to conservation efforts reduce the overall taxpayer burden for air and water quality since conservation protects ecosystem services and maintains healthy ecosystems [28].

### **Rural sustainability**

In many rural North American communities, revenues derived from hunting expenditures during specific seasons are critical to maintain many small businesses, helping them offset

periods when other sources of income are often very limited. Local shops, outfitters, hotels, convenience stores, restaurants, and even landowners who lease their land for hunting, all benefit from hunters' activities and expenses. Of the \$38.2 billion spent by US hunters in 2011, over \$10 billion was spent on travel-related items and services that are typically sourced in rural areas [17].

Not all jobs supported by the hunter-recreation based economy are restricted to the service industries. Additional jobs are supported in the manufacturing and retail of products such as firearms, bows, ammunition, hunting calls and clothing, tree stands, wildlife seed, all-terrain vehicles, and more; such businesses are located in both rural and urban areas. Sportsmen support wildlife agency staff positions through the purchase of hunting licenses and funds collected as excise taxes under the long-running Federal Aid in Wildlife Restoration Act. In 2012, hunters spent over \$806 million for hunting licenses and permits, while in FY2013, over \$812 million in Wildlife Restoration excise tax receipts were received by the Federal government for distribution largely back to state wildlife agencies' conservation efforts [29,30].

## Conclusions

Without hunting, contemporary wildlife management in North America would be severely weakened, in terms of economic and social support [31]. Much evidence indicates that hunters have consistently supported wildlife conservation, and also provided a majority of the funding for wildlife management, through their general taxes, of course, but more directly (and additionally) through their specific taxes, license fees, and funding organizations that support hunting and other wildlife related recreation. As a result, any decline in hunting and hunter participation will be detrimental to wildlife, and ultimately, biodiversity in North America [11,32]. Economic analyses presented here also demonstrate that any declines in hunting will have substantial impacts on the economies of Canada and the US, especially in rural communities. The economic data compiled from reports in Canada and the US are conditioned on the assumptions and limitations of both methods to gather information, and the economic models used to generate overall impact. Nevertheless, even if we assume the calculations are off by 50%, the numbers are still substantial and critical to economies and wildlife conservation. It is critical to note that no alternative-funding model to replace either the economic stimulus of hunting, or its conservation contributions, has been presented in North America to date.

Decision-makers and politicians do not always respond well to concerns about development related impacts to a local deer herd, or declining hunting opportunity for game birds due to changing agricultural policies and practices. They do pay close attention to economic factors, especially those influencing their direct constituents. To that end, economic data presented here and in the reports we synthesize offer a powerful tool to influence policy and decision-making to ensure conservation of wildlife, citizen access and recreational opportunity, and a balanced approach to multiple resource use values in North America. When combined with all recreational activities, of which hunting is a key part, the outdoor recreation-based economy in 2006, in the US alone, generated nearly \$650 billion in spending, resulted in 6.1 million jobs, and generated \$79.6 billion in tax revenues [33]. Canadians spent an estimated \$41.3 billion in nature-related activities, with an additional \$874 million contributed by Canadian individuals for donations or memberships to nature or conservation groups, in 2012 alone [16]. Such economic numbers cannot be ignored by

decision makers. Nor can it be denied that all such expenditures ultimately rely upon healthy ecosystems, and abundant, accessible wildlife. For several generations, in North America, hunter contributions have been directed specifically towards preserving both.

Hunters share ethical space with most, if not all, non-consuming users (e.g. animal-rights advocates, environmentalists) in that all have a deep appreciation for nature, wild things, and wild places that is grounded in personal experience [31]. We strongly encourage hunters and wildlife professionals to use that shared ethical space, as well as cultural values and economic data in their messaging to both the public and to those responsible for management and policy decisions. We also encourage academic institutions to integrate the social and economic aspects of hunting into their courses and curriculums to ensure new generations of wildlife professionals and the general public are armed with effective strategies to communicate the importance of the contributions of sportsmen to the economy and society. Such contributions remain fundamental to the future of wildlife conservation in Canada and the United States.

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### Disclosure statement

No potential conflict of interest was reported by the authors.

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