

Science and Research Technical Report TR-28

**Black bear hunters in Ontario in 2017:
Expenditures, characteristics, and hunting
experiences**



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Black bear hunters in Ontario in 2017: Expenditures, characteristics, and hunting experiences

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2018

Science and Research Branch

Ministry of Natural Resources and Forestry

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Cite this report as:

Hunt, L.M. and J.A. Rodgers. 2018. Black bear hunters in Ontario in 2017: Expenditures, characteristics, and hunting experiences. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Science and Research Technical Report TR-28. 24 p. + appendices

Abstract

In 2017, we surveyed Ontario licensed black bear hunters to better understand their characteristics and hunting experiences, as well as their hunting expenditure contributions to the province. This survey was designed to: 1) estimate how much money hunters spent on bear hunting activities in Ontario in 2017, 2) assess participation in and awareness of the bear premolar teeth submission program, and 3) profile bear hunters. We selected a stratified random sample of 3000 people from combinations of licensed spring and fall hunters living in Northern Ontario, southern Ontario, and the United States and then randomly selected 500 hunters from each group. Respondents completed surveys by mail and online with up to 3 contacts per sampled hunter. The overall response rate was very respectable at 61.5%. Based on the survey results, we estimated that in 2017, the 26,601 licensed bear hunters spent \$50.6 million (95% confidence interval (CI)=\$42.7 to \$60.2 million) using 2017 inflation adjusted Canadian dollars (CAD 2017) on tourism services, other trip-related expenditures, and gear and equipment for bear hunting in Ontario. Resident hunters spent by far the most overall on hunting bear (\$33.9 million, with 95% CI=27.2 to 41.6 million CAD 2017), but non-resident bear hunters spent much more per capita than those who live in Ontario. The pilot spring hunting season contributed an estimated \$13.8 million (95% CI=\$11.7 to \$16.4 million) CAD 2017 of the total expenditures related to bear hunting in Ontario in 2017 versus an estimated contribution of \$36.8 million by fall hunting. Resident bear hunters had low lifetime participation rates (about 10%) and relatively low (50–60%) awareness of the bear premolar teeth submission program. Non-resident hunters had greater participation and awareness rates because almost all used licensed bear operators, many of whom likely encouraged and helped hunters to participate. The use of licensed bear operators also helps explain why non-resident hunters were much more successful in harvesting bears than were resident hunters.

Résumé

La chasse à l'ours noir en Ontario en 2017 : dépenses, caractéristiques et expériences des chasseurs

En 2017, nous avons mené une enquête auprès de chasseurs d'ours noir titulaires d'un permis en Ontario afin de mieux comprendre leurs caractéristiques et leurs expériences de chasse ainsi que leur apport en dépenses à la province. Cette enquête visait : 1) à estimer combien d'argent les chasseurs avaient dépensé pour leurs activités de chasse à l'ours en Ontario en 2017; 2) à évaluer la participation et la sensibilisation au programme d'envoi de prémolaires d'ours; 3) à dresser un profil des chasseurs d'ours. Nous avons sélectionné un échantillon aléatoire stratifié de 3 000 personnes à partir de

groupes combinés de chasseurs titulaires de permis adeptes de la chasse au printemps ou à l'automne et vivant dans le Nord de l'Ontario, dans le Sud de l'Ontario ou aux États-Unis, puis nous avons procédé à une sélection aléatoire de 500 chasseurs dans chaque groupe. Il était possible de répondre aux questionnaires par la poste ou en ligne, avec jusqu'à trois contacts par chasseur dans l'échantillon retenu. Le taux de réponse global était appréciable, à 61,5 %. D'après les résultats du sondage, en 2017, les 26 601 chasseurs d'ours titulaires d'un permis ont dépensé 50,6 millions de dollars (M\$) [intervalle de confiance de 95 % (IC=42,7 \$ à 60,2 M\$) en fonction de l'inflation de 2017 en dollars canadiens ajustés (\$ CAN 2017)] en services touristiques, autres dépenses liées aux déplacements et matériel/équipement de chasse à l'ours en Ontario. Les chasseurs résidents ont dépensé beaucoup plus, dans l'ensemble, pour la chasse à l'ours (33,9 M\$, avec un IC de 95 %, de 27,2 à 41,6 M\$ CAN 2017), mais, au prorata, les chasseurs non résidents ont dépensé davantage. Le projet pilote de chasse au printemps a généré des dépenses estimées à 13,8 M\$ (IC de 95 %, de 11,7 à 16,4 M\$ CAN 2017) sur la somme des dépenses liées à la chasse à l'ours en Ontario en 2017, comparativement à un apport de 36,8 M\$ pour la chasse à l'automne. Les taux de participation des chasseurs d'ours résidents au programme d'envoi de prémolaires d'ours étaient faibles (environ 10 %) et relativement peu d'entre eux (50 à 60 %) étaient au courant de son existence. Les chasseurs non résidents affichaient des taux de participation et de sensibilisation au programme plus élevés, car presque tous ont recouru aux services d'exploitants titulaires d'un permis, dont bon nombre les ont encouragés et aidés à participer. Le recours aux services d'exploitants titulaires d'un permis pour la chasse à l'ours explique aussi pourquoi les chasseurs non résidents parvenaient à des prises plus nombreuses que ceux résidant en Ontario.

Acknowledgements

We thank the responding bear hunters for completing the questionnaires and providing the data for this report. We also thank Christie Curley, Maria de Almeida, Patrick Hubert, Joe Northrup, Bruce Pond, Bob Watt, and Will Wistowsky of the Ministry of Natural Resources and Forestry (MNR) for helping with survey design and results interpretation. The report was greatly improved by helpful suggestions and comments from reviews by MNR's Maria de Almeida, Christie Curley, Mike Gatt, Joe Northrup, and Will Wistowsky and editing by Abby Obenchain. Finally, we appreciate the efforts of MNR's Lecia Makkinga and Harrison Craig who helped to prepare survey packages and enter and summarize the survey data.

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Introduction

Ontario has a long tradition of black bear hunting, with spring bear hunting by non-residents reported as early as 1937 (Northern Policy Institute 2015). In 1972, separate spring (April 15 to June 15) and fall (September 15 to November 30) hunting seasons were introduced (Poulin et al. 2003). Bear-specific licences for residents and non-residents were introduced in 1980, replacing combined hunting licences such as for deer and bear (Poulin et al. 2003).

In the 1990s, 20,000 to 26,000 bear hunting licences were sold annually, with non-residents buying well over half, according to Backler and Gravelines (2003). They estimated that in 1997, bear hunters had hunted for about 144,000 days and spent \$41.7 million on travel and services (all amounts in this report were adjusted by the consumer price index to 2017 Canadian dollars/CAD 2017). They also found that per capita spending by resident and non-resident hunters differed greatly (\$804 and \$2,770, CAD 2017, respectively).

Shortly after Ontario's spring bear season was cancelled in 1999, the number of licensed bear hunters declined by about 20%, with non-resident hunters declining more than residents (Backler and Gravelines 2003). Bear hunters' estimated expenditures declined by about 32% (\$28.2 million CAD 2017; Backler and Gravelines 2003). These declines were partially mitigated from 1999 to 2002 as expenditures increased from \$28.9 million to \$35.5 million (CAD 2017; Backler and Gravelines 2003, Northern Policy Institute 2015). This 22.8% increase was not due to just the 13.5% increase in licence sales over the same period (Backler and Gravelines 2003).

In 2014, a bear spring season pilot was established, opening spring bear hunting and trapping to residents in 8 wildlife management units (WMUs) in Northern Ontario. In 2016, the pilot was extended and expanded, providing spring bear hunting and trapping opportunities to more of the province (88 WMUs) and new hunters (non-residents).

Our main research question was how have Ontarians benefited from the added spring hunting opportunities under the bear spring season pilot? One way to answer this question was to focus on bear hunters' monetary expenditures in Ontario for each bear hunting season, but no recent information was available. Estimating benefits from licence sales data and past per capita estimates of bear hunters' expenditures (e.g., Northern Policy Institute 2015) are difficult as similar estimates would need to be made for 2002. It is also difficult to assign past spending by hunting season (spring vs. fall). To address these issues, in 2017, a Ministry of Natural Resources and Forestry (MNRF) survey of licensed bear hunters was conducted to estimate bear hunter expenditures by hunting season.

A second goal was to better understand how much hunters are aware of and participate in MNRF's voluntary bear premolar teeth submission program. Each year, bear hunters provide reports of bear harvest and hunting activity that are used to help estimate bear harvest at provincial, regional, and WMU scales (e.g., OMNRF 2014a). Some bear hunters also provide samples of premolar teeth from harvested bears that wildlife managers use to assess age composition of harvested bears. This information can help

wildlife managers to understand important details about bear populations and the sustainability of harvest.

Those involved in wildlife management and science would like more hunters to submit teeth, particularly resident hunters who do not use licensed bear operators. The program has been promoted through print materials such as the 2018 Ontario Hunting Regulations Summary (OMNRF 2018b) and social media. However, only about 30% of resident hunters who harvest a bear annually submit teeth samples to MNRF (Tamara Cowie 2018, MNRF, personal communication). To understand this low participation rate and identify barriers to participation, we used the survey to reveal more about bear hunters' awareness of, participation in, and evaluation of the program.

Our final goal was to profile Ontario's black bear hunters. The data from licence sales can give insights into hunters' origins, and harvest and activity reports give insights into hunting behaviours, but we know little about bear hunters' characteristics and experiences. Thus, we used the survey to reveal more about them.

Methods

Study area and population of interest

In 2017, black bear hunting was permitted in 88 of Ontario's WMUs where healthy bear habitat and populations exist (see Figure 1). Two hunting seasons were held: spring (May 1 to June 15) and fall (August 15 to October 31 or November 30 depending on the WMU). Non-resident bear hunters must hunt with a bear hunting service provider (e.g., tourism operator) unless they own land in Ontario or are hunting with an immediate Ontario relative (OMNRF 2018b).

To account for the expected diversity in responses by bear hunter type, we separated hunters into 6 strata (Table 1). The strata were based on when the bear hunting licence was bought (before/during vs. after the spring season) and where the hunter lives (non-resident, Northern Ontario resident, southern Ontario resident). Stratification by licence purchase timing helped to ensure that we surveyed enough people who hunted in spring. These samples enabled us to reliably estimate expenditures for spring bear hunting. We accounted for the fact that some hunters who bought a licence before or during spring might hunt during both seasons or only in fall.

We stratified hunters by residency because we know they spend differently (e.g., Backler and Gravelines 2003) and, therefore, we could account for assumed differences in travel for resident bear hunters from Northern and southern Ontario. Given the small number of non-resident hunters from outside the United States (Table 1), we sampled only U.S. hunters and assumed that their expenditures would represent other non-residents. The population of licensed bear hunters available at the time of the survey had 31 fewer licensed hunters than did the final population of 2017 bear hunters (20 resident and 11 non-resident hunters). We allocated these 31 hunters to strata based on their relative distribution among resident and non-resident strata (Table 1). Hunters'

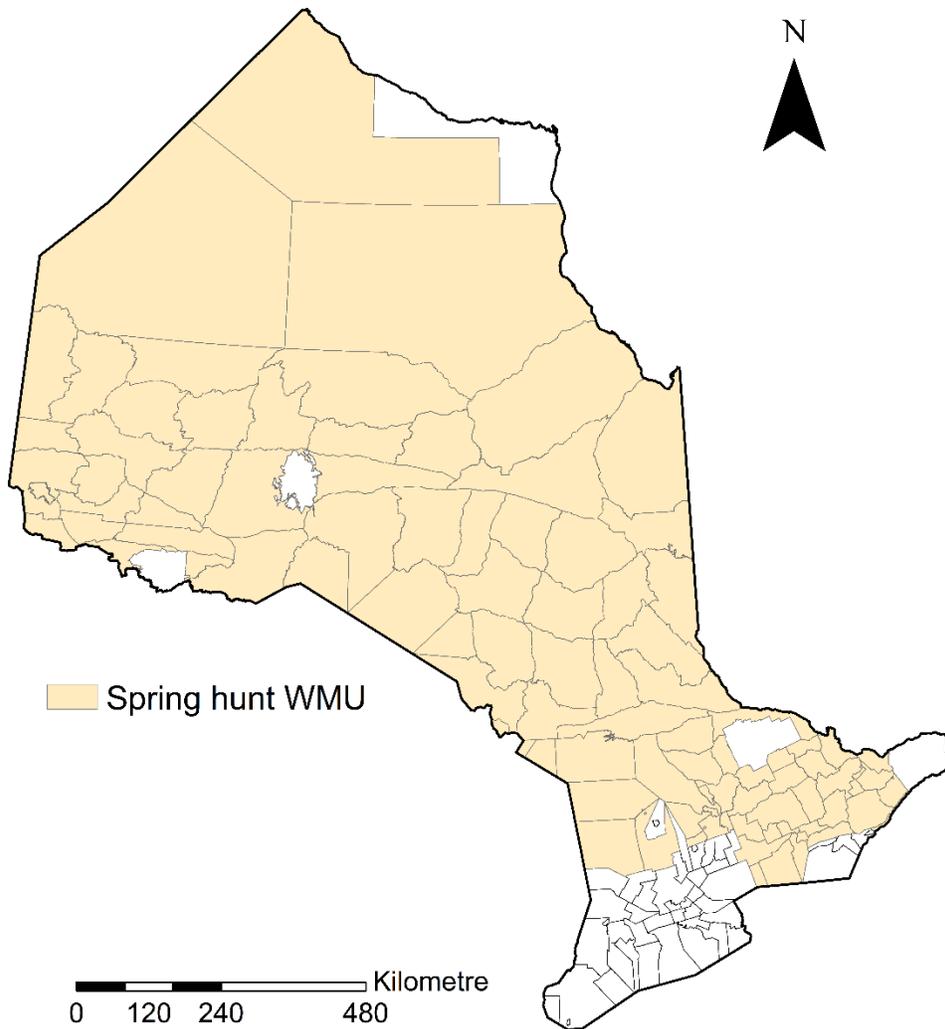


Figure 1. Ontario wildlife management units (WMUs) with black bear hunting seasons in 2017.

postal codes were used to identify Northern vs. southern Ontario residency, with southern Ontario defined by postal codes beginning with K, L, M, N, P0A, P0B, P0C, P0E, P1H, P1L, P1P, and P2A.

Estimates for the average licensed bear hunter were made by weighting (Table 1) the average responses for each stratum and summing these weighted responses. The weights corresponded to the proportion of licensed 2017 hunters in each stratum. For estimates based on any bear hunter group (e.g., all non-residents), we followed the same approach as above but adjusted the weights (e.g., US-FALL and US-SPRING had weights of 0.745 and 0.255, respectively, when summarizing results for all non-residents).

Table 1. Black bear hunters in Ontario in 2017: Number of licensed bear hunters stratified by timing of licence purchase (spring=May 1 to June 15; fall=August 15 to October 31 or November 30); and residence (weight is the proportion of each stratum in the population).

Stratum	Label	Population	Weight
Northern Ontario before/during spring	RES-N-SPRING	3,314 (3 ^a)	0.125
Northern Ontario after spring	RES-N-FALL	3,225 (3 ^a)	0.121
Southern Ontario before/during spring	RES-S-SPRING	4,842 (5 ^a)	0.182
Southern Ontario after spring	RES-S-FALL	9,712 (9 ^a)	0.365
United States before/during spring	US-SPRING	1,402 (3 ^a ,21 ^b)	0.053
United States after spring	US-FALL	4,106 (8 ^a ,57 ^a)	0.154
Total bear hunters	ALL	26,601	1.000

^a Hunters not part of the population from which random samples were selected; these hunters were added to ensure total bear hunters match the actual population of 2017 licensed bear hunters

^b Hunters from outside the United States who were not part of the population from which the random samples were selected

Survey process

We used the Tailored Design Method (Dillman 2000) with different approaches for resident and non-resident hunters. For each stratum, a random sample of 500 hunters was chosen. We contacted all sampled hunters by mail giving them the option to respond online. Each paper questionnaire had a unique identifier, and respondents had to use these identifiers to access the online version. The identifiers also helped us ensure hunters who had already responded were not mailed reminders.

In January 2018, all resident hunters from the sample (i.e., 2000 hunters representing 4 strata) were sent a cover letter that described the survey, a paper questionnaire, and a business reply envelope. Eleven days after mailing the first survey package, those who had not responded were sent a postcard reminder. About 2 weeks after the reminder mailing, all remaining non-respondents were sent a second survey package (different cover letter, paper questionnaire, business reply envelope).

The survey process for non-residents differed to limit international postage costs. In early January 2018, the 1000 non-Ontario hunters to be surveyed were mailed a cover letter explaining the project that included a unique identifier and URL for the online questionnaire. About 2 weeks later, all those who had not responded were mailed a

survey package (cover letter, paper questionnaire, business reply envelope). Five weeks later, all non-respondents were sent a second survey package (cover letter, paper questionnaire). To further reduce costs, only a random sample of 110 non-respondents were mailed a final package with a business reply envelope. All other non-responding individuals were sent a package with a new cover letter and questionnaire and were asked to use the business reply envelope that was sent earlier.

Questionnaire development and analysis

The survey process and questionnaire were developed with a planning team from MNRF's Centre for Northern Forest Ecosystem Research, Wildlife Section, Wildlife Research and Monitoring Section, and Strategic and Indigenous Policy Branch (see acknowledgements). This team identified the 3 research goals, along with objectives from which questions were developed. The questionnaire was tested on MNRF wildlife specialists, MNRF employees who are active bear hunters, and outside stakeholders including Nature and Outdoors Tourism Ontario. The final questionnaire consisted of 29 questions in an 8-page (21.6 cm by 17.8 cm) booklet (Appendix A).

The survey's primary goal was to estimate how much money people spent on bear hunting in Ontario in 2017. We report expenditures in 2017 Canadian dollars (CAD 2017) — United States dollar amounts were converted using a rate of 1.254. This currency conversion was based on 2017 exchange rate differences between USD/CAD.

Total expenditures consisted of:

1. Contributions of inactive hunters (licensed but did not hunt bear in Ontario in 2017)
2. Expenditures on tourism services (licensed bear operators)
3. Expenditures on other bear hunting trips in Ontario
4. Expenditures on bear hunting gear and equipment

Inactive licensed hunters' contributions were limited to licence revenues. Given that inactive hunters could have spent money on gear and equipment for future Ontario bear hunts, their estimated expenditures are likely lower than what they actually spent. These hunters were identified by how they answered Question 5 (*Did you hunt for bears in Ontario in 2017?*). Respondents were told that bear hunting included deer/moose hunting trips during which bears were incidentally or opportunistically also targeted. The proportion of each hunting stratum that was inactive was multiplied by that stratum's population, and the cost of a bear hunting licence including the Harmonized Sales Tax (\$49.56 and \$247.26 CAD 2017 for resident and non-residents, respectively).

Expenditures on tourism services were limited to the proportion of each hunting stratum that reported using tourism services. This estimate was based on responses to Question 13 (*Did you purchase a bear hunting package or services in Ontario in 2017?*), along with respondents who identified spending \$500 CAD 2017 or more on tourism services for the *guide, outfitter, charter, or transporter fees* part of Question 18. The latter was used to clarify whether they used a tourism provider.

Respondents provided information about their total expenditures on tourism services in 2017 (Question 17). We averaged the expenditures by respondents from each stratum. For those who said their tourism package included both bear hunting and fishing/other hunting (Question 13), we allocated 75% of the expenses to bear hunting, which was likely the dominant activity (according to several tourism operators).

Respondents also provided information about other trip-related expenses that were not tourism service expenditures (Question 18). Because some respondents duplicated their tourism services and other trip-related expenditures, we removed obvious duplicates from the *other* trip-related expenditures. Trip-related expenditures were added up and grouped under bear hunting or non-bear hunting (e.g., hunting bear while primarily hunting moose). This partitioning was based on individual responses to Question 19, which asked what percentage of other trip-related expenses was for non-bear hunting activities. For individuals with missing or unusable responses to Question 19 (6.0% of responses for trip-related expenditures), we split the expenditures into bear and other based on the average reported percentage of other trip-related expenses for that stratum. For each stratum, we averaged the bear-related expenditures and multiplied that by the estimated number of active bear hunters in 2017 (i.e., the active rate of bear hunting in 2017 multiplied by the stratum population). The total of other trip-related expenditures was summed over the stratum-specific estimates.

Question 21 focused on 2017 Ontario-based bear hunting gear and equipment expenditures. To separate out bear and non-bear hunting expenditures, we used the same process as for the other trip-related expenditures. The separation was based on responses to Question 22, with 14.4% of responses represented from the average partition rates.

Overall bear hunting expenditures for fall and spring were determined as follows:

- Those who reported hunting only in 1 season: Expenditures were allocated to that season
- Those hunting in both spring and fall: Expenditures were split equally between the 2 seasons

Our second research goal was to determine how aware bear hunters are of and how they perceive the voluntary bear premolar teeth submission program. We evaluated hunters' awareness (Question 25) and lifetime participation (Question 26) and asked hunters who were aware of the program to evaluate statements (Question 27) on a 5-point scale from *strongly disagree* (-2) to *strongly agree* (+2) with a sixth option of *unsure/does not apply* (NA). For each stratum, we reported the average agreement scores for each question (except unsure responses).

Our final goal was to describe bear hunters in Ontario from responses to questions about:

1. Age distribution (Question 29) and residence (Appendix C, Table C7)
2. General insights about bear hunting (e.g., previous bear harvest; Question 2)
3. Methods used to conduct hunts (Question 3)

4. Firearms use (Question 4)
5. Their 2017 hunt (e.g., hunting effort, harvest, and use of tourism services — Questions 6–11, 16) including destination (Appendix C, Table C8)

Inferential tests with a threshold of $p < 0.05$ were used to determine statistically significant differences in responses among and between pairs of strata. The threshold was adjusted to account for multiple comparisons associated with pairwise tests among the strata (i.e., $p < 0.0033$, which is the Bonferroni-corrected probability when conducting all 15 pairwise tests among 6 strata). All tests were based on the variable's scale (i.e., the chi-square for nominal, proportion tests for any dichotomous response variable and the Kruskal-Wallis H-test for interval/ratio variables). In addition to chi-square values, we provided the effect size with Cramér's V (ϕ_c), where values < 0.1 indicate a small magnitude of effect and > 0.5 indicate a large effect size. Along with the Kruskal-Wallis H-test (H), we calculated the epsilon-squared estimate (η^2) for effect size, where 0 means no relationship and 1 shows a perfect relationship. For the expenditure estimates (tourism services, trip related, and gear and equipment), we assessed reliability of the estimates using thresholds for relative standard errors/RSE (i.e., $100 \times$ standard error divided by the mean for each stratum). We followed OMNRF (2014a) and evaluated the reliability of conclusions from data as:

- If $RSE < 16.5\%$, data can be used without condition (*reliable*)
- If $16.5\% < RSE < 33.5\%$, data should be used with caution (*concerning*)
- If $RSE > 33.5\%$ data should be used with extreme caution (*unreliable*)

We pooled data among strata to achieve reliable estimates. The uncertainty in the overall estimates of expenditures was expressed by estimating 95% confidence intervals. Intervals were calculated for each stratum and type of expense (i.e., tourism service, other trip-related expenditures, and gear and equipment) by adjusting the average per capita expenditure estimate by ± 1.96 times the standard error of the mean estimate. The confidence intervals for each stratum were estimated using the lower and upper per capita estimates for each expenditure type following the same methods previously described to estimate the total expenditures. The resulting confidence intervals are likely too narrow given that we did not account for uncertainty in the estimates of proportions for inactive hunters or those using tourism services.

Results

Response rate

A total of 1809 bear hunters responded to the questionnaire; after accounting for 58 undeliverable questionnaires, the final response rate was 61.5%. This response rate differed among the 6 hunter strata (Table 2), from 71% for southern Ontario hunters

who bought a licence in or before spring (RES-S-SPRING) to 57% for hunters from Northern Ontario who bought theirs after spring (RES-N-FALL). The response rate for RES-S-SPRING was statistically significantly greater than for any other stratum except the southern Ontario hunters who bought their licence after spring (RES-S-FALL).

Hunters who bought a licence during or before spring were more likely to respond to the questionnaire than those who did so after spring (63.6%–59.4%, $Z=2.33$, $p<0.01$). Hunters from southern Ontario were more likely to respond to the questionnaire than those from Northern Ontario (67.0% to 57.9%, $Z=4.17$, $p<0.01$) or the United States (67.0% to 59.6%, $Z=3.38$, $p<0.01$).

About one-quarter (25.2%) of respondents completed the questionnaire online, with online use differing strongly by residency: U.S. respondents used the online survey the most (37.2%), followed by those in Northern Ontario (21.6%) and in southern Ontario (17.8%). However, our sampling was designed to encourage U.S. hunters to respond online more than resident hunters.

Table 2. Black bear hunters in Ontario in 2017: Number of licensed bear hunters by hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Label	Responses	Response rate (%)
RES-N-SPRING	294	59.2
RES-N-FALL	279	56.6
RES-S-SPRING	347	70.5
RES-S-FALL	317	63.4
US-SPRING	288	61.0
US-FALL	284	58.2
ALL	1809	61.5

Expenditures

Information sources used to estimate 2017 hunter expenditures included active participation rate in bear hunting, rate of active use of tourism services, average tourism service-related expenses, average other trip-related expenses, and average gear and equipment expenses (%). Active participation in bear hunting differed widely among the 6 strata (Figure 2, $\chi^2=81.42$, $df=5$, $p\leq 0.001$, $\phi_c=0.21$). Northern Ontario bear licence holders were most likely to be inactive, while bear hunters from the U.S. were most active.

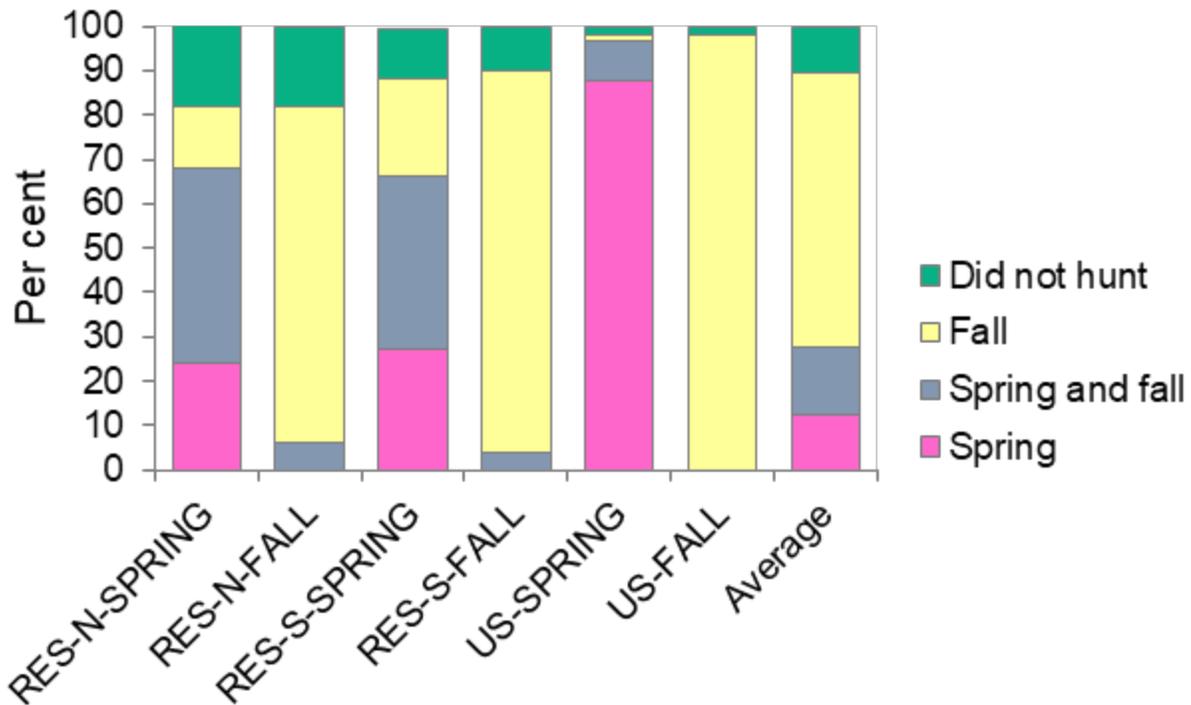


Figure 2. Black bear hunters in Ontario in 2017: Hunter participation rate by bear hunter stratum and hunting season (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Bear hunters who bought their licences before or during spring did not always hunt during the spring season ($\chi^2=648.19$, $df=5$, $p\leq 0.001$, $\phi_c=0.42$). Just over 10% of non-resident hunters who bought a licence before or during spring hunted in fall (8.7% hunted in both fall and spring and 1.4% hunted only during fall). This tendency to hunt in both seasons was more common among residents, with 58% of RES-N-SPRING respondents hunting during fall (44% hunted both seasons and 14% hunted only during fall) and 61% of RES-S-SPRING respondents hunting in fall (39% hunted both seasons and 22% hunted only during fall). A small percentage of hunters who bought a licence after spring said they hunted in spring; we treated these responses as errors and assigned their expenditures to fall.

Tourism service use was also important for estimating expenditures. Non-residents must use a tourism provider unless they own property in Ontario or are hunting with an immediate Ontario relative, therefore, not surprisingly, almost all non-residents reported using one (Figure 3, $\chi^2=1309.5$, $df=0$, $p\leq 0.001$, $\phi_c=0.62$). We inferred that some hunters who reported that they did not use a tourism service actually used one, based on responses to the trip-related questions and expenditures directed to other tourism services, guides, and transportation (Question 18). A large percentage of non-residents said that their tourism package included bear hunting and other hunting/fishing services (42.3% of US-FALL and 31.4% of US-SPRING bear hunters, $\chi^2=346.89$, $df=5$, $p\leq 0.001$, $\phi_c=0.56$). Less than 10% of residents used a tourism service in 2017.

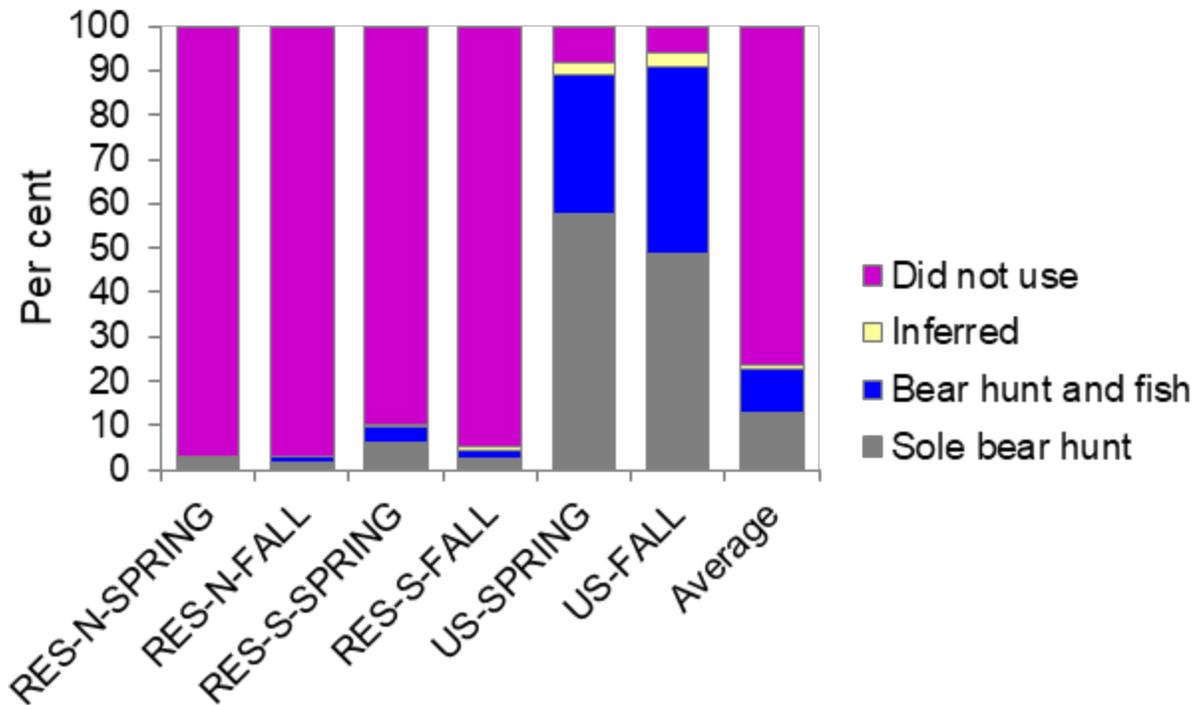


Figure 3. Black bear hunters in Ontario 2017: Use and type of tourism service package by bear hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

To provide reliable average expenditure estimates for residents, we pooled the 4 resident strata and used the pooled average expenditure estimate for all resident hunters (Appendix B, Figure B1). We allocated 75% of the expenditures from joint other hunting/fishing and bear hunting packages to bear hunting.

Average tourism service expenditures related to bear hunting differed greatly between resident and non-residents (Figure 4): Resident expenditures averaged \$1,086 (CAD 2017), while the non-resident averages were \$1,996 and \$2,147 for US-FALL and US-SPRING, respectively. Non-residents also spent more on the other hunting/fishing part of packages (non-bear-hunting services).

The averages of other trip-related expenditures (i.e., excluding the reported tourism service expenditures) were sufficiently reliable among the 6 strata (Appendix B, Figure B2). The average expenditures for these trips included those attributed to bear hunting and other activities (see Appendix C, tables C2 and C5 for estimates of expenditures for specific items associated with trip expenditures and for a breakdown of expenditures on bear and other activities).

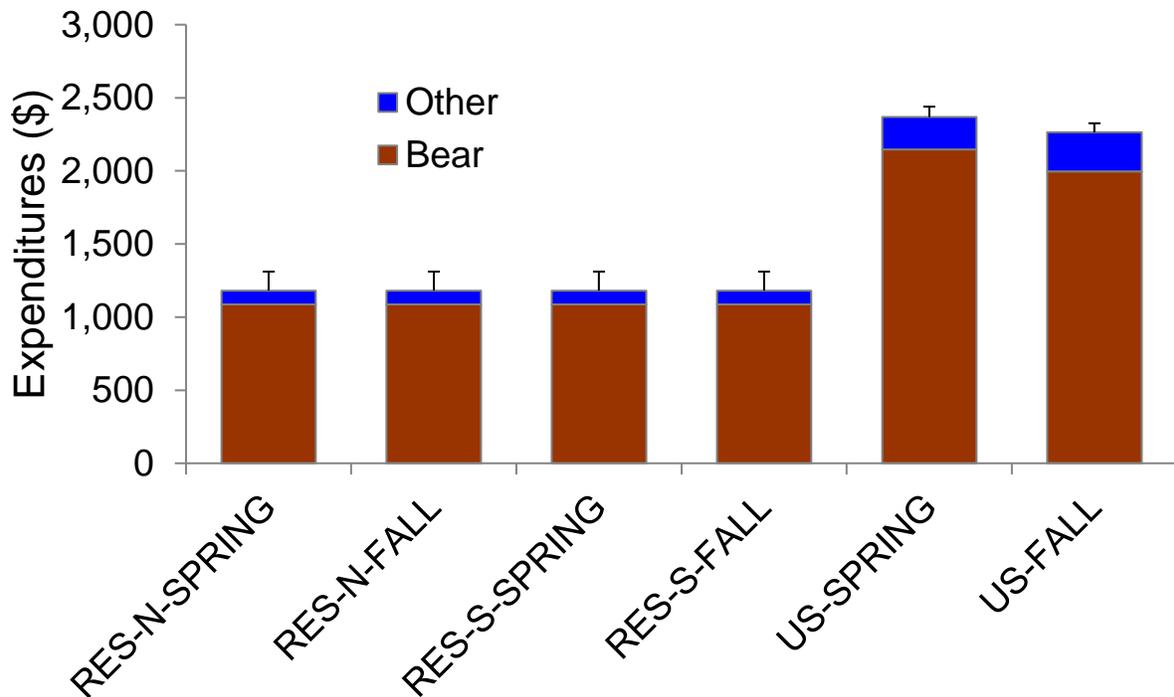


Figure 4. Black bear hunters in Ontario in 2017: Average tourism service expenditures (CAD 2017) by bear hunting stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30)

Non-residents had the highest average other trip-related expenditures directed at bear hunting at slightly less than \$1,000 CAD 2017 (Figure 5). Expenditures of resident hunters who bought a licence before or during the spring tended to be greater than those buying their licence after spring. Hunters who bought a licence after spring, however, had the greatest percentage of total trip-related expenditures allocated to activities other than bear hunting (46% and 48% for RES-N-FALL and RES-S-FALL, respectively).

The final expenditure type that we assessed was bear-hunting-related gear and equipment. While focusing on 2017 reduced the risk of recall bias, it decreased the reliability of the averages because the purchase of big ticket items such as all-terrain vehicles do not occur every year and thus, hunter expenses often vary significantly from year to year (appendices B and C, Figure B3 and Table C3). To overcome this variability, we pooled the expenditures into groups of non-resident hunters, resident hunters who bought their licence early, and resident hunters who bought their licence after spring. This grouping resulted in reasonably reliable average expenditure estimates (Appendix B, Figure B3). Details about types of gear and equipment expenditures are available in Appendix C, tables C3 and C5.

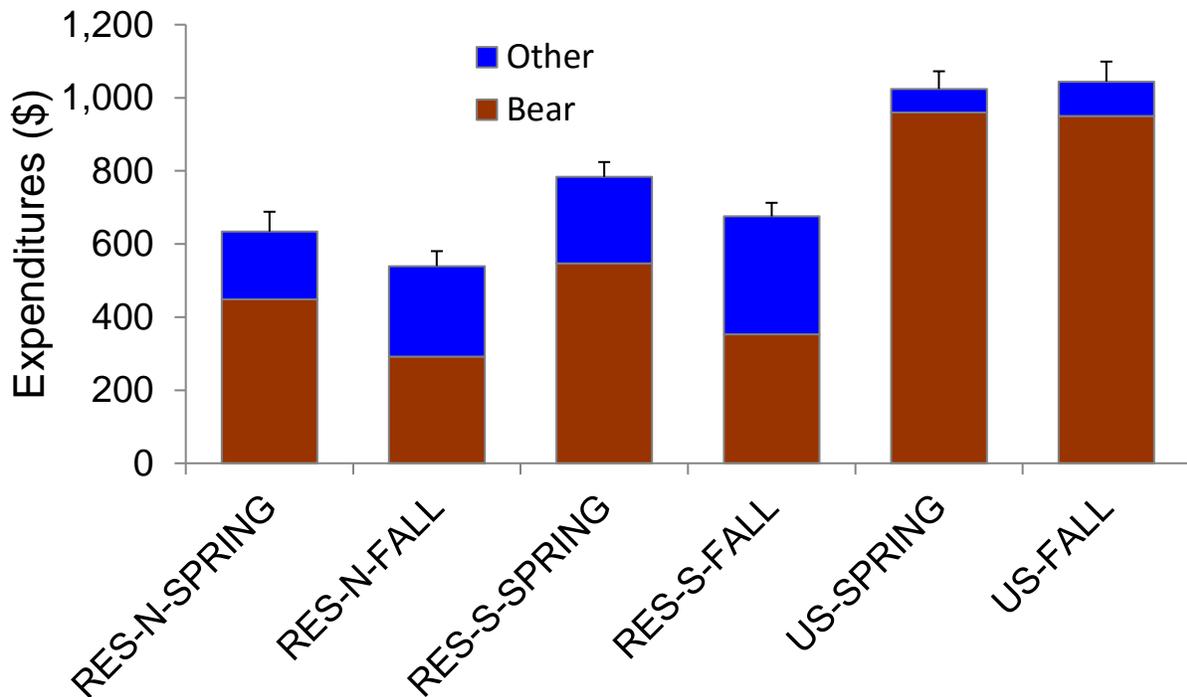


Figure 5. Black bear hunters in Ontario in 2017: Average other trip-related (non-tourism service) expenditures (CAD 2017) by bear hunting stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Resident hunters who bought their licence early spent the most per capita on bear-hunting-related gear and equipment, followed by resident hunters who bought their licence after spring and then non-residents (Figure 6). Expenditures on non-bear hunting activities were lowest for non-residents and greatest for resident hunters who bought a licence after spring.

We estimated total expenditures on bear hunting for each stratum as follows:

1. The estimated number of inactive hunters was multiplied by the cost of a bear hunting licence.
2. The estimated number of hunters who used tourism services was multiplied by the average expenses on tourism services for bear hunting.
3. Other trip-related expenses equalled the estimated number of active bear hunters multiplied by the average trip-related expenditures for bear hunting.
4. Gear and equipment expenses equalled the estimated number of active bear hunters multiplied by the average gear and equipment expenditures for bear hunting.

The total expenditures for all hunters equalled the sum of the stratum-specific estimates.

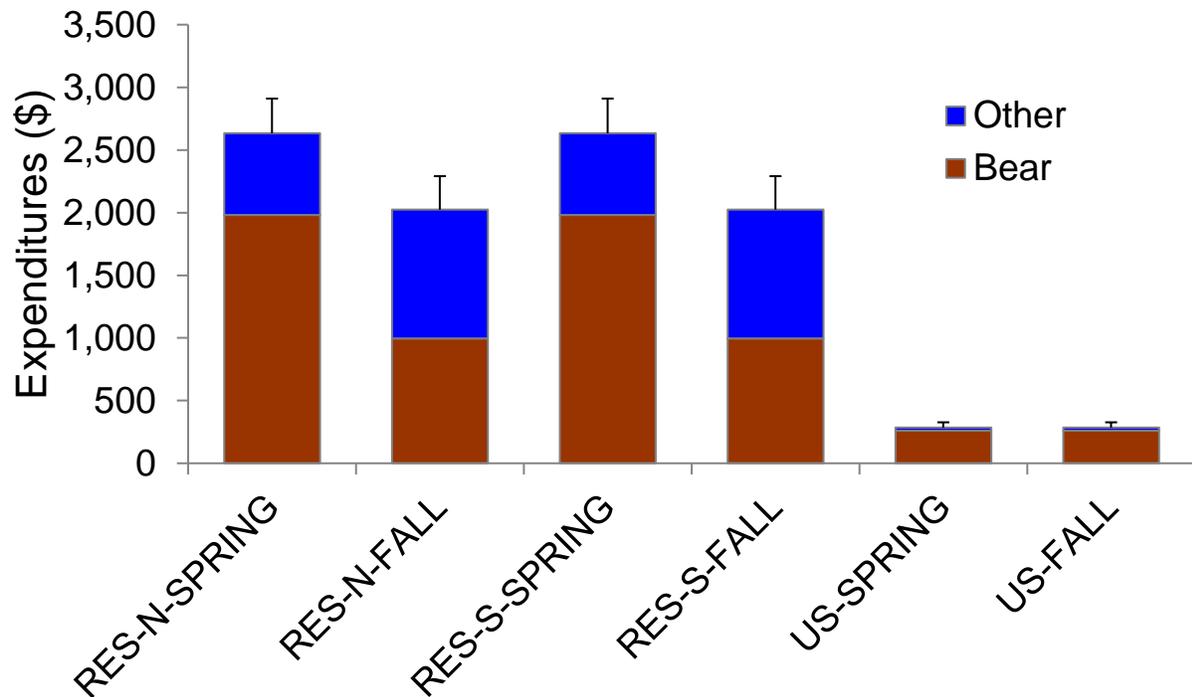


Figure 6. Black bear hunters in Ontario in 2017: Average gear and equipment expenditures (CAD 2017) by bear hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

The estimated overall bear hunting expenditure in Ontario in 2017 (CAD 2017) was \$50.6 million (95% CI=\$42.7–\$60.2 million; Figure 7). Resident hunters from southern Ontario accounted for most expenditures (\$23.7 million, 95% CI=\$19.0–\$29.1 million). Per capita, non-resident hunters spent the most in 2017 — an estimated \$3,092 and \$3,005 CAD 2017 for the US-FALL and US-SPRING strata, respectively. Among resident hunters, those buying a licence before or during spring had greater average expenditures (\$2,340 and \$2,025 for RES-S-SPRING and RES-N-SPRING, respectively) than those who bought licences after spring (\$1,274 and \$1,093 for RES-S-FALL and RES-N-FALL, respectively).

We estimated that bear hunting expenditures during spring 2017 in Ontario totalled \$13.8 million (CAD 2017, 95% CI=\$11.7–\$16.4 million). This estimate included 94%, 52%, and 57% of total bear hunting estimates from the US-SPRING, RES-S-SPRING, and RES-N-SPRING strata, respectively. The fall season estimate of \$36.8 million (CAD 2017, 95% CI=\$31.0–\$43.7 million) was based on the remaining expenditures from the above 3 strata along with all expenditures by hunters from the 3 strata who bought a licence after spring.

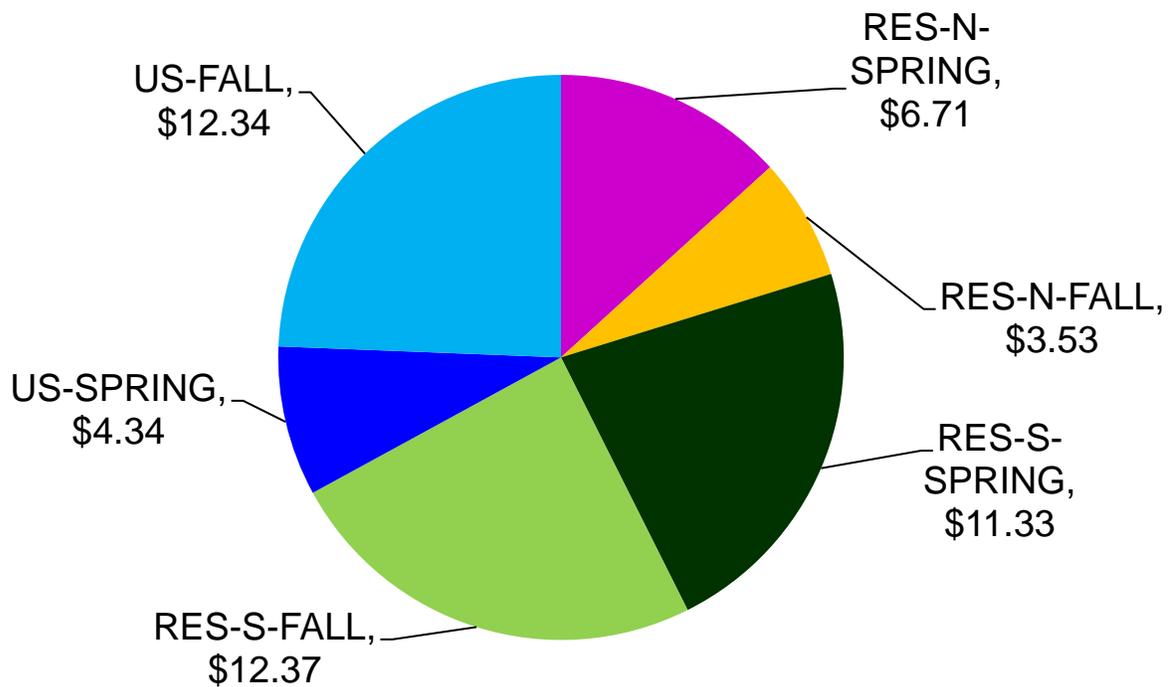


Figure 7. Black bear hunters in Ontario 2017: Total estimated expenditures (CAD 2017 in millions) by bear hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Bear premolar teeth submission program

Hunters from the resident strata had low lifetime participation (9–14%) in the voluntary bear premolar teeth submission program (Figure 8, $\chi^2=390.73$, $df=5$, $p\leq 0.001$, $\phi_c=0.48$). Non-resident participation rates approached 60% largely because tourism providers encourage and help their clients to submit teeth. Awareness of the program was greater among non-resident (about 75%) than resident hunters (48 to 60%), but over half of resident hunters were aware of it the program ($\chi^2=80.31$, $df=5$, $p\leq 0.001$, $\phi_c=0.22$).

The average rating for the bear premolar teeth submission program usefulness varied little among strata and was near the rating of *agree* (i.e., 1.0; Figure 9, $H=9.53$, $df=5$, $p=0.09$, $n^2=0.01$). Respondents agreed less with most individual statements (or in the case of *it is too much of a bother to send teeth to OMNRF*, they disagreed less, $H=77.64$, $df=5$, $p\leq 0.001$, $n^2=0.09$) than they did the statement of overall usefulness of the program. Respondents reacted most negatively to: *I received the age of my harvested bear and thank you crest from OMNRF in a timely manner* ($H=4.24$, $df=5$, $p=0.51$, $n^2=0.01$).

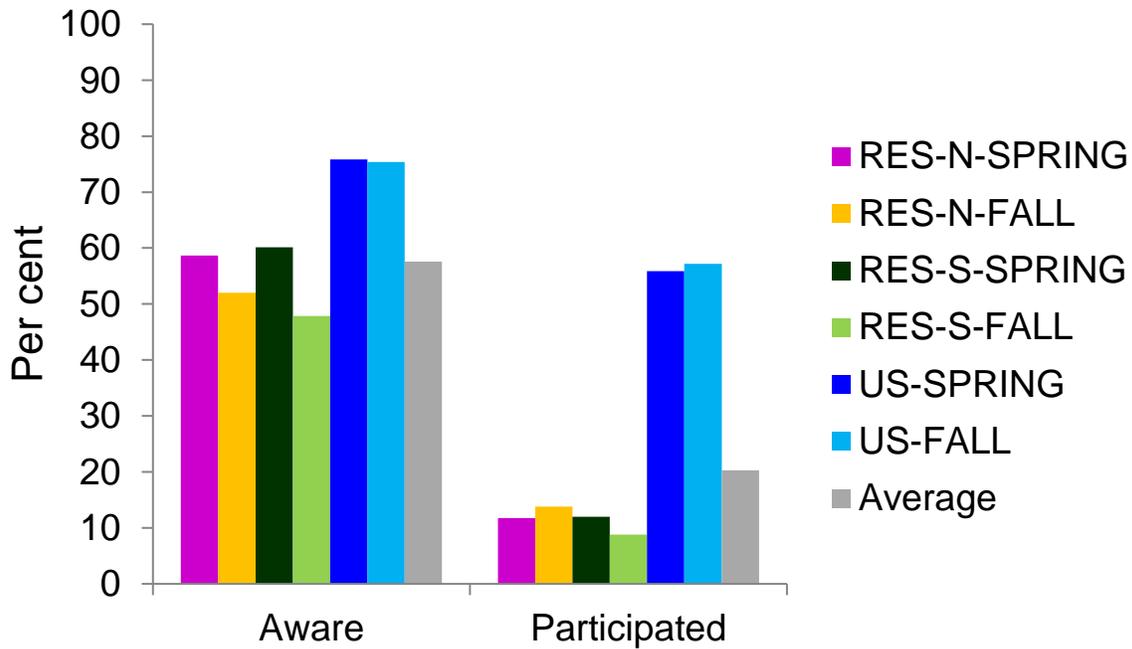


Figure 8. Black bear hunters in Ontario in 2017: Awareness and lifetime participation rates in the voluntary bear premolar teeth submission program by hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

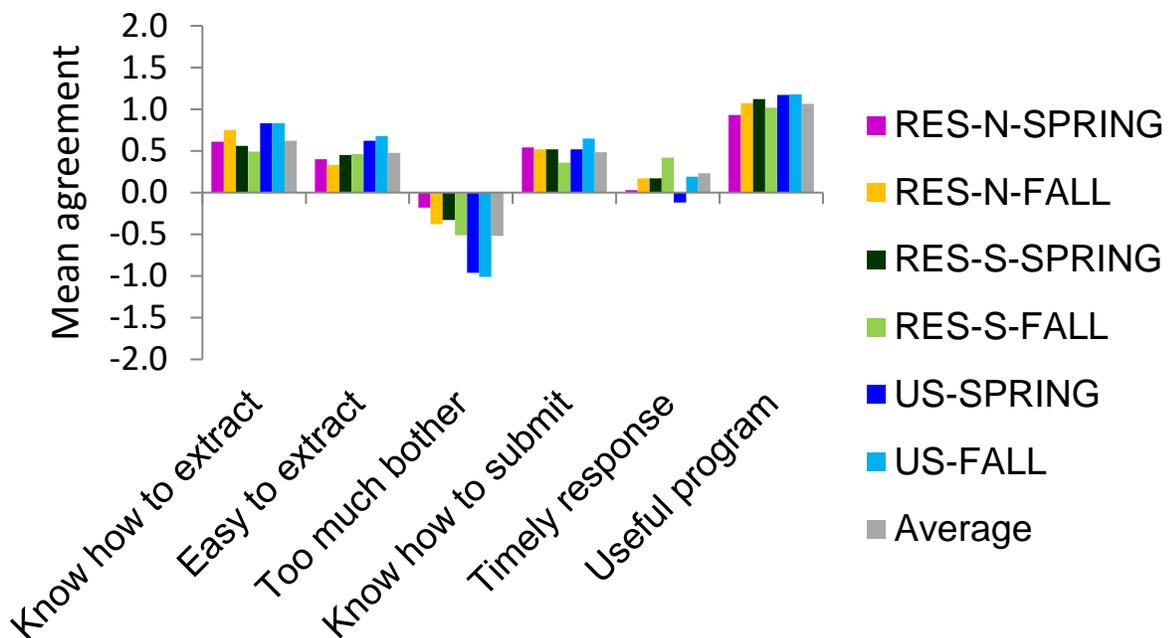


Figure 9. Black bear hunters in Ontario in 2017: Average agreement ratings for statements related to the voluntary bear premolar teeth submission program by bear hunter stratum (+2=strongly agree to -2=strongly disagree; RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Black bear hunters in Ontario

Most bear hunters in 2017 were between 40 and 69 years of age (Figure 10). For all but Northern Ontario residents, most bear hunters were 50 or older. Northern Ontario bear hunters were more equally distributed among the age categories than those in southern Ontario and the United States.

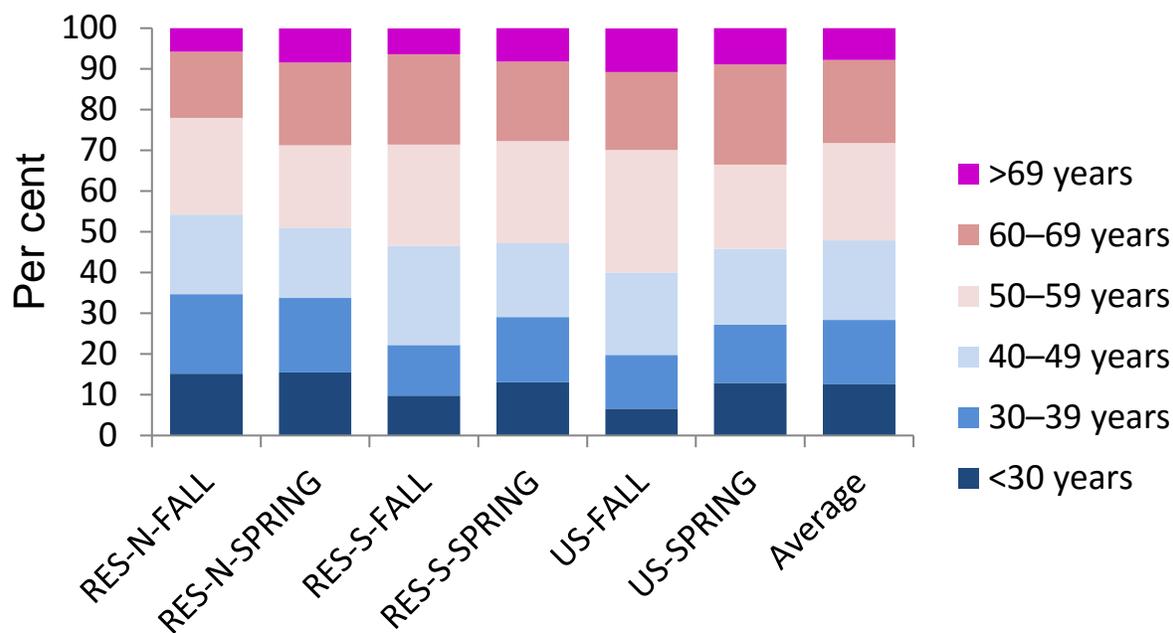


Figure 10. Black bear hunters in Ontario in 2017: Age by bear hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

The average bear hunter had hunted for bears in Ontario for just over 7 years ($H=87.87$, $df=5$, $p \leq 0.001$, $n^2=0.05$) and harvested about 2 bears ($H=123.15$, $df=5$, $p \leq 0.001$, $n^2=0.07$) during their lifetime (Figure 11). Resident hunters generally had more Ontario bear hunting experience, but non-resident hunters appeared more successful at harvesting bears. Non-residents averaged 1 bear harvested in less than 2 years of active hunting while residents averaged 3–5 years of active hunting to harvest a bear. Northern Ontario hunters appeared more successful than southern Ontario residents, and resident hunters who bought a licence before/during spring appeared more successful than resident hunters who bought a licence after spring.

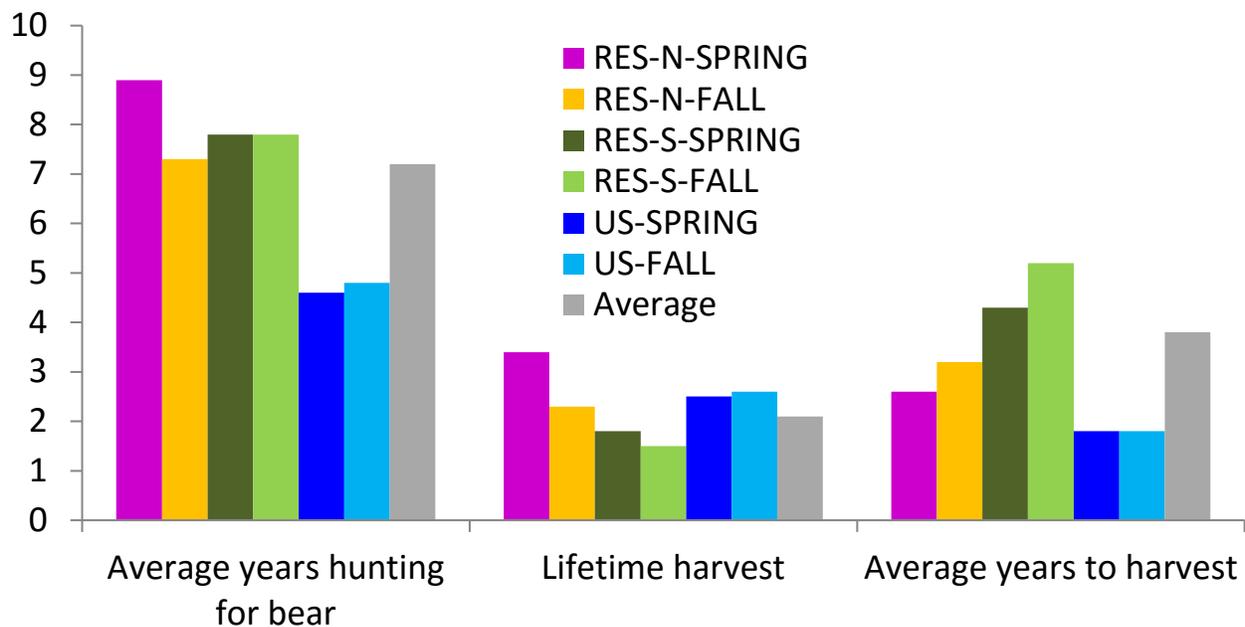


Figure 11. Black bear hunters in Ontario in 2017: Lifetime experience by bear hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

On average, active licensed bear hunters said they hunted for 9.2 days ($H=83.12$, $df=5$, $p \leq 0.001$, $n^2=0.04$) and harvested 0.29 bears in 2017 (Table 3, $H=413.18$, $df=5$, $p \leq 0.001$, $n^2=0.21$). These averages mask some important differences. While the average active non-resident hunted for the least number of days, they harvested bears at rates of 2 to 4.5 times greater than the average active resident hunter did. Among active resident hunters, those who bought a licence early averaged significantly more days hunting for bear and were between 50 and 73% more successful than those who bought a licence after spring.

Table 3. Black bear hunters in Ontario in 2017: Activity and harvest reporting by hunter strata (standard error in parentheses; RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Label	Average days spent hunting in 2017	Average harvest
RES-N-SPRING	14.32 (0.92)	0.29 (0.03)
RES-N-FALL	10.16 (0.67)	0.18 (0.03)
RES-S-SPRING	10.92 (0.70)	0.25 (0.03)
RES-S-FALL	8.79 (0.46)	0.14 (0.02)
US-SPRING	5.41 (0.24)	0.65 (0.03)
US-FALL	4.54 (0.14)	0.62 (0.03)
ALL	9.20 (0.53)	0.29 (0.03)

Surveyed bear hunters typically placed baits on the ground ($\chi^2=72.879$, $df=5$, $p\leq 0.001$, $\phi_c=0.11$) and hunted from stands (Figure 12, $\chi^2=19.54$, $df=5$, $p\leq 0.001$, $\phi_c=0.06$). Non-resident hunters were most likely to hunt from stands and place baits on the ground, while resident hunters who bought a licence after spring were least likely to place bait on the ground. A large percentage of hunters also said that they hunted for bears while hunting for other species ($\chi^2=323.29$, $df=5$, $p\leq 0.001$, $\phi_c=0.33$). This was especially common with resident hunters who bought a licence after spring. Stalking ($\chi^2=105.86$, $df=5$, $p\leq 0.001$, $\phi_c=0.25$) was used most often by Northern Ontario residents, while hunting for bears with dogs was rarely used by any hunter stratum ($\chi^2=17.58$, $df=5$, $p=0.004$, $\phi_c=0.30$).

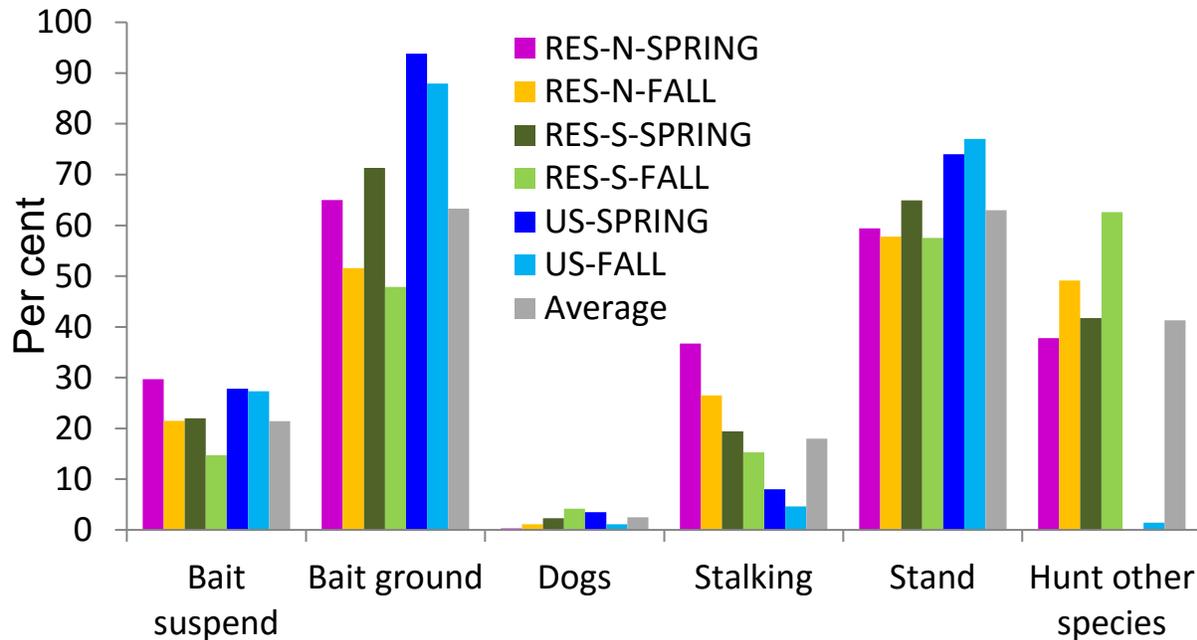


Figure 12. Black bear hunters in Ontario in 2017: Methods used by bear hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Rifles were the most common firearms used by hunters in all resident strata (Figure 13, $\chi^2=78.631$, $df=5$, $p\leq 0.001$, $\phi_c=0.11$). Non-residents were more likely than residents to use bows ($\chi^2=98.09$, $df=5$, $p\leq 0.001$, $\phi_c=0.19$), with crossbows ($\chi^2=32.37$, $df=5$, $p\leq 0.001$, $\phi_c=0.13$) more equally used across the hunter strata (just under a quarter of hunters on average).

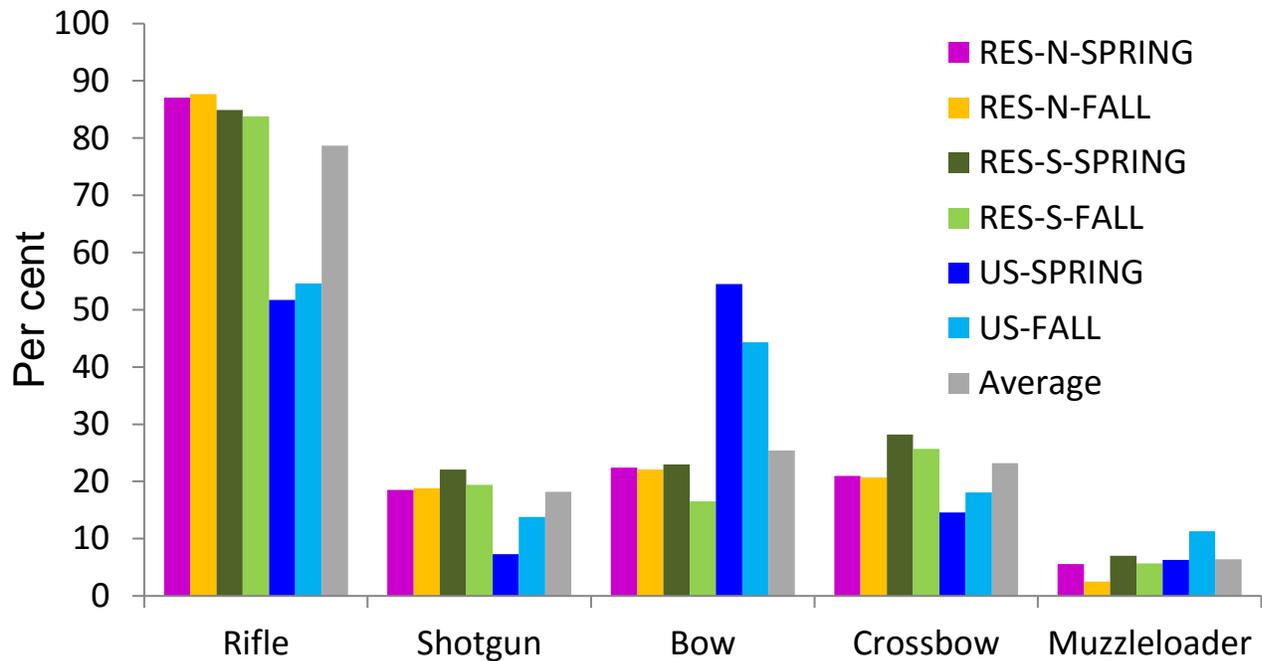


Figure 13. Black bear hunters in Ontario in 2017: Firearms used to hunt bear by bear hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Discussion

We surveyed black bear hunters in Ontario to provide data and information to address 3 goals. Using a random stratified sample of hunters, we were able to provide better insights into the goals, which are described below.

Expenditures by black bear hunters

We estimated that in 2017 in Ontario, the nearly 27,000 licensed bear hunters spent about \$50.6 million (CAD 2017, 95% CI=\$42.7–\$60.2 million). This estimate is greater than that for 1997, the last year Ontario had a spring bear hunting season. The estimate for that year was \$41.7 million (CAD 2017; Backler and Gravelines 2003). However, the per capita estimates were similar for the 2 years, with averages of \$1,874 and \$1,903 (CAD 2017) per licensed hunter for the 1997 and 2017 seasons, respectively.

Despite the similar per capita expenditures, the hunting populations of 1997 and 2017 differed significantly. In 1997, non-residents contributed an estimated 83.2% of all bear hunting expenditures; 20 years later, they contributed only 32.9%. This striking difference likely reflects changes in the bear hunter population and their expenditure patterns, as well as the return of spring bear hunting opportunities.

Similarly, the proportion of non-resident bear hunters in Ontario decreased significantly between 1997 and 2017. In 1997, most bear hunters (55.8%) were non-residents; 20 years later, only 20.7% were non-residents. The likely reasons for this change include management changes (spring bear season cancelled in 1999; spring hunt pilots with limited opportunities for residents in 2014 and 2015 and for non-residents since 2016), currency changes (a U.S. dollar was worth \$1.38 CAD in 1997 but only \$1.25 CAD in 2017), possible changes in the U.S. bear hunter population, and an increase in residents wanting to hunt bear.

The second reason for non-residents contributing less to bear hunting in 2017 vs. 1997 was that residents spent more in 2017 than in 1997. Per capita expenditures by non-resident bear hunters were similar in 1997 and 2017 — \$2,790 and \$3,027 (CAD 2017), respectively. Residents, however, were estimated to have spent \$717 per capita in 1997 and \$1,609 in 2017. This increase is partly due to differences in the survey content between 1997 and 2017. For the 1997 survey, hunters only reported their gear and equipment expenditures related to hunting supplies, although they could also record *other* expenditures. For the 2017 survey, hunters reported their expenditures for a fuller list of gear and equipment (e.g., hunting equipment, camping gear, taxidermy gear; see Appendix A, Question 21 for the full list). This fuller list of gear and equipment was used for the 2017 survey because it is comparable with other lists to estimate gear and equipment expenditures by other recreationists in Ontario (Hunt 2014, OMNRF 2014b).

During the pilot spring bear hunting season in Ontario in 2017, bear hunters were estimated to have contributed about \$13.8 million to the provincial economy (CAD 2017, 95% CI=\$11.7–\$16.4 million). This estimate was based on conservative assumptions that allocated hunters' expenditures to the season when they most likely occurred.

We identify some caveats with these estimates. First, we do not know what spring bear hunters would have done with the \$13.8 million they spent on spring bear hunting had the pilot season not been available. Some hunters likely would have conducted their hunting activities solely during the fall hunt. We reviewed bear hunting licence sales (Backler and Gravelines 2003) during the 4 years before and after the 1999 cancellation of the spring bear season (1995 to 1998 compared with 1999 to 2002), and in the short term, bear hunting licence sales declined 20% with a sharper decline (40.8%) for non-residents. This finding suggests that the spring and fall hunts are not complete substitutes for all bear hunters. Furthermore, a large percentage of resident spring bear hunters already hunt during both the pilot spring and the fall seasons (39 to 44%). It is unlikely these hunters would have deferred all spring expenditures to hunt bear during fall, although they might have hunted for more days in this season. Nevertheless, hunter expenditures during the spring might have been deferred to the fall if the spring season was unavailable.

Second, when interpreting spring (and even total) bear hunting expenditures, we should consider the benefits to Ontario. Without spring bear hunting, resident hunters likely

would have substituted their spring bear hunting expenditures for some other activity in Ontario. This substitution would result in little economic impact from bear hunting for the province, but the impact could still have been locally important especially in Northern Ontario. Northern Ontario residents conducted most of their hunting in Northern Ontario (WMUs 1–45), and over a quarter of southern Ontario bear hunters' hunting effort was reported to occur in Northern Ontario (Appendix C, Table C8). If over one-quarter of southern Ontario resident hunter expenditures also occurred in Northern Ontario, almost \$6 million in expenditures would flow from southern to Northern Ontario. Therefore, southern Ontario resident bear hunter expenditures are likely important to the Northern Ontario economy. Non-residents are unlikely to have spent their bear hunting money on any other activity in Ontario. Therefore, their expenditures are likely most important for generating new expenditures in the province, particularly in Northern Ontario where almost all their associated bear hunting activity occurred (see Appendix C, Table C8).

Finally, our estimates are focused on expenditures directly related to bear hunting in Ontario. Others can use our findings to estimate indirect (e.g., bear hunting service providers' expenditures) and induced effects (e.g., service providers' expenditures on guides/other employees). Considering direct, indirect, and induced expenditures could provide a more comprehensive estimate of the economic impact of bear hunting.

Awareness and participation in the bear premolar teeth submission program

The survey's secondary goal was to better understand hunters' participation in and perceptions of the voluntary bear premolar teeth submission program. Awareness of and lifetime participation in the program was greater among non-residents than residents. This difference likely arose because non-residents almost always used tourism service providers to conduct their Ontario bear hunts, while only a small percentage of resident hunters used them. Given that tourism service providers often participate in the voluntary bear teeth submission program and extract teeth for their clients, it is not surprising that awareness and participation in the program was greater among non-resident than resident hunters.

Participation rates in the program were low among resident hunters, averaging 10.8%. One reason was the comparatively low awareness level among resident hunters (53.0%). If this awareness level increased to 100% and if the currently unaware resident hunters participated at the same rate as aware hunters, the increase in resident participants to the program would be 89%. Therefore, efforts to make resident hunters more aware of the program have strong potential to increase the number of teeth submitted.

Non-residents generally had more favourable impressions of the program than did residents. Again, this result might relate to non-residents' high use of tourism services.

Even among residents, however, the average rating for program usefulness was *agree*. The one statement that received less support than expected was *I received the age of my harvested bear and thank you crest from OMNRF in a timely manner*. Agreement with this question averaged about *neither agree nor disagree*. In 2018, processing of 2017 teeth samples was delayed, and we received several phone calls from bear hunters asking about the status of their age report and crest.

Hunter characteristics and hunting experiences

Our third goal was to describe bear hunters and their hunts. We found that over 10% of licensed bear hunters said they did not hunt bear in 2017. This tendency was most common among Northern Ontario residents and least common among non-residents. Also, many resident hunters who bought a licence after spring hunted for bears incidentally while hunting for other species, meaning a significant proportion (but a minority) of resident hunters had a bear licence without strong interest in hunting for bear.

Many resident hunters who bought a bear licence before or in the spring hunted during both spring and fall (39 to 44%) or even deferred hunting until fall (14 to 22%). These results suggest that licence sale timing alone does not provide enough information about spring bear hunting's importance to resident hunters. Through the questionnaire, we could isolate spring bear hunting activity only from hunters' responses to detailed questions. Licence purchase timing, on the other hand, was a good indicator of non-residents' choice of bear hunting season.

Non-resident bear hunters were more successful at harvesting a bear in 2017 (1.4 to 2.9 times more successful) and over their lifetime (bears harvested divided by years hunted for bear; 2.1 to 3.5 times more successful) than were residents. These differences could be due to non-residents' use of tourism service providers and baiting methods.

Overall, an estimated 29.3% of active licensed hunters harvested a bear, resulting in a provincial estimate of about 7100 bears harvested in Ontario in 2017. This estimate is over 9% greater than that derived from the mandatory harvest and activity reporting survey (OMNRF 2018a). This overestimate was more pronounced for the harvest of bears by non-residents (13%) than residents (6%). We know that non-resident harvest estimates are very accurate because hunters are obligated to report their harvest and they are often assisted by tourism service providers. Therefore, the estimates from our voluntary survey were probably upwardly biased due almost entirely to differences in the estimated success rates for active non-resident hunters (63.1% compared with 56.3% for the voluntary survey here and mandatory reports, respectively). Thus, successful non-resident hunters were more likely to respond to the survey than were unsuccessful hunters.

The difference between our results and the mandatory harvest and activity reporting survey for residents was less than it was for non-residents. However, this closer alignment seemed to arise from 2 differences that worked in opposite directions: When measuring success in a consistent way (i.e., for each hunter and season and not simply each hunter), the estimated success rate from the voluntary survey was almost 15% greater than the rate from the mandatory survey (i.e., 17.1 to 14.6%). This difference was partially mitigated by differences in the estimated rate of inactive licensed hunters. After making the inactive rates comparable (again by hunter and season and not simply hunter), the inactive rate of hunting was 8.3% greater from the voluntary than mandatory survey data (21.6% to 20.0%). Unlike the non-resident comparison, no definitive statement about bias and the surveys is possible because the response rates by resident hunters for the voluntary and mandatory surveys in 2017 were similar (OMNRF 2018a).

Conclusions

Black bear hunting in Ontario is economically important with an estimated \$50.6 million (CAD 2017, 95% CI=\$42.7–\$60.2 million) spent in 2017. An estimated \$13.8 million (95% CI=\$11.7–\$16.4 million) was spent on hunting during the 2017 spring pilot season alone. In comparison, fall hunting contributed an estimated \$36.8 million. While Ontario resident bear hunters spent more than non-residents overall, non-residents spent more per capita on bear hunting than did residents. Northern Ontario residents generally hunted in Northern Ontario (WMUs 1–45), in addition to the more than a quarter of southern Ontario bear hunters who were also estimated to hunt in Northern Ontario. These facts suggest that potentially \$6 million in expenditures flowed from southern to Northern Ontario, benefitting the economy in this part of the province.

Non-resident hunters were much more aware of and likely to participate in the bear premolar teeth submission program than were residents. If all resident hunters could be made aware of the program, the potential increase to participation would be 89%, providing a much more comprehensive base of information about Ontario's bear population. A direction for future research could be how best to increase resident bear hunters' awareness of the program.

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Appendices

Appendix A. 2017 Ontario Black Bear Hunter Survey

2017 Ontario Black Bear Hunter Survey



Research conducted by the Ontario Ministry of Natural Resources and Forestry

If you misplaced your postage-paid return envelope, please mail the survey to Len Hunt at the address below.

Centre for Northern Forest Ecosystem Research
103-421 James Street South
Thunder Bay, ON, Canada
P7E 2V6



1. How many years have you hunted for black bear in Ontario?

_____ years

2. How many black bears in Ontario have YOU personally harvested?

_____ bears

3. What methods do you use while bear hunting in Ontario? (please check one box for each line)

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	Suspended baits above the ground
<input type="checkbox"/>	<input type="checkbox"/>	Placing baits on the ground or in a container on the ground
<input type="checkbox"/>	<input type="checkbox"/>	Dogs
<input type="checkbox"/>	<input type="checkbox"/>	Stalking
<input type="checkbox"/>	<input type="checkbox"/>	Stand/blind hunting
<input type="checkbox"/>	<input type="checkbox"/>	I hunt for bear while primarily hunting for deer or moose
<input type="checkbox"/>	<input type="checkbox"/>	Other (specify _____)

4. What type(s) of firearms do you regularly use while bear hunting in Ontario? (please check one box for each line)

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	Rifle
<input type="checkbox"/>	<input type="checkbox"/>	Shotgun
<input type="checkbox"/>	<input type="checkbox"/>	Bow
<input type="checkbox"/>	<input type="checkbox"/>	Crossbow
<input type="checkbox"/>	<input type="checkbox"/>	Muzzle-loader

5. Did you hunt for bears in Ontario in 2017? (hunting for bears includes trips where you hunt bears while hunting deer or moose)

- Yes No (please skip to question 25)

6. Did you hunt for bears in Ontario during the SPRING of 2017? (please check one box)

- Yes No (please skip to question 9)

7. For your Ontario SPRING bear hunts in 2017, please record each Wildlife Management Unit (WMU) where you hunted for bears. For each WMU, please record how many days you

hunted and whether you personally harvested a bear. *(please record your responses in the table below)*

Wildlife Management Unit	Approximate number of days you hunted for bear in each WMU during the SPRING of 2017	Did you harvest a bear during the SPRING in this WMU?
<i>Example – WMU 31</i>	<i>5</i>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No

8. If you do not recall the WMU, please record other information about the locations of your hunt (e.g., Bear Management Area (BMA) or nearby community).

9. Did you hunt for bears in Ontario during the FALL of 2017? *(hunting for bears includes trips where you hunt bears while hunting deer or moose)*

- Yes No (please skip to question 12)

10. For your Ontario FALL bear hunts in 2017, please record each Wildlife Management Unit (WMU) where you hunted for bears. For each WMU, please record how many days you hunted and whether you personally harvested a bear. *(please record your responses in the table below; see question 7 for an example of how to complete the table)*

Wildlife Management Unit	Approximate number of days you hunted for bear in each WMU during the FALL of 2017	Did you harvest a bear during the FALL in this WMU?
		<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No

11. If you do not recall the WMU, please record information about the locations of your hunt (e.g., Bear Management Area (BMA) or nearby community).

BLACK BEAR HUNTING EXPENDITURES

12. What currency will you use to report your bear hunting expenditures? *(please check only one box and use this same currency to record all of your expenditures)*

- Canadian United States

13. Did you purchase a bear hunting package or services in Ontario in 2017 (e.g., from a tourist outfitter that might include accommodation, baiting, food, and/or transportation to the hunting site)? *(please check one box)*

- Yes I purchased a package solely or primarily for hunting bear
 Yes I purchased a joint package for bear hunting and fishing/hunting other species
 No (please skip to question 18)

14. Was this package or service for bear hunting in Northern Ontario (WMUs 1 to 45, north of French and Mattawa Rivers)? *(please check one box)*

- Yes No

15. Was this package or service for bear hunting during the ...? *(Please check all that apply)*

- Spring Fall

16. What items were included in your Ontario bear hunting package or service? *(please check one box for each line)*

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	Accommodation
<input type="checkbox"/>	<input type="checkbox"/>	Baiting
<input type="checkbox"/>	<input type="checkbox"/>	Guides
<input type="checkbox"/>	<input type="checkbox"/>	Meals and beverages
<input type="checkbox"/>	<input type="checkbox"/>	Transportation to and from bait sites
<input type="checkbox"/>	<input type="checkbox"/>	Air transportation to and from an outpost/lodge
<input type="checkbox"/>	<input type="checkbox"/>	Skinning and butchering
<input type="checkbox"/>	<input type="checkbox"/>	Taxidermy
<input type="checkbox"/>	<input type="checkbox"/>	Hunting licence
<input type="checkbox"/>	<input type="checkbox"/>	Other (specify _____)

17. How much did YOU PERSONALLY spend on these bear hunting package(s) or services including gratuities/tips in 2017? (Please record the amount below)

\$ _____

For the following expenditure questions, please only record expenditures not included in your bear hunting package or service expenditures (e.g., travel costs in Ontario to and from your home to a tourism lodge or outpost).

18. How much did YOU PERSONALLY spend in ONTARIO for bear hunts in 2017 on the following items NOT included in hunting packages or services? (please record your expenses for each item)

	Total amount spent in Ontario
Fuel for vehicles	\$ _____
Other ground transportation within Ontario (e.g., train, bus)	\$ _____
Airline costs within Ontario	\$ _____
Lodging within Ontario (including camping fees)	\$ _____
Guide, outfitter, charter, transporter fees (separate from question 17)	\$ _____
Groceries, meals, and beverages	\$ _____
Equipment rental	\$ _____
Hunting fees and licences	\$ _____
Taxidermy and butchery services (by professional)	\$ _____

19. About what percentage of your total trip expenditures above were spent primarily for... (please check a box for each type of hunt; the percentages should add to 100)

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Hunting bear during the SPRING	<input type="checkbox"/>										
Hunting bear during the FALL	<input type="checkbox"/>										
Hunting other wildlife or pursuing other activities	<input type="checkbox"/>										

20. What percentage of your total hunting expenditures above were spent in northern Ontario (WMUs 1 to 45 – the area north of the French and Mattawa Rivers) (Please record your responses below)

About _____ per cent

21. How much did YOU PERSONALLY spend in ONTARIO in 2017 on the following gear and equipment related to bear hunting? (only report expenditures that occurred in 2017)

	Total amount spent in Ontario
Hunting equipment (guns, bows, arrows, ammunition, cases, blinds)	\$ _____
Personal gear (clothing, boots, sun glasses, sun screen, bug spray/suit)	\$ _____
Camping gear (cooler, tent, sleeping bags, lanterns)	\$ _____
Photographic equipment (trail-cam, cameras, lenses)	\$ _____
Other gear (lifejackets, binoculars, guidebooks)	\$ _____
Taxidermy and butchery gear (for do it yourself)	\$ _____
Purchased ground or water-based vehicles (boats, ATVs, trailers)	\$ _____
Other vehicle expenses (storage fees, licence, training)	\$ _____
Maintenance and repairs for vehicles	\$ _____
Registration and vehicle licence fees	\$ _____
Other expenses (specify _____)	\$ _____

22. About what percentage of your 2017 gear and equipment expenditures above were spent primarily for ... (please check a box for each type of hunt; the percentages should add to 100)

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Hunting bear during the SPRING	<input type="checkbox"/>										
Hunting bear during the FALL	<input type="checkbox"/>										
Hunting other wildlife or pursuing other activities	<input type="checkbox"/>										

23. What percentage of your total gear and equipment expenditures from question 21 were spent in Northern Ontario (WMUs 1 to 45 – the area north of the French and Mattawa Rivers) (Please record your responses below)

About _____ per cent

24. Compared to previous years, were your 2017 Ontario bear hunt total expenditures:
(please check one box only)

- | | |
|--|---|
| <input type="checkbox"/> Less than average | <input type="checkbox"/> More than average |
| <input type="checkbox"/> About average | <input type="checkbox"/> Not applicable (this was my first year hunting for bear) |

VOLUNTARY BLACK BEAR TEETH SUBMISSION PROGRAM

Managing bears and bear populations in Ontario is difficult without the help of hunters. Hunters like you can provide important information related to harvest, bear sightings, and your hunting activities. To understand the age structure of local bear populations, the Ontario Ministry of Natural Resources and Forestry (OMNRF) relies on hunters to provide two premolar teeth from harvested bears. These teeth are analyzed by science specialists and provide data necessary to help us manage bears sustainably.

25. Before this survey, were you aware of this voluntary premolar bear teeth submission program in Ontario? *(please check one box)*

- Yes No (please skip to question 28)

26. Have you participated in this program by submitting two premolar teeth from a harvested bear to OMNRF? *(please check one box)*

- Yes (Thank You) No

27. Please rate your agreement/disagreement with the following statements related to the Voluntary Bear Teeth Submission Program? *(please check one box for each statement)*

Statement	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Unsure / not apply
I know how to extract premolar teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is easy to extract teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is too much of a bother to send teeth to OMNRF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I know how to submit teeth to OMNRF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I received the age of my harvested bear and thank you	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

crest from OMNRF in a timely manner

The voluntary teeth submission program is useful

ABOUT YOU

28. What are the first three characters of your postal code or zip code? (please record your response below)

_____ first three characters of postal or zip code

29. What is your age? (please check one box only)

<input type="checkbox"/>	15 – 18	<input type="checkbox"/>	40 – 49	<input type="checkbox"/>	70 – 79
<input type="checkbox"/>	19 – 29	<input type="checkbox"/>	50 – 59	<input type="checkbox"/>	80 +
<input type="checkbox"/>	30 – 39	<input type="checkbox"/>	60 – 69		

Thank you for completing the survey. Please mail it back to us in the self-addressed, postage-paid envelope or mail it to us at the address shown on the front cover of the survey. Please use the space below to share any other thoughts about black bears and bear management in Ontario. Please avoid writing information that could be used to personally identify you such as your name or address.

Appendix B. Black bear hunters in Ontario in 2017: Reliability of expenditure estimates

Thresholds were used to assess the reliability of the expenditure estimates for tourism services, other trip-related expenditures, and gear and equipment (OMNRF 2014b). Relative standard errors (standard error of the expenditure estimate divided by the average estimate) were considered *reliable* if they were less than 16.5%, *concerning* if they were 16.6 to 33.5%, and *unreliable* if they were greater than 33.5%. For the tourism service expenditures, the estimates for the Northern Ontario resident strata were in the unreliable to concerning range (Figure B1). Thus, the expenditure estimates for tourism services were pooled for all residents, which resulted in a reliable estimate for average expenditures.

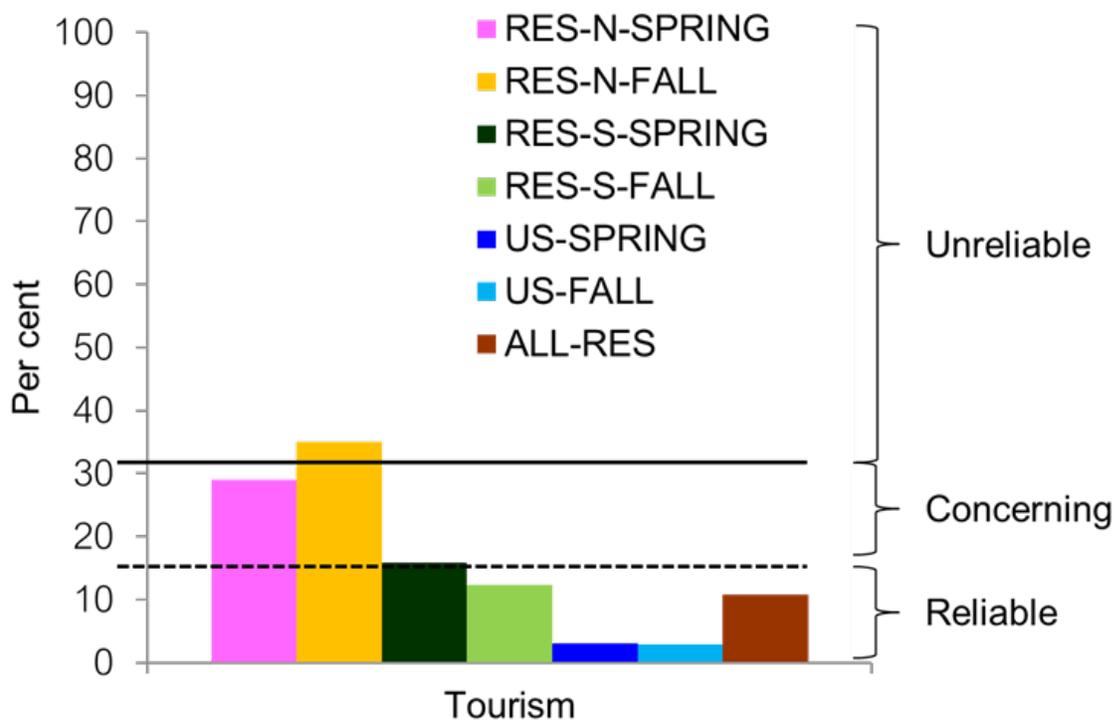


Figure B1. Relative standard errors (%) for 2017 Ontario black bear hunter tourism service expenditures by bear hunter strata and all residents (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

The strata averages for all expenditures on other trip-related items were evaluated as reliable (Figure B2). Most average gear and equipment expenditures were considered or approached *concerning* for all strata (Figure B3). Thus, gear and equipment expenditures were pooled into groups of all non-residents, all residents who bought a licence before or during the spring season (May 1 to June 15) and all residents who bought a licence after spring. Using these groups, the average gear and equipment expenditures were deemed reliable.

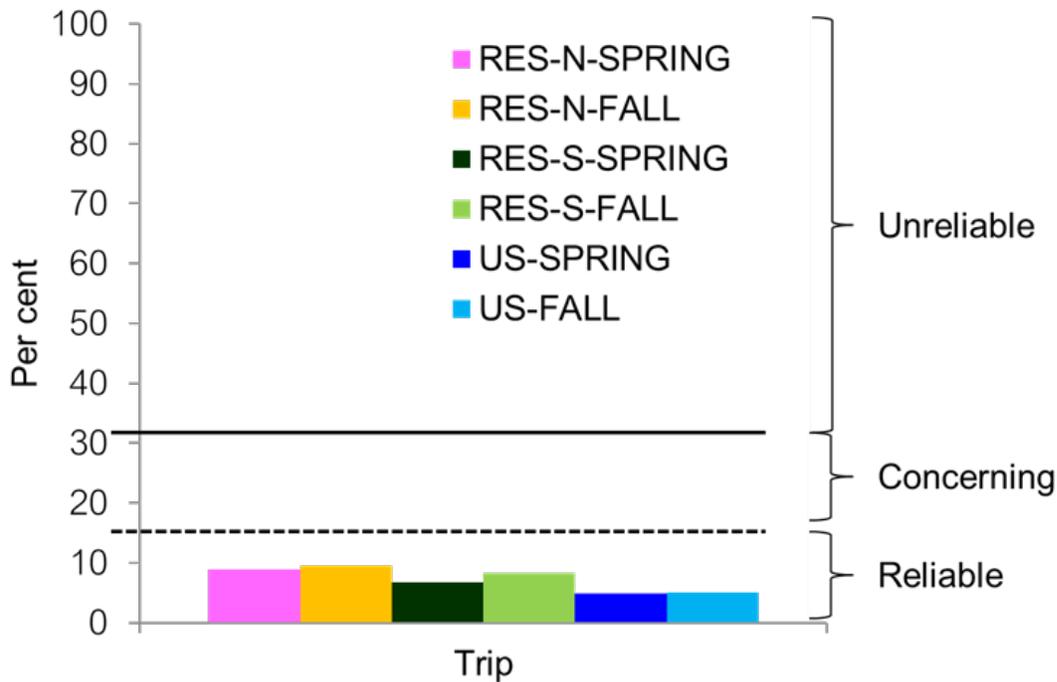


Figure B2. Relative standard errors (%) for 2017 Ontario black bear hunter tourism service expenditures by bear hunter strata and groups based on strata (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

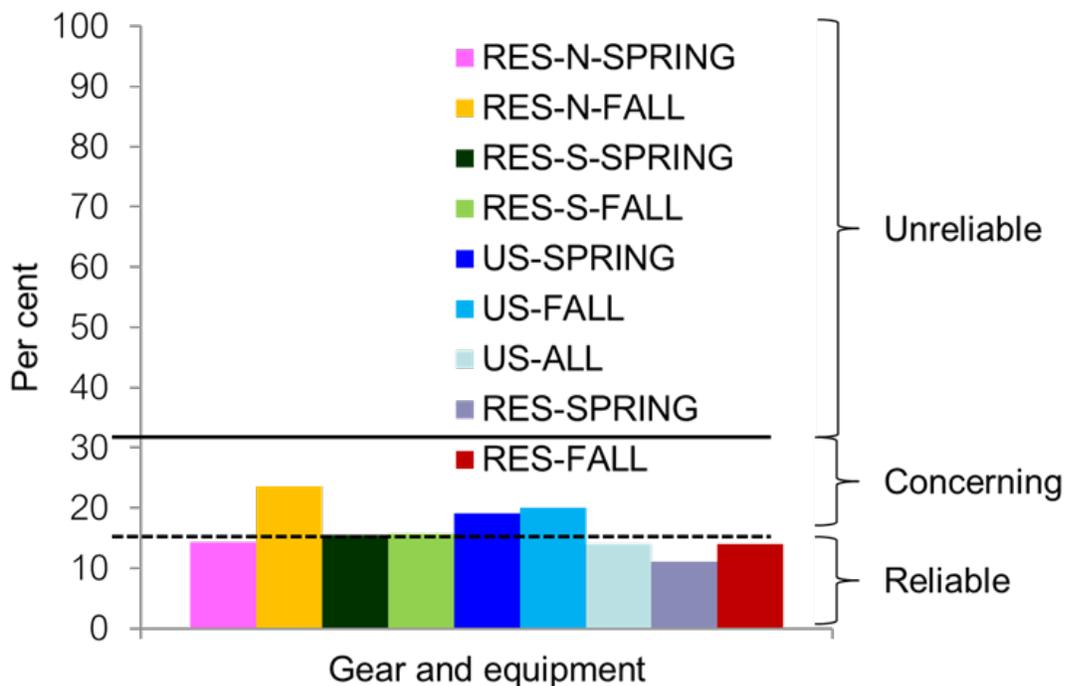


Figure B3. Relative standard errors (%) for 2017 gear and equipment expenditures related to black bear hunting in Ontario by bear hunter strata, all non-residents (US-ALL), all residents buying a licence before or during the spring (May 1 to June 15, RES-SPRING), and all residents buying a licence after spring (RES-FALL; RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Appendix C. Black bear hunters in Ontario in 2017: Other survey results

Table C1. Percentage of Ontario's licensed black bear hunters in 2017 by strata who reported their expenditures in Canadian (CAD 2017) vs. United States currency (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Item	RES-N- SPRING	RES-N- FALL	RES-S- SPRING	RES-S- FALL	US- SPRING	US- FALL
Canadian	100.0	99.6	100.0	100.0	13.3	10.9
United States	0.0	0.4	0.0	0.0	86.7	89.1

Table C2. Percentage of Ontario's licensed black bear hunters in 2017 by strata using different types of tourism services (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Item	RES-N- SPRING	RES-N- FALL	RES-S- SPRING	RES-S- FALL	US- SPRING	US-FALL
Accommodation	100.0	50.0	83.3	90.9	88.7	90.8
Baiting	83.3	83.3	80.0	63.6	97.6	97.6
Guides	66.7	66.7	56.7	45.5	75.7	75.9
Meals and beverages	66.7	50.0	30.0	45.5	20.7	21.0
Transportation	50.0	66.7	40.0	72.7	35.2	39.1
Air transportation	0.0	16.7	0.0	0.0	2.4	1.6
Skinning and butchering	50.0	83.3	46.7	36.4	53.0	62.7
Taxidermy	16.7	0.0	3.3	9.1	0.0	1.6
Licences	33.3	50.0	16.7	25.0	23.9	26.1

Table C3. Average expenditures (\$ CAD 2017) for other trip-related hunting expenses. Relative standard errors are in parentheses by black bear hunter stratum. Bear vs. other hunting expenditures are not separated out (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30; NA=not applicable).

Item	RES-N- SPRING	RES-N- FALL	RES-S- SPRING	RES-S- FALL	US- SPRING	US- FALL
Fuel for vehicles	207.41 (10%)	121.96 (11%)	216.77 (8%)	132.44 (8%)	264.93 (5%)	229.17 (5%)
Other ground transportation	4.38 (45%)	2.88 (49%)	4.20 (29%)	3.15 (37%)	0.83 (71%)	2.17 (52%)
Airline costs	0.00 (NA)	0.47 (100%)	0.00 (NA)	0.90 (77%)	12.17 (47%)	11.94 (50%)
Lodging	16.55 (36%)	12.30 (34%)	42.31 (17%)	46.03 (16%)	99.35 (20%)	91.45 (19%)
Guide, outfitter, charter, transporter fees	1.08 (100%)	1.47 (91%)	2.61 (38%)	2.33 (66%)	17.97 (30%)	28.91 (24%)
Groceries, meals, and beverages	117.99 (14%)	80.52 (15%)	131.06 (9%)	84.46 (8%)	201.40 (5%)	172.11 (6%)
Equipment rental	6.41 (70%)	3.84 (65%)	2.68 (46%)	4.98 (82%)	6.79 (36%)	8.34 (34%)
Hunting fees and licences	47.99 (6%)	38.01 (6%)	51.71 (6%)	37.23 (7%)	272.15 (5%)	260.65 (4%)
Taxidermy and butchering	47.01 (33%)	30.42 (43%)	95.58 (21%)	41.13 (26%)	83.86 (23%)	145.61 (22%)

Table C4. Average expenditures (\$ CAD 2017) for gear and equipment hunting expenses. Relative standard errors are in parentheses by black bear hunter stratum. Bear vs. other hunting expenditures are not separated out (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Item	RES-N- SPRING	RES-N- FALL	RES-S- SPRING	RES-S- FALL	US- SPRING	US- FALL
Hunting equipment	381.04 (14%)	175.95 (16%)	309.50 (14%)	162.72 (17%)	76.60 (27%)	35.40 (40%)
Personal gear	128.92 (14%)	63.14 (17%)	112.65 (11%)	62.27 (11%)	55.77 (16%)	34.25 (17%)
Camping gear	85.31 (40%)	23.48 (31%)	91.18 (54%)	23.28 (20%)	22.47 (43%)	6.45 (34%)
Photographic equipment	91.02 (18%)	40.70 (18%)	69.13 (12%)	34.28 (14%)	18.44 (39%)	11.23 (72%)
Other gear	26.28 (28%)	11.07 (34%)	28.77 (22%)	10.16 (31%)	38.23 (51%)	6.86 (43%)
Taxidermy and butchery gear	29.21 (26%)	36.61 (42%)	49.97 (27%)	22.33 (35%)	19.12 (55%)	16.20 (48%)
Ground or water-based vehicles	956.79 (24%)	586.46 (41%)	691.88 (25%)	435.13 (29%)	2.98 (70%)	0.62 (77%)
Other vehicle expenses	49.32 (30%)	12.78 (24%)	96.76 (54%)	23.55 (19%)	13.92 (29%)	11.64 (33%)
Maintenance and repairs for vehicles	175.34 (17%)	82.17 (20%)	213.30 (43%)	86.69 (17%)	46.32 (38%)	56.40 (33%)
Registration and vehicle licence fees	49.83 (18%)	29.87 (17%)	45.31 (13%)	31.00 (15%)	2.24 (62%)	4.19 (57%)
Other	68.85 (37%)	25.79 (42%)	225.26 (43%)	36.43 (65%)	30.10 (54%)	5.70 (35%)

Table C5. Average gear and other trip-related allocations (%) to non-black bear hunting activity. (Relative standard errors are in parentheses; RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30; NA=not applicable).

Item	RES-N- SPRING	RES-N- FALL	RES-S- SPRING	RES-S- FALL	US- SPRING	US-FALL
Other expenditures (spring only)	7.7 (38%)	NA (NA)	8. (29%)	NA (NA)	5.9 (15%)	NA (NA)
Other expenditures (fall only)	52.8 (14%)	40.4 (8%)	54.5 (9%)	50.8 (5%)	NA (NA)	6.1 (14%)
Other expenditures (fall and spring)	21.4 (14%)	NA (NA)	25.6 (12%)	NA (NA)	NA (NA)	NA (NA)
Gear and equipment expenditures (spring only)	26.4 (17%)	NA (NA)	22.1 (15%)	NA (NA)	9.3 (21%)	NA (NA)
Gear and equipment expenditures (fall only)	57.0 (13%)	47.9 (6%)	59.1 (9%)	53.9 (5%)	NA (NA)	11.9 (17%)
Gear and equipment expenditures (fall and spring)	30.6 (11%)	NA (NA)	34.8 (9%)	NA (NA)	NA (NA)	NA (NA)

Table C6. Black bear hunting-related expenditures (%) in Ontario vs. typical year expenditures by hunter stratum (RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Item	RES-N- SPRING	RES-N- FALL	RES-S- SPRING	RES-S- FALL	US- SPRING	US-FALL
Less than average	23.0	17.6	15.4	16.7	4.7	6.7
About average	51.3	51.4	55.6	52.5	43.2	46.6
More than average	14.6	11.0	12.9	14.1	10.9	9.1
1 st year hunting for bear	11.1	20.0	16.1	16.7	41.2	37.5

Table C7. Rural vs. urban residence of licensed resident black bear hunters (%) by hunter stratum (if second character of postal code for home residence was 0, it was considered rural; RES=resident; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Item	RES-N- SPRING	RES-N- FALL	RES-S- SPRING	RES-S- FALL
Rural	55.7	59.2	50.3	54.5
Urban	44.3	40.8	49.7	45.5

Table C8. Relative black bear hunting effort (days hunted, %) in Ontario in 2017 by region and bear hunter strata (Northern Ontario=WMUs 1–45; RES=resident; US=United States; N=Northern Ontario; S=southern Ontario; spring=May 1 to June 15; fall=August 15 to October 31 or November 30).

Item	RES-N- SPRING	RES-N- FALL	RES-S- SPRING	RES-S- FALL	US- SPRING	US-FALL
Northern Ontario	96.3	88.8	26.6	25.8	92.9	91.0
Southern Ontario	3.7	11.2	73.4	74.2	7.1	9.0

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ISBN 978-1-4868-3014-5 (print)
ISBN 978-1-4868-3015-2 (pdf)