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WILD HARVEST INITIATIVE®

Wild Meat Sharing and Consumption Index Survey

Wyoming

A product of

conservation VISIONS®

Contents

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Executive Summary

Recreational hunting is defined as the pursuit of animals (fish and shellfish excluded) for resources that are not required to meet the hunter's basic nutritional, resource, or spiritual needs (as in subsistence hunting) and are not sold for profit (as in commercial hunting). Recreational hunting emerged in North America in the late 19th century as the foundation of conservation in postcolonial North America. Today it is recognized as making significant contributions to wildlife conservation and the economies of both Canada and the United States. However, while the conservation and economic benefits are widely known, the food benefits of recreational hunting can be overlooked.

Recreational hunting is an important source of food for many people in North America, including those that do not hunt. The food generated through recreational hunting is not only consumed by the hunter, but is also shared with many other people through interpersonal connections and donations. Unfortunately, there has been little effort to characterize how much food is shared, and the number of people with whom food is shared.

Conservation Visions, in partnership with Wyoming Game and Fish Department, implemented the Wild Meat Sharing and Consumption Index Survey in the state of Wyoming as part of the Wild Harvest Initiative®. This survey assessed wild meat consumption and sharing tendencies, as well as hunting characteristics of the hunter population in Wyoming.

We found that 93.5% of successful hunters in Wyoming shared their wild meat. Successful hunters shared their meat with an average of 2.3 people inside of their household and an additional 3.5 individuals outside of their household. Of all the meat generated from recreational hunting, 83.1% was consumed within the household, and 16.2% was shared with people outside of the household. After scaling these statistics to represent all hunters in Wyoming, we estimate that 108,940 people were given wild meat inside of hunters' households and 1.7 million pounds of wild meat were shared with 168,341 people outside of hunters' households, in the 2019–2020 hunting season.

We also found that hunters living in rural communities and of lower socioeconomic status consumed wild meat more frequently and were more likely to report that wild meat is a crucial part of their household food supply. Furthermore, younger generations hunted more often, consumed more wild meat and perceived hunting to be more important to their household food supply than older generations; but younger generations also experienced more obstacles to hunting.

These results indicate that hunters share a significant amount of the food generated through recreational hunting with many people, both inside and outside of their households. This demonstrates that the relevance of recreational hunting to food provisioning extends beyond those who participate. Our results also corroborate findings that recreational hunting is more important to food security for people living in rural communities and of lower socioeconomic status; they also provide new insights, indicating that younger generations differ from older generations in terms of their hunting and food-sharing characteristics, as well as their motivations and obstacles to hunting.

Introduction

After the European discovery of North America, ecosystems on this continent were radically altered by the unfettered exploitation of wildlife. Between the 16th and 19th century, North America's vast wildlife resources were thought to be unlimited, and were highly-profitable to those who exploited them (Mahoney and Jackson 2013). Old-growth timber was plundered without limitation for infrastructure and trade back to Europe, and market hunters made a living by hunting animals in order to sell their hides, meat, and other products (e.g., bowhead whale for their baleen) to affluent city dwellers. This resulted in the decimation of many species (e.g., bison, elk, mule deer, pronghorn antelope, and wild turkey), and the extirpation of other species (great auk and passenger pigeon) and subspecies (Merriam's elk and Audubon bighorn) (Mahoney and Jackson 2013; Brennan et al. 2019; Di Minin et al. 2021).

In the 19th century, the striking absence of once-abundant wildlife could no longer be ignored. A new type of hunter, the "sport hunter", emerged and advocated for the fair chase, ethical treatment and sustainable use of animals, which resulted in the initiation of harvest laws and regulations that set the foundation for the North American Model of Wildlife Conservation (Mahoney et al. 2015; Brennan et al. 2019).

The term "sport hunting" is now antiquated and has been replaced with "recreational hunting". As the name would suggest, recreational hunting is often defined as the pursuit and killing of an animal for recreation or pleasure (Hutton et al. 2009; Di Minin et al. 2021). However, this does not reflect the wide-ranging motivations of recreational hunters, which include obtaining nutritious, ethically-sourced wild meat (Darimont et al. 2017; Bray et al. 2018; Goguen et al. 2018); therefore, we opt for a broader definition of recreational hunting: the pursuit of an animal (fish and shellfish excluded) for resources that are not required to meet the hunter's basic nutritional, resource, or spiritual needs (as in subsistence hunting) and are not sold for profit (as in commercial hunting).

Recreational hunting makes a significant contribution to the economy and conservation in Canada and the US. Total expenditures related to recreational hunting in the US amounted to an estimated $26.2 billion in 2016 (US Department of the Interior et al. 2018). Furthermore, hunting plays a key role in the management of wild species, which saves several hundred million dollars each year by preventing damage to agriculture and human infrastructure, reducing the spread of disease, and helping manage invasive species populations (White et al. 2015). In addition to the economic benefits, recreational hunting generates over a billion dollars for conservation each year through excise taxes, fees and donations: in the US, hunting generates approximately $485 million in taxes, $796 million in fees and $440 million in donations for conservation, every year (Arnett and Southwick 2015). These funds result in tangible conservation impacts; for example, the US Duck Stamp has resulted in over 6 million acres of natural areas being acquired for conservation, and Ducks Unlimited has conserved nearly 15 million acres of waterfowl habitat (Ducks Unlimited; US Fish and Wildlife Service 2018).

While the conservation and economic benefits of recreational hunting are widely known, the food benefits can be overlooked. Preliminary results from the Wild Harvest Initiative® indicate that over 1.3 billion meals (based on a 6oz serving) are generated from recreational hunting in the US, every year (Conservation Visions 2019). This represents an important contribution to food security in the US, where approximately 42 million individuals (1 in 8) experience food insecurity (Feeding America 2021).

Importantly, the food generated from recreational hunting is not only benefitting hunters, because it is shared with other people through interpersonal connections and donations (Goguen et al. 2018). Unfortunately, however, there has been little research pertaining to the impact of the food generated through recreational hunting on food security and human livelihoods.

To assess the food consumption and sharing tendencies, as well as hunting characteristics, of the hunter population in Wyoming, Conservation Visions, in partnership with Wyoming Game and Fish Department, implemented the Wild Meat Sharing and Consumption Index Survey in the state of Wyoming. This survey is part of the Wild Harvest Initiative®, which was launched by Conservation Visions in 2015. This Initiative represents the first serious effort to evaluate the comprehensive economic, conservation, and social benefits of recreational wild animal harvests to modern American and Canadian societies. The Initiative's science-based approach and long-term advocacy and knowledge mobilization strategies are providing a new and innovative assessment of wildlife's value to all citizens, including in the contexts of food security and human health.

The data obtained from this survey are used to evaluate the consumption, and sharing habits of the Wyoming hunting population. This survey also included questions to assess why people hunt and share food, how often people hunt, and a variety of other hunting-related statistics. We also assessed whether the importance of hunting and wild meat differed among demographic groups, such as age, ethnicity and socioeconomic status. This survey is the second of a series of jurisdictional surveys planned for the US and Canada.

Methods

Survey area

Wyoming is the ninth largest state in the contiguous US by area (253,596 km^2); it is also the least populated (579,000) and the least densely populated (2.32 persons/km^2) (United States Census Bureau 2019). Wyoming contains large stretches of wilderness and unique landscapes. Wyoming consists of the Rocky Mountains as well as the Great Plains and is home to bison, grizzly bears, pronghorn antelope, elk, mule deer, white-tailed deer, and gray wolves. Approximately 9% of the state land is designated wilderness, national parks or study areas; 74% of the state is a grassland pasture or rangeland; and only 2% of the land is cultivated (US Department of Agriculture 2019). The paucity of cultivated land is because Wyoming has an average elevation of 6700 feet above sea level and approximately 37% of the state is unsuitable for crop cultivation (Knight et al. 1994). The majority of Wyoming's land area (55%) is public land, owned by either the state or federal government (National Wilderness Institute 1995).

Survey design and implementation

The survey was administered using Qualtrics, a web-based survey tool. The survey was administered to a random sample of 44,000 hunters that either successfully drew a hunting license, or purchased a hunting license for which no draw was needed, in 2019 or 2020. License holders of all types of hunting licenses (e.g., bird/small game license, elk license, turkey license, etc.) were included in the sample. The survey was sent via email by the Wyoming Game and Fish Department on June 7, 2021. Respondents could fill out the survey during the time period of June 7 - July 20, 2021. Reminders were sent at 14 days and 28 days. Hunters were incentivized to participate with a draw to win a $350 Bass Pro Shops gift card.

Non-residents of Wyoming and individuals who did not possess a hunting licence were excluded from the survey. Specific answers to certain questions also precluded respondents from answering certain questions. For example, if the respondent wrote that they did not hunt during the season, they were not asked if they were successful at hunting during the season, or if a respondent wrote that they were unsuccessful at hunting during the season, they were not asked which species they harvested.

Survey respondents were asked to complete a harvest matrix indicating which species they had harvested in the last hunting season. For each reported species, respondents indicated the number of animals harvested, whether the harvest occurred on public or private land, and what percentage of the meat they allocated to the following usage categories (responses needed to sum to 100%): consumed inside of the household, shared outside of the household, still in the freezer, left in the field, used as feed for animals, spoiled, and other. Respondents selected species from a list reflecting the legally hunted species in Wyoming. For practical reasons, select small game species as well as upland and migratory bird species were grouped into categories, such as “ducks” and “rabbits”. Furbearers and fish were not included.

Percentage of food shared by mass

For each harvested species, respondents reported the number of animals harvested and the percentage of meat from that species that they allocated to each usage category. To determine the total percentage of meat allocated to each usage category by the entire survey population, it was necessary to first determine the total mass of meat that was allocated to each usage category. To do this, we used the Wild Harvest Initiative® Database (WHID) to determine the edible mass of harvested species (Conservation Visions 2019).

The WHID includes the number of animals legally harvested in Wyoming during the 2014-2015 and 2015-2016 hunting seasons, as well as the edible mass of each species harvested. For each species reported by a respondent, we multiplied the number of animals harvested by the edible mass of the species to give the total edible mass resulting from the harvest of that species. The total edible mass of the harvest was then multiplied by the percentage of meat reportedly allocated to each usage category to obtain the mass of meat allocated to each usage category. These masses were summed for all species and respondents, and were used to derive the percentage of meat allocated to each usage category.

In certain instances, the WHID was more detailed than the sharing survey, as the WHID contained species weights based on the demographic characteristics of big game animals (for example, male vs female vs juvenile moose), whereas survey respondents only reported harvest at the species level (e.g., “moose”). To assign an edible mass to large game species reported in the survey, for each species, we obtained a weighted average of the edible mass of each demographic grouping, weighted by the number of animals harvested in each demographic grouping. This method allowed for the edible mass given to large game species in this survey to reflect the patterns of harvest in Wyoming. For example, if mostly male moose were harvested in Wyoming between 2014 and 2016, then the edible mass of a male moose would have greater influence on the edible mass of moose used in this survey.

The WHID was also more specific for small game species as well as upland and migratory bird species than this survey. The WHID contained the edible mass of each species, whereas this survey contained species categories such as “ducks” and “rabbits”. The edible mass of all species within each species category were averaged to determine an edible mass for the species category.

Representativeness of the survey sample

Hunting and wild meat sharing statistics derived from this survey (e.g., the total amount of meat shared outside of the household) are dependent on the type and frequency of species reported to be harvested by hunters in this survey. As such, it was important to determine whether the type and frequency of species reported to be harvested by hunters in this survey was consistent with the type and frequency of species harvested by of all hunters in Wyoming. For example, if a disproportionately high number of large game hunters was sampled in this survey, that could result in overestimating the amount of wild meat shared outside of the household (because large game animals produce more meat relative to small game animals). To determine whether our survey sample is representative of the type and frequency of species that were harvested by all resident hunters in Wyoming, we compared the proportional edible mass generated by all species harvested in this survey with the proportional edible mass of all species harvested by all hunters in Wyoming (using the WHID). Total edible mass of the harvest was used for this comparison, as the focus of this survey was on food sharing.

Hunting on private and public land

Respondents reported, for each species they harvested in the 2019–2020 season, whether the animal was hunted on “public land only”, “mostly public land”, “public and private land”, “mostly private land” or “private land only”. We summarized these data at the hunter level by assigning a numerical variable to each categorical grouping: “public land only” = 1, “mostly public land” = 2, “public and private land” = 3, “mostly private land” = 4, and “private land only” = 5. For each respondent, we took the average of these numerical assignments for all reported harvests. This average was then rounded to the nearest whole number and converted back into the categorical groupings to indicate the typical behaviour of each hunter. The unrounded average was used for inferential statistical analyses involving this variable.

We also determined where each species and game type tended to be harvested (public vs private land). To do this, we assigned the same numerical classification for public/private land designations described above for all harvest records. A weighted average containing all harvest records corresponding to each species and game type was obtained. Each weighted average of public/private land designations was weighted by the number of animals harvested in each harvest record. This weighted average reflects where the majority of animals within a species/game-type were harvested. For example, if a species only had two harvest records, one where 15 animals were harvested on “public land only” (i.e., numerical classification =1) and one where 2 animals were harvested on “private land only”(i.e., numerical classification = 5), the weighted average would be 1.47, indicating that most animals were harvested on public land.

Scaling data

Certain statistics in this survey were scaled to be representative of the entire hunter population of Wyoming. This was done to estimate two statistics: 1) the total edible mass of wild meat that was distributed to each of the usage categories, and 2) the total number of people with whom food was shared by hunters, within and outside of the hunters’ households. To estimate these statistics, we calculated a conversion rate to scale the statistics generated from our survey to the state level.

The scaling method was based on the number of residents that successfully harvested species inside of Wyoming, because this information was available at both the survey and state level. This method also avoided sample bias, because scaling was only based on successful hunter participation. Therefore, if the survey included a disproportionately low or high number of successful hunters, this would not affect the scaled statistics.

The Wyoming Game and Fish Department kept a record of the number of resident hunters that successfully harvested pronghorn, deer, elk, moose, bighorn sheep, mountain goat, bison, and black bear inside of the state in the 2019-2020 hunting season. For each of the 8 species, state-level data was divided by the survey-level data. This gave 8 ratios, each representing an estimate of the relative size of the survey population in comparison to the total population of hunters in the state. The conversion rate was then calculated by taking a weighted average of these ratios, weighted by the total number of residents that successfully harvested each species in the state (state level). This weighting minimized the error associated with small sample sizes and prevented a relatively small number of hunters from having a large influence on the conversion rate. The unitless conversion rate derived from these calculations was 14.85.

Inferential statistics

We conducted inferential statistics to determine whether hunting and wild meat sharing characteristics varied significantly across the following variables: gender (male, female), age (Greatest, Boomers, Generation X, Millennials), community size [rural (less than 500), small town (500 - 10,000), city (greater than 10,000)], household income (<$50,000, $50,000-$99,999, $100,000-$149,999, $150,000-$199,999, $200,000 or more), highest educational attainment (high school or less, non-bachelor's post-secondary education, bachelor's degree, master's/PhD), ethnicity (Caucasian, other), and member of a hunting/conservation organizations (member, non-member).

If a significant effect of being a member of a hunting conservation organization was detected, then the variable was further tested to determine if there were significant differences between members and non-members of Ducks Unlimited, Rocky Mountain Elk Foundation, National Wild Turkey Federation, Wyoming Wildlife Federation, and Safari Club International.

There were initially more categories for community size, education and ethnicity than reported above; however, certain categories were pooled to conduct inferential statistics due to low sample size. For community size, there are no cities in Wyoming with a population size greater than 100,000 and "city (10,000 - 100,000)", "large city (100,000 - 1 million)", and "metropolitan (over 1 million)" were grouped into "city (greater than 10,000)". For ethnicity, "Hispanic", "Native American", "Asian", "African American or Black", and "Pacific Islander (includes Hawaiian)" were grouped into "other". For highest educational attainment, "high school graduate or have GED" and "less than high school" were grouped into "high school or less"; and "associate's degree (2-year college degree)", "completed some college courses", and "completed vocational school" were grouped into "non-bachelor's post-secondary education".

An appropriate statistical test was chosen depending on the survey question. If the response to the question was categorical, the question was analysed with a Pearson's chi-squared (χ^2) test. If the response to the question was continuous, analysis of variance (ANOVA) and t-tests were performed. If the response to the question was ranked, Mann-Whitney and Kruskal-Wallis non-parametric tests were performed. All tests were performed with a significance threshold of $\alpha = 0.01$.

The following survey questions were analyzed with χ^2 tests: "Were you successful in obtaining wild meat through your own recreational hunting?", "Did you share some or all of the wild meat that you personally harvested with another person, including those in your household?", and "What were your motivations for hunting?", "What were your motivations for sharing wild meat?", "Which of these are significant obstacles to your hunting of wild meat?". If differences were detected, then additional χ^2 tests were used to determine if responses differed between observed and expected values across all categorical groupings.

The following variables were analyzed using analysis of variance (ANOVA) and t-tests: “Was the animal(s) harvested on public or private land?”, “Approximately how many times per month does your household eat meals that include wild harvested meat (on average)?”, and “Approximately how many days did you spend hunting last season?”. Outliers were removed from the latter two variables, if the response surpassed the upper limit of the mean + 3 standard deviations. For the variable “Approximately how many times per month does your household eat meals that include wild harvested meat (on average)?”, respondents gave a range of answers between 0 to 99 meals per month. Any value above the upper limit of 60 was eliminated from the analysis (n=17). For the variable ‘Approximately how many days did you spend hunting last season”, respondents gave a range of answers between 0 to 365. Any value above the upper limit of 100 was eliminated from the analysis (n=9). Both variables were log-transformed to normalize the data.

Before conducting statistics on numerical variables, first, a Levene’s test was used to determine equality of variances. If the Levene’s test was not significant (α=0.05), then equal variances were assumed, otherwise equal variances were not assumed. The appropriate ANOVA or t-test was selected based on the assumption of equal or unequal variances. If the ANOVA was significant (α<0.01) and the variances were equal, a Bonferroni correction was used. If the ANOVA was significant but variances were not equal, the Benjamini and Hochberg (BH) adjustment was used.

Questions with ordinal answers were ranked and analyzed with non-parametric statistics to compare the medians among groups. A Mann-Whitney u-test was used to compare groups of two, and a Kruskal-Wallis h-test was used to compare groups of 3 or more. The following survey questions were assessed using non-parametric statistics: “Wild meat is a crucial part of my household's food supply”, and “Having the freedom to harvest wild meat is very important to my quality of life”. Responses were assigned with the following numeric classification for analyses: “Strongly Disagree” = 1, “Somewhat Disagree” = 2, “Somewhat Agree” = 3, “Strongly Agree” = 4. If the Kruskal-Wallis h-test was significant (α<0.01), then pairwise Mann-Whitney u-tests were performed to determine differences among groups.

Results

Response rate and representation

The survey was sent to 44,000 hunters and 6023 individuals answered one or more questions in the survey (response rate = 13.7%). However, 354 indicated that they were not a resident of Wyoming, and 762 indicated that they did not possess a hunting license; these respondents were eliminated from the survey, giving an effective sample size of 4877 (effective response rate = 11.1%). Not all respondents answered all questions: the number of responses to survey questions ranged between 4327–4877. The response rate of this survey was similar to the response rate of another electronic survey of resident hunters in Wyoming, which exhibited a response rate of 19% (2,215/11,497) and an effective response rate of 10% (1,113/11,497) after removing unusable surveys (Southwick Associates 2017).

The type and frequency of species harvested by respondents in our survey was consistent with type and frequency of species harvested by all hunters in Wyoming between the years 2014–2016; therefore, harvest characteristics of this survey population are considered to be representative of all hunters in Wyoming (Figure A1).

Hunting statistics

Of 4641 respondents who hunted during the season, 3442 (74.2%) were successful in obtaining wild meat through recreational hunting. Most successful hunters only harvested a single species (54.3%), while 27.6% harvested 2 species, and 11.3% harvested 3 species. The remaining 6.8% of successful hunters harvested 4 or more species. Overall, hunters had a strong preference for harvesting large game species. Of the successful hunters, 93.7% harvested a big game species. In contrast, only 24.7% of successful hunters harvested a small game species. The five most commonly harvested species among hunters were elk, pronghorn, mule deer, white-tailed deer and pheasant (Figure 1).

Respondents spent an average of just over 2 weeks hunting in the last season (14.8 days; median = 10) and reported consuming an average of 10.8 meals that include wild meat per month (median = 8). Hunters harvested on average 0.3 animals per day spent hunting (median = 0.1), meaning that the typical hunter needed to hunt for approximately 10 days to harvest one animal. Despite this seemingly low success rate, hunters harvested an average of 17.2 pounds of meat per day spent hunting (median =8.3). In one hunting season, each hunter took home an average of 3.2 animals (median =1), and an average of 153.7 pounds of edible wild meat (median = 75.4).

Nearly half of hunters harvested animals only on public land (47.7%), while 17.2% harvested only on private land, 13.7% harvested animals equally on public and private land, 14.2% harvested animals mostly on public land, and 7.2% of respondents harvested animals mostly on private land. Big game and small game animals tended to be hunted mostly on public land, however, this varied by species. For example, white-tailed deer and goose were hunted mostly on private land (Figure 2).

Hunters were generally supportive of conservation efforts. 70.6% of hunters strongly agreed that projects which raise awareness of the significance of natural habitats for hunting are very important (Table 1). Likewise, just under half of respondents (41.2%) were a member of a hunting/conservation organization (Table 1), and 47.9% of respondents reported conservation benefits as a motivation for hunting (Table A2). Hunting was reported to be very important to the majority of respondents for their food and quality of life: 73.9% of respondents either strongly agreed or somewhat agreed that wild meat was a crucial part of their household's food supply, and 94.2% of respondents either strongly agreed or somewhat agreed that the freedom to harvest wild meat was very important for their quality of life.

Virtually all hunters reported participating in another type of wild harvest activity (92.7%), and the vast majority of hunters also participated in recreational fishing (86.8%). The largest barrier for hunting was reported to be a lack of free time (38.5%), which was followed closely by a lack of access to public land (34.8%), other hunters' disrespectful behavior in the field (30.3%), and too many other hunters in the field (24.8%). Interestingly, no one barrier to hunting was reported by the majority of participants. In contrast, the most cited motivation for hunting was outdoor recreation, and was cited by 82.9% of respondents. This was followed closely by time with family and friends (72.9%) and a preference for wild meat due to its food value (69.3%; Table A2).

Table 1. Hunting-related statistics of the hunter population in Wyoming.

Hunting Characteristic	Number	Percent	Number of Total Respondents
Did you hunt during the season?			4867
Yes	4658	95.7 (95.1, 96.3)	
No	209	4.3 (3.7, 4.9)	
How many years have you been hunting?			4392
Over 30 years	2461	56.0 (54.6, 57.5)	
16-30 years	1119	25.5 (24.2, 26.8)	
6-15 years	534	12.2 (11.2, 13.1)	
Less than 6 years	278	6.3 (5.6, 7.0)	
Following harvest do you process your own wild game meat?			4449
Yes, I process my own meat	2970	66.8 (65.4, 68.1)	
No, I pay to take it to a meat processor	1155	26.0 (24.7, 27.2)	
Other	210	4.7 (4.1, 5.3)	
No, a friend/family member does it for me	114	2.6 (2.1, 3.0)	
It is important to me that my hunting trips are enjoyable whether they result in the harvest of an animal or not.			4440
Strongly agree	3578	80.6 (79.4, 81.7)	
Somewhat agree	658	14.8 (13.8, 15.9)	
Strongly Disagree	126	2.8 (2.3, 3.3)	
Somewhat disagree	78	1.8 (1.4, 2.1)	
It is important to me that I bring home wild meat from my hunting trips.			4452
Somewhat agree	2058	46.2 (44.8, 47.7)	
Strongly agree	1612	36.2 (34.8, 37.6)	
Somewhat disagree	502	11.3 (10.3, 12.2)	
Strongly Disagree	280	6.3 (5.6, 7.0)	
I believe that projects which raise awareness of the significance of natural habitats for hunting are very important.			4427
Strongly agree	3124	70.6 (69.2, 71.9)	
Somewhat agree	1121	25.3 (24.0, 26.6)	
Strongly Disagree	96	2.2 (1.7, 2.6)	
Somewhat disagree	86	1.9 (1.5, 2.3)	
Are you a member of a hunting/conservation organization?			4424
No	2601	58.8 (57.3, 60.2)	
Yes	1823	41.2 (39.8, 42.7)	
Were you successful in obtaining wild meat through your own recreational hunting?			4641
Yes	3442	74.2 (72.9, 75.4)	
No	1199	25.8 (24.6, 27.1)	
Wild meat is a crucial part of my household's food supply.			4441
Somewhat agree	1690	38.1 (36.6, 39.5)	
Strongly agree	1589	35.8 (34.4, 37.2)	
Somewhat disagree	714	16.1 (15.0, 17.2)	
Strongly Disagree	448	10.1 (9.2, 11.0)	

Having the freedom to harvest wild meat is very important to my quality of life.			4430
Strongly agree	3325	75.1 (73.8, 76.3)	
Somewhat agree	846	19.1 (17.9, 20.3)	
Strongly Disagree	135	3.0 (2.5, 3.6)	
Somewhat disagree	124	2.8 (2.3, 3.3)	

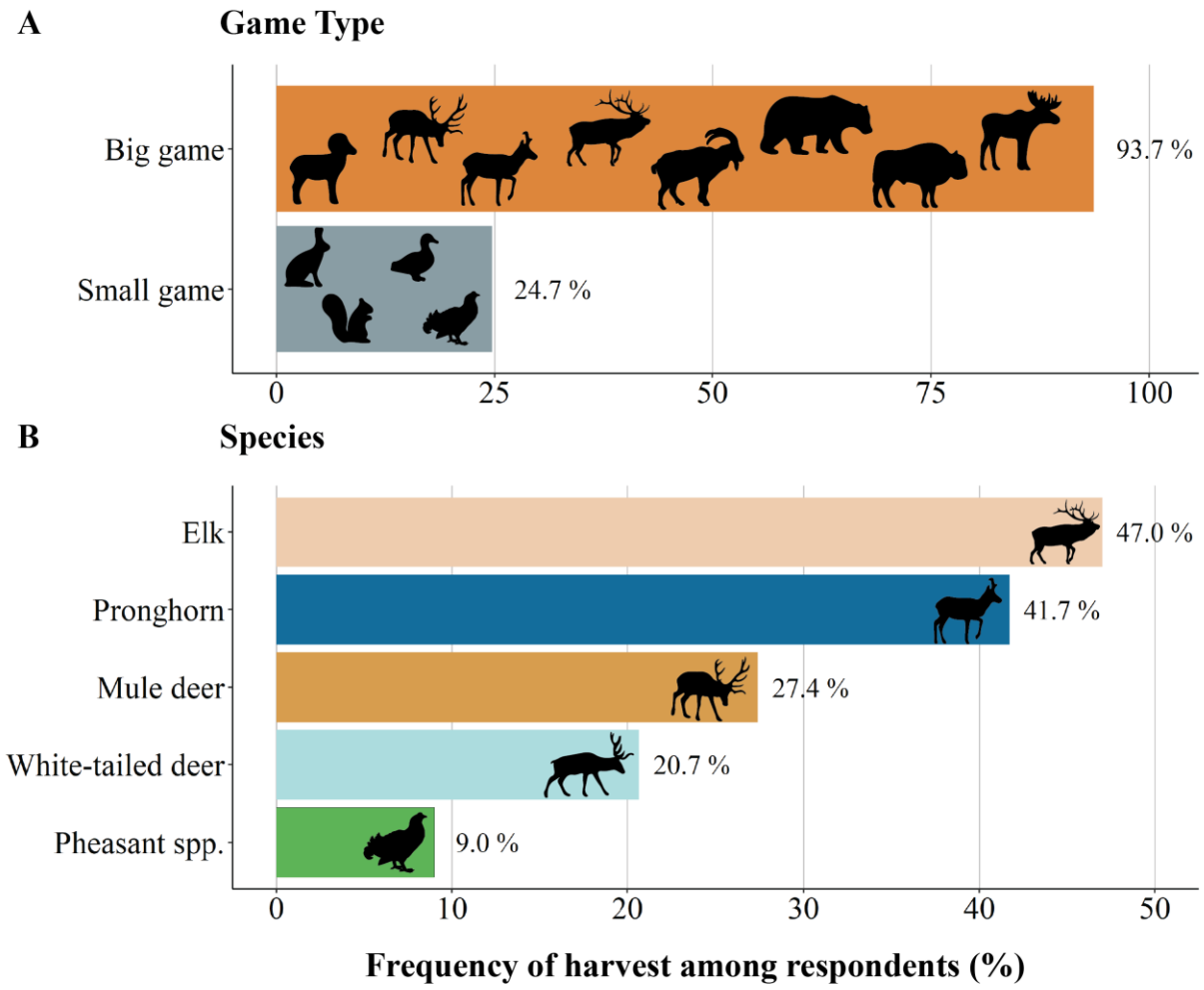

Figure 1. Most commonly harvested game type (A) and species (B) in Wyoming. Bars denote the percentage of respondents that reportedly harvested the game type or species. Respondents could harvest more than one game type or species; therefore, percentages do not sum to 100.

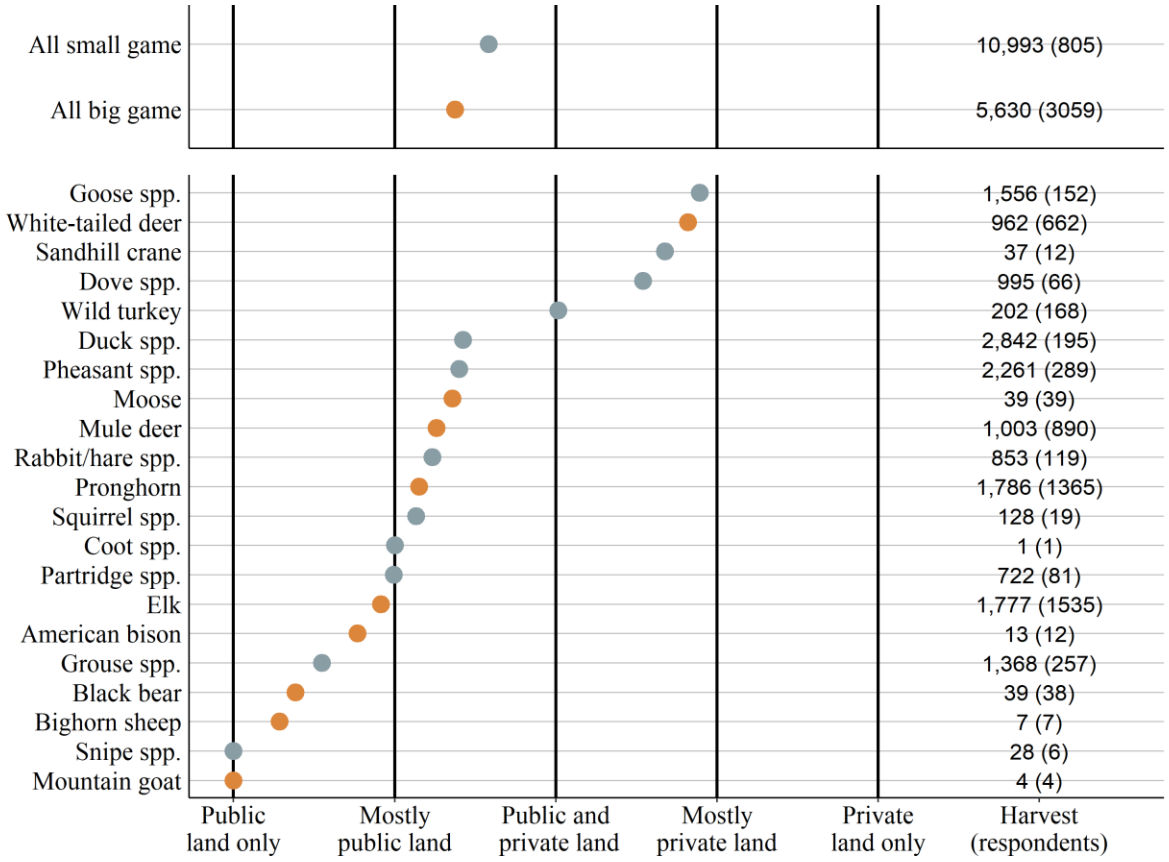

Figure 2. Land type where each species and game type were hunted in Wyoming. Dots represent where each species or game type was hunted on a scale of "public land only" to "private land only". Orange dots correspond to big game species, and gray dots correspond to small game species. For each species and game type, the far-right column displays the total number of animals that were reported to be harvested and the total number of respondents which harvested each species or game type in the survey population. Only species harvested inside of Wyoming are included.

Wild meat production and sharing statistics

Of the successful hunters, 93.5% shared their harvest with another person, 90.3% shared their wild meat with at least one other person inside of their household and 68.9% shared their meat with at least one other person outside of their household. Successful hunters shared their meat with an average of 2.3 other people inside of their household (median = 2), and an average of 3.5 individuals outside of their household (median =2). On average, hunters shared their meat with an average of 5.8 people each (median = 5). Furthermore, 5.4% of successful hunters shared their entire harvest and did not consume any of the wild meat themselves. While the vast majority of hunters shared their harvest, only 40.4% of hunters received wild game from someone else.

While the number of people with whom wild meat was shared was slightly greater outside of the household than within the household, we found that hunters shared a far greater amount of their food

within their household than outside of their household. Of all the harvested meat, 83.1% by mass is consumed within the household, and 16.2% is shared with people outside of the household. Scaling our data, based on the total number of successful hunters in Wyoming, we estimate that 108,940 people were given wild meat inside of hunters' households in Wyoming and 168,341 people were given wild meat outside of the household following the 2019–2020 hunting season. In total, hunters shared their food with an estimated 277,281 people, and approximately 1.7 million pounds of wild meat were shared outside of hunters' households (Figure 3). The majority of the food shared outside of hunters' households was shared to family and friends (Figure 4).

By mass, resident hunters of Wyoming obtained 99.6% of their wild meat from hunting inside of the state and 0.4% of their wild meat from hunting outside of the state. Wild meat derived from large game animals tended to be derived more from in state harvests than did meat derived from small game harvests (Figure 5). Wild meat derived from big game was shared outside of the household more than wild meat derived from small game (Figure 6).

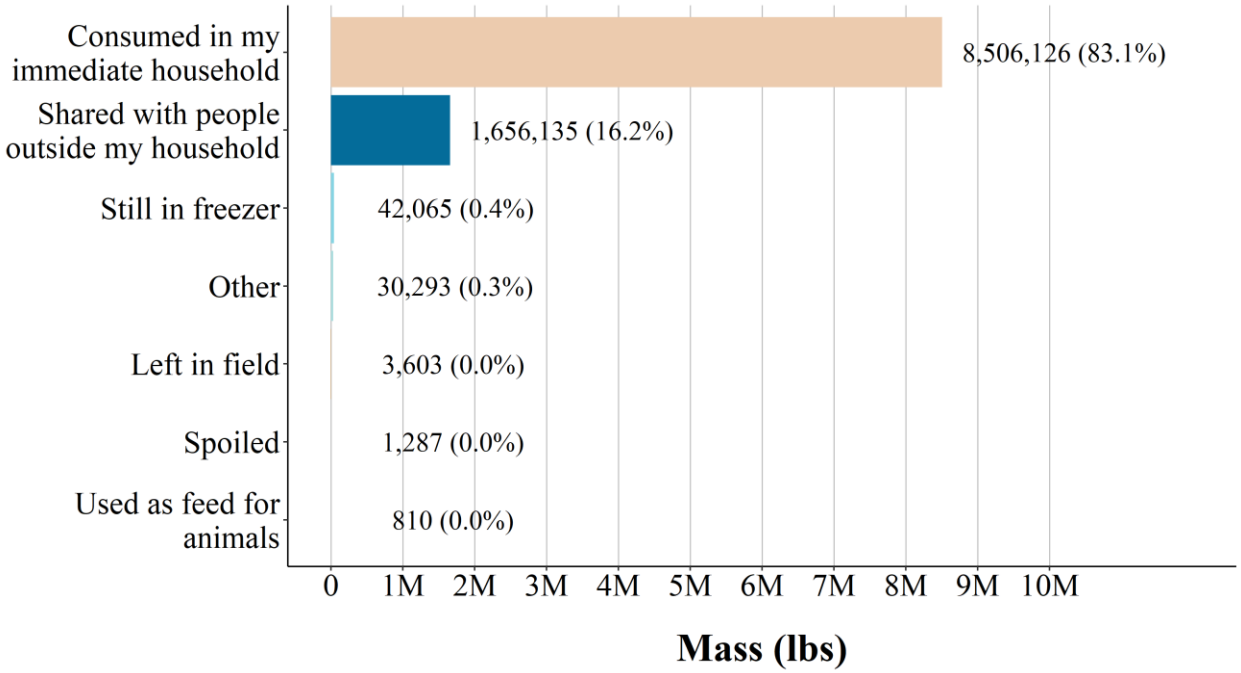

Figure 3. Estimated amount of food shared by all hunters in Wyoming in the 2019–2020 hunting season. The amount of food consumed in hunters' immediate household includes the food that the hunter themself consumed, and so the amount of food that is shared within the household is smaller than reported here.

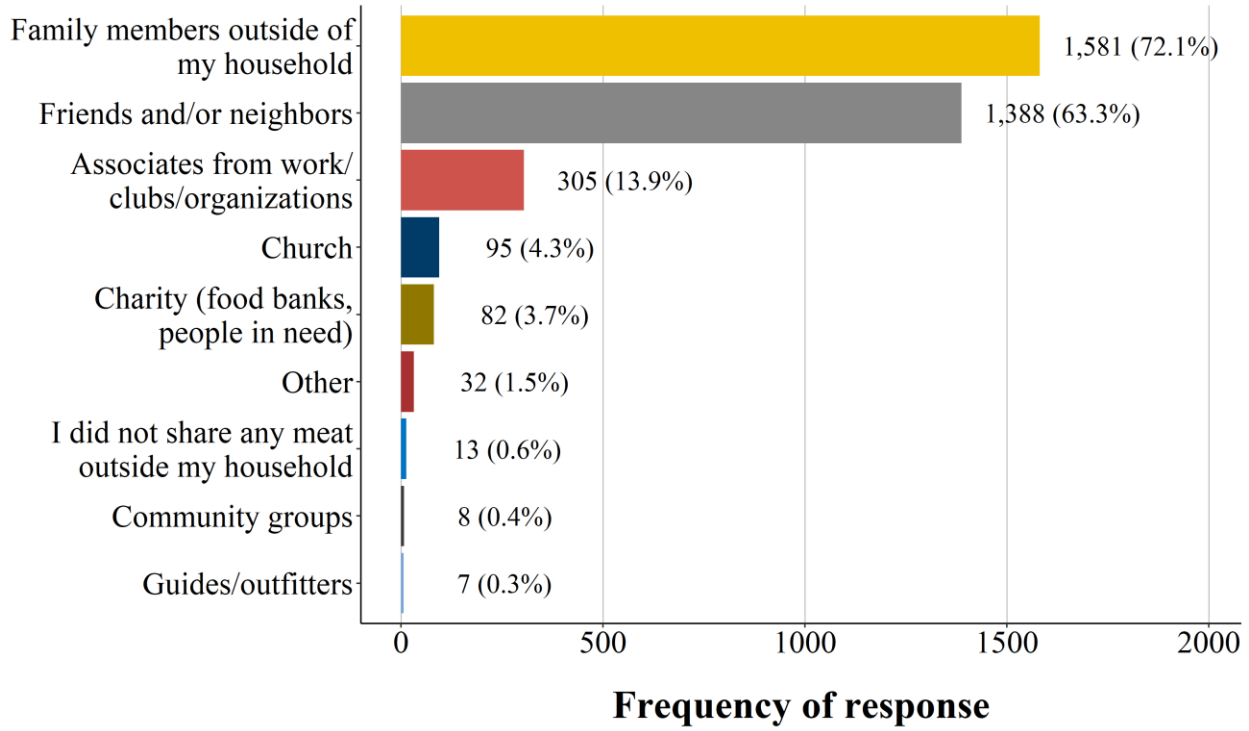

Figure 4. With whom hunters in Wyoming shared wild meat outside of their households. Bars denote the percentage of respondents that selected the response. Respondents could select more than one option; therefore, percentages do not sum to 100%.

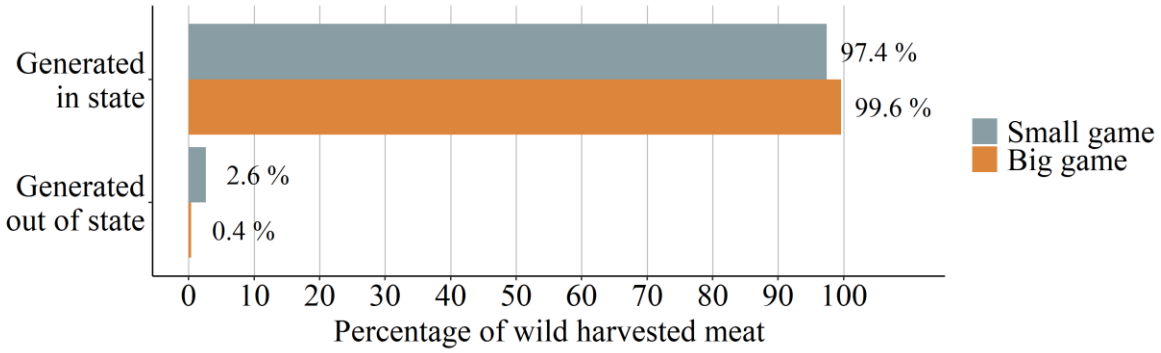

Figure 5. Proportion of wild meat obtained by resident hunters of Wyoming from harvesting animals inside and outside of Wyoming. Proportions are shown for big game (orange) and small game (gray). Like colors sum to 100%.

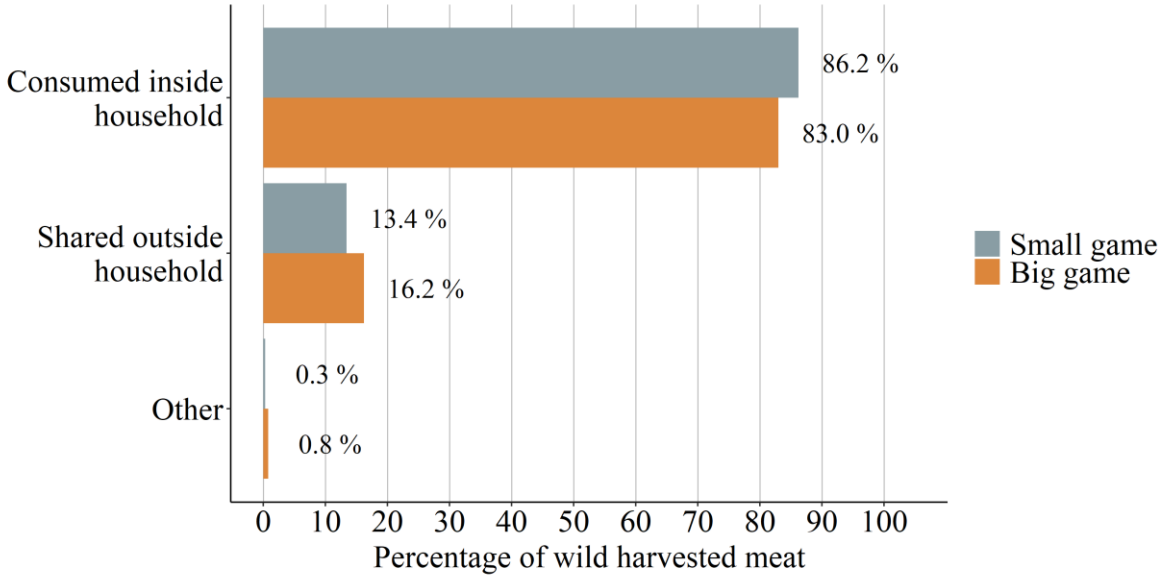

Figure 6. Wild meat sharing tendencies for big and small game. Percentages reflect the proportion of the total amount of meat consumed inside of the household, shared outside of the household, and allocated to other usage categories (i.e., still in the freezer, left in the field, used as feed for animals, spoiled, and other), for each of big game (orange) and small game (gray) animals. Like colors sum to 100%.

Inferential statistics

Hunting success

There were significant differences in hunting success among demographic groups. Millennials were more likely to be successful in obtaining wild meat than all other groups ($p < 0.001$). 77.2% of Millennials were successful in obtaining wild meat through hunting, which was a significantly greater success rate than that observed in Gen X (69.2%), Boomers (67.1%) and the Greatest generation (56.4%). Those that were a member of a hunter organization also had a significantly higher success rate (74.2%) than those who were not a member of a hunter organization (67.4%; $p < 0.01$). No other significant differences were found among demographic variables for hunting success.

Hunting effort

There were also significant differences in hunting effort amongst demographic groups. Significant differences were found between age groups ($p < 0.001$). Younger generations hunted more often than older generations. Gen X and Millennials hunted, on average, 4.2 and 6.9 more days per year than the Greatest generation, respectively (both $p < 0.001$), and 2.2 and 4.9 more days per year than Boomers, respectively (both $p < 0.001$). Millennials hunted, on average, 2.7 more days per year than Gen X ($p < 0.001$).

There were also significant differences in hunting effort across gender, highest educational attainment ($p = 0.01$) and member of a hunting/conservation organization. Males hunted 3.7 more days per year,

on average, than females ($p < 0.01$). Respondents with a high school education or less hunted, on average, 1.9 more days per year than those with a master's or PhD ($p < 0.01$). Members of a hunting/conservation organization hunted, on average, 3.9 more days per year than non-members ($p < 0.001$). Upon further testing individual hunter/conservation organizations, members of ducks unlimited hunted, on average, 4.2 more days per year than non-members ($p = 0.001$). No other significant differences were found among demographic variables for hunting effort.

Importance of wild meat to food supply

Responses to the question "Wild meat is a crucial part of my household's food supply" varied significantly across demographic groups. Like the relationship between in age and hunting effort, and age and hunting success, wild meat was more important for Millennials than Gen X ($p < 0.001$), to both Millennials and Gen X than Boomers ($p < 0.001$), and to all three generations than the Greatest generation (all $p < 0.001$).

The importance of wild meat also varied significantly across all demographic groupings except for ethnicity. Wild meat was more important for females than it was for males ($p < 0.001$); and for those living in rural communities or small towns than those living in cities (both $p < 0.001$). Wild meat was more important to households making <$50,000 a year and $50,000-$99,000 than households making $100,000-$149,999, $150,000-$199,999 and $200,000 or more (all $p < 0.001$). Likewise, wild meat was more important to those with a highest educational attainment of high school or less than those with non-bachelor's post-secondary education, a bachelor's degree, and a master's/PhD degree (all $p < 0.001$). Lastly, wild meat was more important to food security for members of a hunting/conservation organization than non-members ($p < 0.001$). Upon further testing of individual hunting/conservation organizations, wild meat was more important to members of the Wyoming Wildlife Federation than non-members ($p < 0.01$).

Wild meat consumption frequency

Mirroring trends related to the importance of wild meat to food security, females consumed, on average, 4.5 more meals of wild harvested meat per month than males ($p < 0.001$). Furthermore, younger generations tended to consume more wild meat than older generations. Boomers, Gen X and Millennials consumed, on average, 2.6, 4.3 and 7.3 more meals of wild meat per month than the Greatest generation, respectively (all $p < 0.001$). Gen X and Millennials also consumed, on average, 1.7 and 4.7 more meals of wild meat than Boomers, respectively (both $p < 0.001$). Lastly, Millennials consumed, on average, 3.0 more meals of wild meat per month than Gen X ($p < 0.001$).

We detected significant differences in wild meat consumption among community size ($p < 0.001$) and education ($p < 0.01$). Respondents living in a rural and small town consumed, on average, 1.9 and 1.0 more meals of wild meat per month than respondents living in cities (both $p < 0.001$). Furthermore, respondents with a high school education or less consumed, on average, 1.1 more meals of wild harvested meat per month than respondents with a bachelor's degree ($p < 0.01$).

Members of a hunting/conservation organization consumed on average 1.3 more meals of wild harvested meat per month than non-members ($p < 0.001$). Upon testing individual hunter/conservation groups, members of the Wyoming Wildlife Federation had, on average, 4.7 more wild harvested meals per month than non-members ($p < 0.01$).

Wild meat sharing

Millennials were more likely to share their harvest than any other age group ($p < 0.001$) and were more likely to receive wild-harvested meat than any other age group ($p < 0.01$). Boomers were less likely to receive meat compared to other age groups ($p < 0.001$).

Respondents with a high school education or less were less likely to receive wild meat than other age groups ($p < 0.001$). In contrast, those with non-bachelor's post-secondary education were more likely to receive wild meat ($p < 0.01$).

Members of a hunting/conservation organization were more likely to share wild meat and receive wild meat from others (both $p < 0.01$). No other significant differences were found in relation to food sharing characteristics.

Hunting on public and private land

Younger hunters, hunters living in cities, and hunters with a higher household income tended to hunt more on public land. Millennials hunted more on public land than did Gen X ($p < 0.01$); and Gen X and Millennials hunted more on public land than did Boomers ($p < 0.001$ for both) and the Greatest generation ($p < 0.001$ for both).

Hunters living in a small town and city tended to hunt more on public land than did hunters living in rural communities ($p < 0.001$ for both). Furthermore, hunters with an annual household income of >$200,000 hunted more on public land than did hunters with an annual household income of $100,000-$149,999 ($p < 0.01$). Hunters with an annual household income of 100,000-$149,999 hunted more on public land than did hunters with an annual household income of <$50,000 group ($p = 0.001$) (Table A3).

Motivations for hunting, motivations for sharing wild meat, and obstacles to hunting

Many significant differences were found in terms of motivations for wild meat sharing, motivations for hunting, and obstacles to hunting. Not all significant differences are reported here.

In terms of motivations for hunting, Millennials were more likely to report "Save money on food", "Preference for wild meat (ethical/humane)", and "Conservation benefits (money spent on hunting goes back into conservation of habitats)", while Boomers and the Greatest Generation were less likely to report these responses (all $p < 0.001$) (Table A4). Furthermore, hunters with an annual household income of < $50,000 were more likely to report "Save money on food". In contrast, hunters with an annual household income of > $200,000 were less likely to report this response (both $p < 0.001$) (Table A5).

In terms of motivations for sharing wild meat, Boomers were more likely to report "Donating to charitable organizations", but were less likely to report "Raising awareness of the benefits of wild meat" and "Giving someone the opportunity to try wild meat" ($p < 0.001$). Furthermore, hunters with a masters or PhD were more likely to report "I just enjoy sharing my harvest with others" while hunters with a highest educational attainment of high school or less were less likely to report this response (both $p < 0.001$).

In terms of obstacles to hunting, the Greatest generation and Boomers were more likely to report "I do not experience any obstacles to hunting", while Millennials were less likely to report this response (all p

< 0.001). Therefore, Millennials reportedly experienced more obstacles to hunting than older generations. Likewise, Millennials were more likely to report "Cost (gear, equipment, lodging, travel, etc.)" while the Greatest generation and Boomers were less likely to report this response (all $p < 0.001$) (Table A6). Unsurprisingly, the Greatest generation was more likely to report "Personal health reasons" as an obstacle to hunting (ex: difficulty hiking for long periods)" ($p < 0.001$).

Discussion

Food sharing was extremely prevalent among hunters in Wyoming. 93.5% of hunters shared their food and hunters shared their food with an average of 5.8 people each. These results are consistent with food sharing tendencies of venison in Michigan, where venison was shared with approximately 5.6 people (Goguen et al. 2018). Our results suggest that the sharing of wild meat is mostly to non-hunters, because while 93.5% of hunters shared their food, only 40.4% of hunters received wild game from someone else. Therefore, the food benefits of wild meat are likely to extend beyond the hunting community.

Interestingly, while hunters shared their food with more people outside of their household (average 3.5 individuals) than inside (average 2.3 individuals), far more food was consumed inside of the household (83.1%) than outside of the household (16.2%) (Figure 3). The reason for this discrepancy is likely derived from the nature by which hunters share their food. Outside of the household, hunters mostly shared their food with family members, friends and neighbors, or associates from work (Figure 4). Many of these sharing events are likely ephemeral, taking place at family get-togethers or events such as thanksgiving or birthdays. This provides the opportunity to share wild meat with a lot of people, but the amount of food that is shared is likely relatively smaller compared to inside of the household. Inside of the household, recipients are likely given more opportunities to consume wild meat, as the average hunter household consumed 10.8 meals of wild meat per month. Nonetheless, a vast amount of food is shared outside of the household by hunters in Wyoming.

In scaling the food sharing reported by respondents in this survey to all of Wyoming, we found that a vast amount of food was shared by hunters in Wyoming following the 2019–2020 hunting season. We estimate that 1.7 million lbs. of wild meat are shared outside of hunters' households with approximately 168,341 individuals in Wyoming, each year. This food sharing represents an important food provision system, which impacts many people in Wyoming. We found that in total, an estimated 277,281 people receive wild meat from hunters. This is nearly half of the population of Wyoming (47.8%). However, this number may be an overestimate, because this figure is based on the assumption that people received wild meat from only one hunter. In reality some people likely received wild meat from more than one hunter. Furthermore, there are inherent inaccuracies associated with self-reporting, especially, as it relates to wild meat donations to charity, for which the hunter may not know how many people they shared their wild meat with.

Hunters in Wyoming had a strong preference for large game animals (Figure 1). Virtually all hunters harvested big game (93.7%) while only 24.7% harvested small game. Importantly, these statistics only represent the species that were harvested, not targeted. Therefore, the number of hunters targeting big and small game may be different than reported here, depending on the difficulty associated with harvesting different types of game. On a national level, approximately 80% of hunters target big game, 31% of hunters target small game, and 21% of hunters target migratory birds (US Department of the Interior et al. 2018). While these national statistics suggest that large game is more popular than small

game, hunters in Wyoming tended to harvest more large game than national-level statistics would suggest. This may because access to quality upland bird and waterfowl habitat is limited in Wyoming, because much of the habitat for these species is located on private land (Personal Communication — Wyoming Game and Fish Department).

Hunters may prefer to target large game because of the amount of food generated from the harvest of a single animal. While the typical hunters needed to hunt for 10 days to harvest an animal, hunters harvested an average of 153.7 lbs. of wild meat in the season — the equivalent of 17.2 lbs. of meat for each day spent hunting. This represents a considerable food provision for the hunter and the people with whom the hunter shares their harvest. This much food is likely a strong motivation to hunt. Most respondents (69.3%) reported a preference for wild meat as a motivation for hunting (Table A2).

Importantly, our survey found that hunting and wild meat is of greater importance to members of society living in rural communities, and of lower socioeconomic status. Wild meat was more important to food supply for hunters living in rural communities and small towns than those living in cities, for households making <$50,000 a year and between $50,000-$99,000 than all other income levels, and hunters with a high school or less education than all other educational attainment groups. The frequency of wild meat consumption mirrored these results. Wild meat was consumed more by people in rural and small towns than in cities and by less educated people than more educated people. Additionally, hunters with an annual household income of < $50,000 were more likely to report “Save money on food” as a motivation for hunting, and was reported by 45.5% of hunters in this group (Table A5). These results suggest that rural communities and individuals of lower socioeconomic status are more dependent on wild meat for food security. This is consistent with other research, which found that hunting license sales were negatively correlated with socioeconomic status in Illinois (Zhang and Miller 2019), and hunting license sales were negatively correlated with both human population density and income in Ohio (Karns et al. 2015).

We found that younger generations tended to hunt more often, were more successful in obtaining any wild meat in a season, and consumed more meat on average than older generations. This may reflect a vigor in younger hunters, whereby younger hunters tend to spend more time hunting, and harvest more animals as a result. In support of this, younger generations were also more likely to report that hunting was more important to household food supply than older generations.

In spite of this vigor, millennials were more likely to experience obstacles to hunting, and were more likely to report “Cost (gear, equipment, lodging, travel, etc.)” as an obstacle to hunting, and “Save money on food” as a motivation for hunting. These results may suggest that Millennials experience more obstacles because they have less wealth than other generations. Younger generations have less wealth because wealth takes time to accumulate, but millennials, in particular, currently have less wealth compared to other generations when they were of the same age (Kurz et al. 2019; Gale et al. 2020). This is partly attributable to millennials being more racially diverse than preceding generations and the large wealth divide between white and Black people (Kurz et al. 2019; Gale et al. 2020).

Conclusion

We found that hunting generated a lot of meat for hunters in Wyoming, as each hunter harvested, on average, 153.7 pounds of edible wild meat in the 2019–2020 season. This wild meat was perceived as important to both food security and quality of life for the hunters: 73.9% of respondents either strongly agreed or somewhat agreed that wild meat was a crucial part of their household's food supply, and 94.2% of respondents either strongly agreed or somewhat agreed that the freedom to harvest wild meat was very important for their quality of life.

We also found that food sharing is extremely prevalent among hunters in Wyoming. Not only do hunters generate a lot of wild meat, but they share 16.2% (1.7 million lbs.) of this meat with over 168,000 people outside of their households, each year. These results suggest that hunting is an important food provision system in Wyoming that extends beyond the hunter community.

While obtaining wild food was an important aspect of hunting for most respondents, we found that the importance of hunting to food security was not equal among demographic groups. Respondents living in rural communities and of lower socioeconomic status consumed more wild meat and reported wild meat as being more important to food security than respondents living in cities and of higher socioeconomic status, respectively. Lastly, younger and older hunters varied in many ways, from how often they hunted and consumed wild meat, to their motivations and obstacles to hunting. Further research is needed to determine whether these reflect generational differences that persist throughout participants' lifetimes, or if they are a product of participants' age and change as they progress through life.

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Appendix

Table A1. Demographic characteristics of survey sample.

Demographic Characteristic	Number	Percent	Number of Total Respondents
Gender			4383
Male	3845	87.7 (86.8, 88.7)	
Female	509	11.6 (10.7, 12.6)	
Prefer not to say	28	0.6 (0.4, 0.9)	
Other	1	0.0 (0.0, 0.1)	
Age			4404
Generation x (born 1965-1980)	1675	38.0 (36.6, 39.5)	
Boomers (born 1946-1964)	1421	32.3 (30.9, 33.6)	
Millennials (born after 1980)	1145	26.0 (24.7, 27.3)	
Greatest/Silent (Born prior to 1946)	163	3.7 (3.1, 4.3)	
Highest educational attainment			4355
Bachelor's degree (4-year college degree)	1085	24.9 (23.6, 26.2)	
Completed some college courses	1036	23.8 (22.5, 25.1)	
High school graduate or have GED	832	19.1 (17.9, 20.3)	
Master's or PhD	584	13.4 (12.4, 14.4)	
Associate's degree (2-year college degree)	561	12.9 (11.9, 13.9)	
Completed vocational school	201	4.6 (4.0, 5.2)	
Less than high school	56	1.3 (1.0, 1.6)	
Annual household income			4379
$100,000 - $149,999	957	21.9 (20.6, 23.1)	
$50,000 - $74,999	862	19.7 (18.5, 20.9)	
$75,000 - $99,999	807	18.4 (17.3, 19.6)	
$25,000 - $49,999	611	14.0 (12.9, 15.0)	
Prefer not to answer	574	13.1 (12.1, 14.1)	
$150,000 - $199,999	278	6.3 (5.6, 7.1)	
$200,000 or more	167	3.8 (3.2, 4.4)	
Less than $25,000	123	2.8 (2.3, 3.3)	
Community size in which you live			4394
City (over 10,000)	1976	45.0 (43.5, 46.4)	
Small town (500 - 10,000)	1861	42.4 (40.9, 43.8)	
Rural (less than 500)	557	12.7 (11.7, 13.7)	
Ethnicity			4377
White or Caucasian	3955	90.4 (89.5, 91.2)	
Prefer not to answer	210	4.8 (4.2, 5.4)	
Hispanic	91	2.1 (1.7, 2.5)	
Other	62	1.4 (1.1, 1.8)	
Native American	36	0.8 (0.6, 1.1)	
Asian	13	0.3 (0.1, 0.5)	
African American or Black	7	0.2 (0.0, 0.3)	
Pacific Islander (includes Hawaiian)	3	0.1 (0.0, 0.1)	

Table A2. Non-exclusive hunting characteristics of the hunter population in Wyoming.

Hunting Characteristic	Number	Percent*	Number of Total Respondents
In which other types of wild harvests do you participate?			4409
Recreational freshwater fishing	3829	86.8 (85.8, 87.8)	
Gathering firewood	1977	44.8 (43.4, 46.3)	
Shed antler gathering	1680	38.1 (36.7, 39.5)	
Christmas tree harvest	1202	27.3 (25.9, 28.6)	
Berry picking	1175	26.7 (25.3, 28.0)	
Mushroom foraging	611	13.9 (12.8, 14.9)	
Collecting worms for bait	601	13.6 (12.6, 14.6)	
Collecting items for natural crafts (burls, acorns, etc.)	501	11.4 (10.4, 12.3)	
Recreational saltwater fishing	446	10.1 (9.2, 11.0)	
Trapping	333	7.6 (6.8, 8.3)	
I do not participate in other wild harvesting activities apart from hunting	323	7.3 (6.6, 8.1)	
Fruit, tuber, vegetable, and/or herb foraging	320	7.3 (6.5, 8.0)	
Wildflower harvesting	152	3.4 (2.9, 4.0)	
Other, please specify	58	1.3 (1.0, 1.7)	
Sap and/or resin harvesting	33	0.7 (0.5, 1.0)	
Wild honey harvesting	23	0.5 (0.3, 0.7)	
Which of these are significant obstacles to your hunting of wild meat?			4439
Not enough free time	1711	38.5 (37.1, 40.0)	
Lack of access to public land	1543	34.8 (33.4, 36.2)	
Other hunters' disrespectful behavior in the field	1347	30.3 (29.0, 31.7)	
Too many other hunters in the field	1099	24.8 (23.5, 26.0)	
Expense of harvesting on private land	946	21.3 (20.1, 22.5)	
License and tag fees	810	18.2 (17.1, 19.4)	
Scarcity of wildlife in my preferred hunting area(s)	715	16.1 (15.0, 17.2)	
I do not experience any obstacles to hunting	702	15.8 (14.7, 16.9)	
Government restrictions	688	15.5 (14.4, 16.6)	
Family obligations	681	15.3 (14.3, 16.4)	
Cost (gear, equipment, lodging, travel, etc.)	667	15.0 (14.0, 16.1)	
Concern regarding declining animal populations	665	15.0 (13.9, 16.0)	
Government regulations are confusing	608	13.7 (12.7, 14.7)	
Personal health reasons (ex: difficulty hiking for long periods)	530	11.9 (11.0, 12.9)	
Other, please specify	332	7.5 (6.7, 8.3)	
No one else to go with	271	6.1 (5.4, 6.8)	
Negative societal attitudes towards hunting	204	4.6 (4.0, 5.2)	
Challenges associated with processing my wild meat	138	3.1 (2.6, 3.6)	
Lost interest	41	0.9 (0.6, 1.2)	
What were your motivations for hunting?			4327
Outdoor recreation (exercise, adventure, etc.)	3589	82.9 (81.8, 84.1)	

Time with friends / family	3155	72.9 (71.6, 74.2)	
Preference for wild meat (health/nutrition/organic/local)	2999	69.3 (67.9, 70.7)	
Relaxation	2638	61.0 (59.5, 62.4)	
Connect with nature	2582	59.7 (58.2, 61.1)	
Conservation benefits (money spent on hunting goes back into conservation of habitats)	2072	47.9 (46.4, 49.4)	
Save money on food	1615	37.3 (35.9, 38.8)	
Preference for wild meat (ethical/humane)	1595	36.9 (35.4, 38.3)	
Cultural tradition	1534	35.5 (34.0, 36.9)	
Help to control animal populations	1222	28.2 (26.9, 29.6)	
Run dogs and watch them work	357	8.3 (7.4, 9.1)	
Other, please specify	103	2.4 (1.9, 2.8)	
Why did you choose to share your wild meat harvest with people outside your household?			2181
I just enjoy sharing my harvest with others	1263	57.9 (55.8, 60.0)	
Helping family and friends with their food supply	874	40.1 (38.0, 42.1)	
I share with people who don't want to hunt themselves (or cannot) but enjoy wild harvested meat	681	31.2 (29.3, 33.2)	
Giving someone the opportunity to "try" wild meat	615	28.2 (26.3, 30.1)	
Exhibiting pride in my successful hunt	322	14.8 (13.3, 16.3)	
I had more than I could consume in my household	307	14.1 (12.6, 15.5)	
Helping those in need with their food supply (outside of family and friends)	225	10.3 (9.0, 11.6)	
Raising awareness of the benefits of wild meat	203	9.3 (8.1, 10.5)	
Health reasons (provision of healthy protein to others)	187	8.6 (7.4, 9.7)	
I was just making room in the freezer	86	3.9 (3.1, 4.8)	
Other, please specify	85	3.9 (3.1, 4.7)	
Reciprocity (hopes of getting meat back in other years from other hunters)	70	3.2 (2.5, 3.9)	
Donating to charitable organizations	42	1.9 (1.3, 2.5)	
Exchange with landowner for hunting on their property	31	1.4 (0.9, 1.9)	
I did not share with anyone outside my household	23	1.1 (0.6, 1.5)	
I enjoy hunting, but my household does not like to eat wild game meat.	19	0.9 (0.5, 1.3)	
I couldn't take it with me after my hunt	5	0.2 (0.0, 0.4)	

* Respondents could have listed more than one response; therefore, column totals do not sum to the number of total respondents.

Table A3. Public and private land hunting tendencies among age groups, community size groups and annual household income groups. A value of 1 indicates that all hunters hunted only on public land and a value of 5 indicates that all hunters hunted only on private land.

Group	n	Mean	Standard Error
Age			
Greatest or Silent	92	2.87	0.176
Boomers	953	2.66	0.053
Gen X	1159	2.22	0.043
Millennials or Gen Z	884	2.04	0.047
Community size			
Rural (less than 500)	385	2.68	0.082
Small town (500 - 10,000)	1348	2.30	0.041
City (greater than 10,000)	1346	2.25	0.041
Annual household income			
Less than $50,000	483	2.44	0.072
$50,000 - $99,999	1165	2.27	0.044
$100,000 - $149,999	700	2.13	0.055
$150,000 - $199,999	202	2.32	0.104
$200,000 or more	120	2.57	0.145

Table A4. Motivations for hunting by age group.

	Millennials (born after 1980)	**Generation X (born 1965-1980)**	**Boomers (born 1946-1964)**	**Greatest (born prior to 1946)**
	n (%)	n (%)	n (%)	n (%)
Outdoor recreation (exercise, adventure, etc.)	969 (84.6)	1305 (77.9)	1110 (78.1)	115 (70.6)
Time with friends / family	888 (77.6)**	1196 (71.4)	902 (63.5)**	93 (57.1)
Save money on food	594 (51.9)**	585 (34.9)	376 (26.5)**	21 (12.9)**
Preference for wild meat (health/nutrition/organic/local)	824 (72.0)	1113 (66.4)	894 (62.9)	95 (58.3)
Preference for wild meat (ethical/humane)	517 (45.2)**	571 (34.1)	426 (30.0)**	29 (17.8)**
Conservation benefits (money spent on hunting goes back into conservation of habitats)	656 (57.3)**	680 (40.6)**	611 (43.0)	68 (41.7)
Connect with nature	766 (66.9)**	923 (55.1)	738 (51.9)*	84 (51.5)
Relaxation	708 (61.8)	960 (57.3)	825 (58.1)	82 (50.3)
Cultural tradition	408 (35.6)	538 (32.1)	496 (34.9)	56 (34.4)
Help to control animal populations	360 (31.4)*	440 (26.3)	358 (25.2)	35 (21.5)
Run dogs and watch them work	92 (8.0)	113 (6.7)	129 (9.1)	18 (11.0)
Other	31 (2.7)	45 (2.7)	24 (1.7)	3 (1.8)

* Significant at the 0.01 level

** Significant at the 0.001 level

Table A5. Motivations to hunting by annual household income.

	Less than $50,000	**$50,000-$99,999**	**$100,000-$149,999**	**$150,000-$199,999**	**$200,000 or more**
	n (%)	n (%)	n (%)	n (%)	
Outdoor recreation (exercise, adventure, etc.)	543 (74.0)	1296 (77.7)	809 (84.5)	238 (85.6)	140 (83.8)
Time with friends / family	475 (64.7)	1155 (69.2)	708 (74.0)	223 (80.2)	127 (76.0)
Save money on food	334 (45.5)**	647 (38.8)	300 (31.3)*	73 (26.3)*	35 (21.0)**
Preference for wild meat (health/nutrition/organic/local)	491 (66.9)	1112 (66.6)	643 (67.2)	177 (63.7)	114 (68.3)
Preference for wild meat (ethical/humane)	271 (36.9)	604 (36.2)	335 (35.0)	96 (34.5)	50 (29.9)
Conservation benefits (money spent on hunting goes back into conservation of habitats)	309 (42.1)	813 (48.7)	450 (47.0)	124 (44.6)	75 (44.9)
Connect with nature	394 (53.7)	929 (55.7)	599 (62.6)	176 (63.3)	104 (62.3)
Relaxation	393 (53.5)	958 (57.4)	597 (62.4)	180 (64.7)	113 (67.7)
Cultural tradition	231 (31.5)	538 (32.2)	378 (39.5)*	110 (39.6)	69 (41.3)
Help to control animal populations	208 (28.3)	488 (29.2)	237 (24.8)	74 (26.6)	37 (22.2)
Run dogs and watch them work	43 (5.9)	120 (7.2)	96 (10.0)	36 (12.9)*	18 (10.8)
Other	23 (3.1)	27 (1.6)	18 (1.9)	7 (2.5)	3 (1.8)

* Significant at the 0.01 level

** Significant at the 0.001 level

Table A6. Obstacles to hunting by age group.

	Millennials (born after 1980)	**Generation X (born 1965-1980)**	**Boomers (born 1946-1964)**	**Greatest (born prior to 1946)**
	n (%)	n (%)	n (%)	n (%)
I do not experience any obstacles to hunting	108 (9.4)**	243 (14.5)	292 (20.5)**	53 (32.5)**
Government restrictions	191 (16.7)	237 (14.1)	230 (16.2)	22 (13.5)
Government regulations are confusing	157 (13.7)	230 (13.7)	198 (13.9)	17 (10.4)
License and tag fees	227 (19.8)	319 (19.0)	237 (16.7)	14 (8.6)*
Cost (gear, equipment, lodging, travel, etc.)	269 (23.5)**	242 (14.4)	140 (9.9)**	8 (4.9)**
Not enough free time	629 (54.9)**	745 (44.5)**	321 (22.6)**	7 (4.3)**
Other hunters' disrespectful behavior in the field	364 (31.8)	517 (30.9)	431 (30.3)	29 (17.8)
Lost interest	6 (0.5)	12 (0.7)	20 (1.4)	2 (1.2)
Challenges associated with processing my wild meat	37 (3.2)	47 (2.8)	46 (3.2)	8 (4.9)
Negative societal attitudes towards hunting	52 (4.5)	66 (3.9)	75 (5.3)	9 (5.5)
Family obligations	251 (21.9)**	302 (18.0)**	113 (8.0)**	11 (6.7)*
Concern regarding declining animal populations	165 (14.4)	240 (14.3)	231 (16.3)	23 (14.1)
Personal health reasons (ex: difficulty hiking for long periods)	31 (2.7)	145 (8.7)	287 (20.2)	64 (39.3)
Scarcity of wildlife in my preferred hunting area(s)	156 (13.6)	283 (16.9)	248 (17.5)	25 (15.3)
Lack of access to public land	441 (38.5)	602 (35.9)	455 (32.0)	37 (22.7)*
Expense of harvesting on private land	238 (20.8)	359 (21.4)	315 (22.2)	30 (18.4)
Too many other hunters in the field	352 (30.7)**	424 (25.3)	299 (21.0)**	18 (11.0)**
No one else to go with	74 (6.5)	77 (4.6)*	103 (7.2)	15 (9.2)
Other	67 (5.9)	124 (7.4)	120 (8.4)	16 (9.8)

* Significant at the 0.01 level

** Significant at the 0.001 level

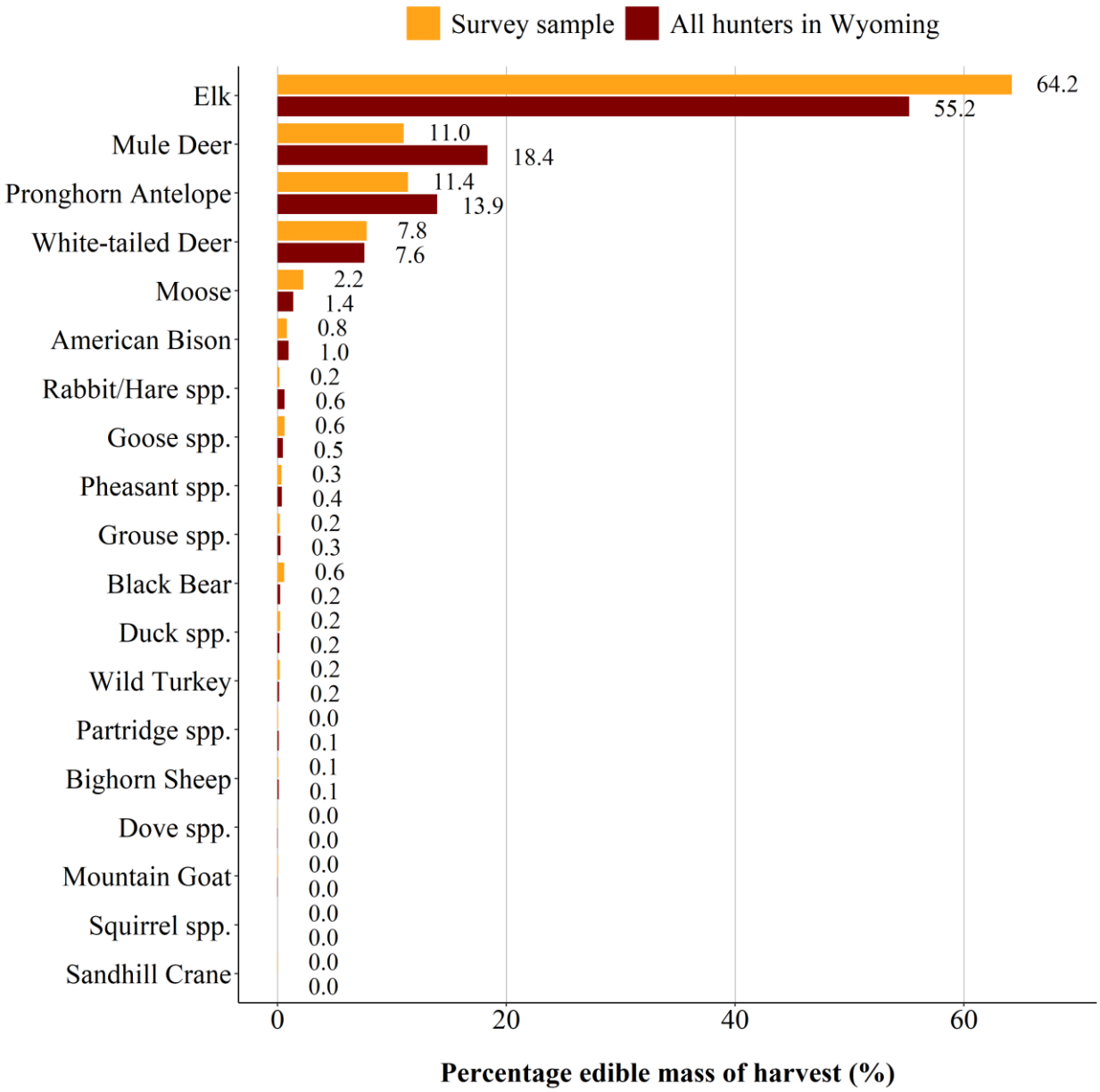

Figure A1. Comparison of the species harvest reported by survey respondents vs the species harvest of all hunters in Wyoming. The harvest reported by survey respondents reflects the 2019–2020 hunting season and the harvest of all hunters in Wyoming reflects the average of two harvest seasons, 2014–2015 and 2015–2016. Data represent the total edible mass derived from the harvest of each species as a percentage of the total edible mass derived from the harvest of all species. Yellow bars represent the survey sample, and dark red bars represent the hunter population of Wyoming. Yellow bars and dark red bars each sum to 100%. Harvest data for all hunters in Wyoming were obtained from the Wild Harvest Initiative® Database.