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2018 MICHIGAN CHRONIC WASTING DISEASE SURVEY

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ABSTRACT

We contacted deer hunters after the 2017 hunting season to describe their current hunting practices that may impact CWD management, to determine hunters' opinions about CWD management options and possible outcomes, and to determine whether hunters were confident in the MDNR's ability to manage CWD. An estimated 97% of the adult resident deer hunting license buyers pursued deer in Michigan during 2017 (508,877 hunters). These hunters harvested 363,372 deer. About 51% of the hunters harvested at least one deer. About 24% of hunters used urine-based scents and 51% used bait while hunting. The use of bait differed significantly among regions and was used the most in the UP (81%) and NLP (55%). Hunting success and mean harvest per hunter were significantly greater for hunters using bait in the UP and NLP than non-baiters. Most Michigan deer hunters did not support the MDNR taking no actions to control CWD, but they also were unwilling to accept outcomes that resulted in fewer deer, fewer bucks, and fewer bucks with large antlers. Hunters generally accepted liberalized hunting seasons but did not support using trained shooters to kill deer or issuing permits to landowners to shoot deer outside the hunting season. Overall, hunters had high levels of confidence in the MDNR's ability to provide information about CWD, but hunters were less confident in the MDNR's ability to make the right decisions and to carry out effective management. About 33% of the deer harvested were processed outside the county where they had been killed. Meat processors played a vital role in deer hunting in Michigan because they handled over 50% of the deer harvested in Michigan. Both the MDNR and meat processors have a mutual interest in identifying deer infected with CWD. Thus, creating a partnership between the MDNR and meat processors could benefit both groups. About

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31,856 Michigan deer hunters pursued deer, elk, or moose outside of Michigan, and they transported 10,711 animals back to Michigan.

INTRODUCTION

Chronic Wasting Disease (CWD) is a fatal neurodegenerative disease affecting several species of wildlife in the Cervidae family including mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), elk (*Cervus canadensis*), and moose (*Alces alces*) in North America. CWD is considered the most important disease currently threatening North American cervids (Gillin et al. 2018). CWD belongs to a group of diseases known as transmissible spongiform encephalopathies, which are caused by infectious misfolded proteins (i.e., prions). CWD prions can be passed directly and indirectly among susceptible animals.

Chronic Wasting Disease was first found among Michigan's wild white-tailed deer in 2015 (Stewart et al. 2016). The Department of Natural Resources (MDNR) has the authority and responsibility to protect and manage deer and elk in Michigan while the Michigan Natural Resources Commission (MNRC) has the authority to regulate the taking of game (Natural Resources and Environmental Protection Act, Public Act 451 of 1994). The MNRC and MDNR can attempt to manage CWD by modifying hunting practices that may facilitate transmission of CWD.

Opinion surveys are one of the management tools used by the MDNR to accomplish their statutory responsibility and to advise the MNRC. The main objectives of this study were (1) to describe current hunting practices that may impact CWD management, (2) to determine hunters' opinions about CWD management options and possible outcomes, and (3) to determine whether hunters were confident in the MDNR's ability to manage CWD. Results of this study will be used to help guide decision making about CWD in Michigan.

Deer population status and hunter attitudes are considered when developing deer hunting regulations. Opinion surveys using probability sampling designs are considered the best method to estimate hunter opinions because the respondents are randomly selected and considered representative of all hunters. Opinions are also frequently obtained from non-randomly selected hunters via public meetings and during informal contacts (e.g., phone calls, letters, online surveys open to all hunters to answer). Estimates of opinions obtained through these processes are generally considered lower quality; however, these estimates are often easier to obtain and cost less than estimates from surveys using probability sampling designs. Thus, an additional objective of our study was to compare hunter opinions derived from (1) a randomly selected sample and (2) a non-randomly selected subset of license buyers.

METHODS

The MDNR currently sells hunting licenses using a statewide electronic license sales system. This system allowed the MDNR to maintain a central database containing license sales information (e.g., sales transactions and customer profiles). From this database, the sex, birth

date, state and county of residence, and license purchasing history of each license buyer were determined.

Although 620,932 people purchased a license to hunt deer in Michigan during 2017 (Frawley 2018), the target population for this study was limited to 527,296 adults (at least 18 years old on October 1, 2017) resident license buyers. Deer hunting license buyers were stratified based on their region of residence (Figure 1). These regions (strata) generally matched ecological regions (Upper Peninsula [UP], Northern Lower Peninsula [NLP], and Southern Lower Peninsula [SLP]) in Michigan (Albert 1995). The ecoregions were areas having similar soils, vegetation, climate, geology, and physiography. The first stratum consisted of adult hunters residing in the UP (N = 40,239). The second and third stratum consisted of adult hunters residing in the NLP (N = 103,576) and in the SLP (N = 383,481).

In August 2018, a questionnaire (Appendix A) was sent to (1) a randomly selected sample and (2) a non-randomly selected sample of deer hunting license buyers. The randomly selected sample consisted of 4,000 people from each region (overall total of 12,000). We also provided all 2017 deer hunting license buyers the option to complete the questionnaire via the internet (i.e., non-random sample). This option was advertised through an email message that was sent to all license buyers that had provided an email address to the MDNR (N=164,051). Only responses received from adult, resident license buyers were used in the final analysis of the non-random sample. The mail and online questionnaires included the same questions. Up to two follow-up questionnaires were mailed to nonrespondents from the random sample; however, no follow-up reminders were sent to the non-random sample of license buyers.

Hunters were asked to report whether they hunted in 2017, county most often hunted, type of land on which hunting occurred (public or private lands), and number of deer harvested. Hunters that went afield (i.e., active hunters) were also asked whether they had used bait and urine-based scents while hunting. Successful hunters (i.e., harvested at least one deer) were asked to report who butchered their deer, where it was butchered, and to describe disposal method for the unused parts of the carcass.

Active hunters were presented with several statements describing possible CWD management options and possible outcomes (e.g., using liberal bag limits and banning bait) and were asked to indicate whether each option and outcome would be acceptable. Responses included “completely unacceptable,” “somewhat unacceptable,” “neither,” “somewhat acceptable,” and “completely acceptable,” and “not sure.” Hunters were also presented several statements related to the MDNR’s ability to manage CWD and asked whether they were confident that the MDNR could manage CWD. Responses included “strongly agree,” “agree,” “neither,” “disagree,” “strongly disagree,” and “not sure.”

Estimates were calculated separately by the region where the hunter had hunted most often in 2017. Regions matched the three ecoregions (UP, NLP, and SLP) that had been defined when selecting the survey sample (Figure 1), and also included the 16-county CWD management zone (Calhoun, Clinton, Eaton, Gratiot, Hillsdale, Ingham, Ionia, Isabella, Jackson, Kent, Mecosta, Montcalm, Muskegon, Newaygo, Ottawa, and Shiawassee), and the 5-county CWD core area (Ionia, Kent, Mecosta, Montcalm, and Newaygo). Hunters were also asked to indicate how important deer hunting was to them compared to their other recreational

activities. Their answer to this question was used to classify them into a hunter type. Estimates were calculated for hunters that indicated that deer hunting was their most important recreational activity (Avid Group) and among hunters that reported deer hunting was among their most important recreational activities (Generalist Group).

We calculated estimates using a stratified random sampling design (Cochran 1977) and presented estimates along with their 95% confidence limit (CL). This CL can be added and subtracted from the estimate to calculate the 95% confidence interval. The confidence interval is a measure of the precision associated with the estimate and implies the true value would be within this interval 95 times out of 100. There are several other possible sources of error in surveys that are probably more serious than theoretical calculations of sampling error. They include the failure of participants to represent the population (i.e., non-random selection), question-wording, and question order. It is very difficult to measure these possible biases.

We calculated statewide estimates from both the non-random online sample and randomly selected sample; however, we relied primarily on the estimates from the random sample to describe hunter attributes and opinions because these estimates were considered less biased. We explicitly stated when an estimate was derived from the online sample; otherwise, estimates presented without stating the source were derived from the randomly selected sample. Furthermore, we only used the random sample to calculate estimates for subgroups (e.g., regions and hunter types).

In addition to the data collected for this study, we also used data that had been collected by previous studies (Frawley 2000, 2002) to examine whether the use of bait affected hunter success and harvest. Previous studies either did not examine this effect or evaluated it using a different measure (i.e., hunting efficiency). Estimates were calculated following the probability sampling designs that were used to collect the data (see methods described in reports).

Statistical tests are used routinely to determine the likelihood that the differences among estimates are larger than expected by chance alone. The overlap of 95% confidence intervals was used to determine whether estimates differed significantly. Non-overlapping 95% confidence intervals were equivalent to stating that the difference between the means was larger than would be expected 95 out of 100 times if the study had been repeated (Payton et al. 2003).

RESULTS

Of the 12,000 questionnaires mailed to the random sample, 303 were undeliverable, resulting in an adjusted sample size of 11,697. We received questionnaires from 5,214 people, yielding a 45% adjusted response rate. Of the 164,051 email invitations sent to deer hunters, 18,268 were undeliverable, resulting in an adjusted sample size of 145,783. We received completed online questionnaires from 9,698 people, and 8,453 of these responses were from people that had received an email invitation (6% adjusted response rate [8,453/145,783]). We also excluded nonresidents and respondents less than 18 years old from the group of online responses; thus, responses from 9,320 customers were used in the final analyses of the non-random sample.

Among the active deer hunters in 2017, about 28% of the deer hunters reported deer hunting was their most important recreational activity (Avid Group), and 57% reported deer hunting was among their most important recreational activities (Generalist Group, Table 1 and Figure 2). In contrast, 12% of hunters indicated deer hunting was no more important than their other activities. In addition, 2% of hunters indicated deer hunting was less important than their other activities, and less than 1% of hunters indicated either that deer hunting was not an important activity or did not indicate the importance of deer hunting.

The frequency in which deer hunters had purchased a deer hunting license during 2013-2017 was calculated for the Avid and Generalist groups. Avid hunters had purchased a license an average of 4.57 ± 0.07 years, while Generalist hunters had purchased a license in an average of 4.45 ± 0.05 years.

An estimated 97% of the adult resident deer hunting license buyers pursued deer in Michigan during 2017 (508,877 hunters, Table 2). About 10% of the license buyers hunted most often in the UP, 37% hunted in the NLP, and 49% hunted in the SLP. In addition, about 25% of license buyers hunted most often in the 16-county CWD management zone, and 10% hunted in the 5-county CWD core area.

Hunters harvested an estimated 363,372 deer statewide (Table 3). About 51% of the hunters harvested at least one deer. Hunting success was similar in the NLP (51%) and SLP (52%) but lowest in the UP (41%). Hunter success was greater among Avid hunters (60%) than Generalist hunters (51%). About 72% of deer hunters statewide hunted on private lands only, 14% hunted on public lands only, and 14% hunted on both private and public lands (Table 4, Figure 3).

Our estimates of statewide hunter success and harvest that were derived from online responders were significantly greater than the estimate derived from the mail sample (Table 3). For example, harvest estimates from the online sample were 52% greater than estimates from the random sample.

Among successful hunters in 2017, about 49% paid a processor to butcher at least one of their deer (Table 5, Figure 4). A lower proportion of UP hunters paid a processor (40%); however, use of processors did not differ significantly among the other regions or hunter types. Hunters statewide took an estimated 162,082 whole deer to a processor (0.63 ± 0.04 deer per hunter, Table 6). Thus, about 45% of the deer harvested in all seasons (162,082 of 363,372 deer) were taken to a processor. About 46% of successful hunters butchered at least one deer entirely by themselves or with a friend's help. These hunters butchered an estimated 169,542 deer (0.66 ± 0.05 deer per hunter). In addition, about 6% of successful hunters processed some of the deer themselves but also paid a processor to handle some tasks (e.g., making burgers and sausage). About 21,731 deer were handled by both a hunter and a paid processor. About 3% of hunters gave away 9,973 deer before they were processed.

Most successful hunters (65%) in Michigan processed at least one deer in the same county where it had been killed (Table 7, Figure 5). These hunters processed 239,195 deer in the county where they had been killed (Table 8). Thus, about 66% of the deer harvested in 2017

(239,195 of 363,372 deer) were processed in the county of kill. In contrast, about 36% of hunters processed at least one deer in a different county than where it had been killed. These hunters processed an estimated 118,861 deer outside the county where it had been killed. Thus, about 33% of the deer harvested in 2017 (118,861 of 363,372 deer) were processed outside the county where they had been killed. In addition, the county where a deer was processed was unknown for 5,316 deer. The NLP had the highest proportion (43%) of hunters processing a deer in a different county than where it had been killed.

About 52% of the active hunters in 2017 (262,826 of 508,877 hunters) usually paid a meat processor to butcher their deer (Table 9, Figure 6). A lower proportion of UP hunters usually paid a processor (45%); however, use of processors did not differ significantly among the other regions or hunter types. About 1% of the active hunters (3,334) reported that the processor that they normally used had stopped accepting deer in 2017 because of CWD (Table 10, Figure 7). Among active hunters in Michigan that normally used a processor, 60% (157,176) indicated that they would continue to hunt deer if all processors stopped handling deer because of CWD (Tables 11 and 12, Figure 8). In contrast, 12% of hunters (31,215) would stop hunting deer. In addition, 28% of hunters (72,307) were uncertain whether they would continue hunting if a processor was unavailable to butcher their deer. Estimates of future hunting activity did not differ significantly among regions or hunter types.

Most successful hunters (51%) in Michigan during 2017 reported that a processor disposed of the carcass for at least one of their harvested deer (Table 13, Figure 9). These processors disposed of 169,188 deer carcasses (Table 14), which represented about 47% of the deer harvested in 2017 (169,188 of 363,372 deer). In contrast, 26% of the successful hunters reported disposing 96,162 deer carcasses in a landfill, which represented about 26% of the deer harvested. The UP had the lowest proportion (41%) of hunters reporting that a processor disposed of a deer carcass but the highest proportion (18%) of hunters that left a carcass on the bare ground.

About 24% of active hunters used urine-based scents while hunting in 2017 (Table 15, Figure 10). Use of these urine-based scents did not vary significantly among regions; however, Avid hunters used these scents (33%) more often than most hunters. Among hunters using urine-based scents, 35% used scents made from natural urine and 22% used a product made from a combination of natural and synthetic urine (Table 16). About 36% of hunters that used urine did not know whether the urine was natural or synthetic. Only 6% of hunters using scents used a product made exclusively from synthetic urine.

About 52% of active Michigan hunters used bait while hunting in 2017 (Table 17, Figure 11). The use of bait differed significantly among regions and was used most frequently in the UP (81%) and NLP (55%) and was used least often in the SLP (43%). Hunting success and mean harvest per hunter were significantly greater for hunters using bait in the UP and NLP than non-baiters; however, success and harvest per hunter for all seasons combined did not vary significantly between baiters and non-baiters in the SLP (Table 18, Figure 12). In the UP, 45% of baiters were successful and 23% of non-baiters were successful. In the NLP, 58% of baiters were successful and 42% of non-baiters were successful.

In 1999, hunting success and mean harvest per hunter during all deer seasons combined were significantly greater for hunters using bait in the UP and NLP than non-baiters (Table 19, Figure 13). In contrast, success and harvest did not vary significantly for SLP hunters. In 2001, hunting success and harvest was significantly greater for archers and firearm hunters using bait in the NELP than non-baiters (Table 19, Figure 14). The NELP included Alcona, Alpena, Montmorency, Oscoda, and Presque Isle counties.

Active hunters were presented with statements describing ten possible CWD management options and were asked to indicate whether each option would be unacceptable or acceptable (Tables 20 and 21, Figures 15 and 16). Most Michigan hunters (61%) indicated that attempting no management action was unacceptable. Most hunters (62%) also reported that using trained shooters to kill deer in localized areas was unacceptable. None of the other eight management options were considered unacceptable by most hunters, although about 43-48% of hunters indicated that four options were unacceptable (i.e., issue permits to landowners and hunters to harvest more deer [43%], suspend mandatory antler-point restrictions [44%], eliminate baiting and feeding of deer while hunting [45%], and eliminate baiting and feeding deer year-round [48%]). Banning baiting and feeding was significantly less acceptable among UP and NLP hunters than SLP hunters (Table 20, Figure 15). In addition, UP hunters were less likely to accept a rule that required all unused parts of a carcass to be buried or disposed of in a landfill.

Two management actions were acceptable to most hunters (Table 21, Figure 16). About 59% of hunters indicated that prohibiting the transport of intact deer carcasses outside CWD-infected areas was acceptable. In addition, 52% of hunters reported that using regulated hunting seasons with liberal harvest limits was acceptable. None of the other six management options were considered acceptable by most hunters, although about 39-48% of hunters indicated that three other options were acceptable (i.e., eliminate baiting and feeding of deer while hunting [39%], issue permits to landowners and hunters to harvest more deer [41%], and require all unused carcass parts be buried or disposed of in a landfill [48%]). Acceptability of the management options was generally similar among regions, except for eliminating baiting while hunting. Hunters in the UP were less likely to accept this option than hunters in the NLP and SLP.

Active hunters were presented with statements describing five possible outcomes of CWD management and were asked to indicate whether each outcome would be unacceptable or acceptable (Tables 22 and 23, Figures 17 and 18). Most hunters indicated that seeing fewer deer (52%), having fewer male deer (56%), and having fewer deer with large antlers (56%) were not acceptable. Slightly less than one-half of hunters indicated that harvesting fewer deer (47%) and having a reduced deer population (49%) were unacceptable. None of the management outcomes were acceptable to most hunters, and acceptability of the management outcomes was generally similar among regions.

Hunters answered seven questions designed to gauge how confident they were in the MDNR's ability to manage CWD (Tables 24 and 25, Figures 19 and 20). Most hunters were confident that the MDR would take the correct actions regarding CWD. Over two-thirds (>66%) of hunters agreed that the MDNR would provide timely information about CWD (71%), provide the best available information about CWD (72%), provide hunters with enough information to

decide how they should respond to CWD (75%), and provide accurate information about human safety concerns related to CWD (77%). Slightly less than two-thirds of hunters indicated that they were confident that the MDNR would make good deer management decisions regarding CWD issues (60%), properly address CWD in Michigan (64%), and provide adequate opportunities for hunters to express their concerns about CWD (67%). Confidence in the MDNR was generally similar among regions, except among hunters in the core CWD area and CWD management zone. Hunters in these areas were less confident that the MDNR would make good deer management decisions and were less confident that the MDNR would properly address CWD in Michigan.

An estimated 31,856 adult Michigan deer hunters pursued deer, elk, or moose outside of Michigan in 2017 (Table 26). About 28% of these hunters harvested at least one animal, and they transported 10,711 animals back to Michigan. Our estimates of hunter success and harvest for out-of-state hunters that were derived from online responders were significantly greater than the estimate derived from the mail sample. Harvest estimates from the online sample were 3.9 times greater than estimates from the random sample.

DISCUSSION

The response rate for the mail version of the survey was greater than for the online version (45% versus 6%). DJ Case and Associates (2017) reported a 20% response rate for an online survey of Michigan deer hunters that had received three email invitations to participate. This response rate was lower than the 46% response rate for a mail survey (included up to three mailings to non-respondents) that was sent to a random sample of deer hunting license buyers (Frawley 2018).

The most commonly hunted wild game species in Michigan and the United States during recent years has been deer (Frawley 2006, Fuller 2016). More deer hunters in Michigan consider deer hunting as one of their more important recreational activities than hunters pursuing other game species (Frawley and Rudolph 2008). The importance of deer hunting in Michigan was similar among hunters in 2001, 2003, 2006, 2012, and 2017 (Figure 21).

Our statewide estimates derived from the non-random online respondents often differed significantly from estimates from the mail survey (random sample). These differences were greatest for estimates of hunting attributes (e.g., harvest, use of bait or urine-based scents [Tables 3, 15, and 17]), and the importance of deer hunting (Table 1). Inferences based on the online respondents indicated that a greater proportion of hunters were classified as Avid hunters (i.e., indicated that deer hunting was their most important recreational activity) than based on estimates from a random sample (28% for the mail sample versus 44% for the online sample). Similarly, DJ Case and Associates (2017) reported that 37% of deer hunters that completed an online survey (non-random sample) were Avid hunters, which was at least 8 percentage points greater than previous estimates derived from mail surveys (Figure 2). Laborde (2014) also reported that online waterfowl hunters (non-random sample) hunted more often, harvested more waterfowl, and were more avid than randomly selected samples of hunters that had completed a mail survey. Peyton and Bull (2006) also reported that attendees

at a public meeting (non-random sample) held to discuss deer population goals in Michigan were more committed to deer hunting than deer hunters in general.

Compared to estimates derived from the random sample, estimates from online responders indicated that hunters were less likely to accept reduced deer numbers, fewer male deer, and fewer deer with large antlers (Table 22). The differences in opinion estimates were relatively small compared to hunting attribute estimates. Laborde (2014) also reported that estimates of hunting effort and harvest based on online responders were significantly greater than estimates from a random sample; however, opinion estimates were similar between random and non-random samples. Laborde (2014) indicated that opinion estimates from non-random samples could be useful for monitoring hunter opinions for many management options, although he cautioned against using non-random samples to estimate opinions about widely publicized and controversial issues.

About 72% of deer hunters statewide hunted on private lands only and 14% hunted on public lands only. The remaining hunters (14%) hunted on both private and public lands (Table 4, Figure 3). Donovan et al. (2004) reported that about 78% of the land area of Michigan was private lands and about 22% was public lands. Thus, the distribution of hunting between private and public lands was similar to the proportions of available land types.

Among the three regions, hunters in the NLP had the highest proportion (43%) of hunters processing a deer in a different county than where it had been killed. This pattern likely reflected that the NLP has the greatest percentage of hunters residing outside the region. In 2017, 37% of the UP hunters resided in the LP, 56% of the NLP hunters resided in the SLP, and 98% of the SLP hunters resided in the SLP (MDNR, unpublished data).

There are both biological and social considerations to make regarding regulating baiting and supplemental feeding. The biological concerns have focused on its potential to congregate deer and to help spread diseases, including CWD (Silbernagel et al. 2001, Williams et al. 2001, Bollinger et al. 2004, Conner and Miller 2004, VerCauteren et al. 2007, Kjaer et al. 2008). Unfortunately, baiting has been highly popular among Michigan hunters (Langenau et al. 1984, Minnis and Peyton 1994, Winterstein 1992, and Frawley 2000). In 2017, 51% of Michigan hunters used bait (Table 17). Furthermore, baiting was used more frequently in the UP (81%) and NLP (55%) than in the SLP (43%). In addition, archers have been more likely to use bait than firearm hunters (Minnis and Peyton 1994, Frawley 2000).

The primary reasons that Michigan hunters have cited for using bait were to make hunting more exciting because they can see more deer and improve their hunting success. Previous Michigan studies have reported that baiting had minimal effect on overall harvest (Langenau et al. 1984, Winterstein 1992). Our analysis of data collected from Michigan hunters in 1999, 2001, and 2017 suggested that baiters were more successful and harvested more deer than non-baiters in the UP and NLP. Weckerly and Foster (2010) suggested that baiting would be more effective in areas where natural food was more limited. The UP and NLP were primarily forested while the SLP was primarily agricultural crops (Donovan et al. 2004); thus, baiting may be more effective in the UP and NLP because natural food may be more limited than in the SLP.

Bait has also been used frequently to see more deer when conducting field surveys using trail cameras (Jacobson et al. 1997, Koerth et al. 1997, McCoy et al. 2011). Weckerly and Foster (2010) reported that they saw ≥3.5 times more deer during baited surveys during the late summer in central Texas than during unbaited surveys. In addition, Beaver (2017) observed deer movements during the late summer in south-central Texas before and after bait sites were created, and he reported that deer increased their use of baited areas after bait was introduced.

Although baiting appeared to improve hunting success in the UP and NLP, we are uncertain how a baiting ban would change overall harvest because we do not know how the distribution of hunters, deer, and harvest would change. In the absence of bait, deer movement and distribution will be different than it was with bait (Beaver 2017). Deer may spend more time foraging on natural foods and be more susceptible to harvest without bait. It is possible that the same number of deer would be taken without bait, but a greater proportion of these deer may be taken by hunters that formerly did not use bait.

Although most Michigan hunters approve of baiting, most hunters also support baiting restrictions when the health of the herd is in jeopardy (Frawley 2017). Thus, any restrictions placed on baiting must weigh both the pro and cons before deciding how to address baiting and feeding (Gillin et al. 2018). Holsman et al. (2010) reported that hunter support for management actions to address CWD, including baiting bans, was predicated on the perceived efficacy of those actions. Furthermore, Riley et al. (2018) reported that support for any management action and satisfaction with the agency was related to the fairness of the process that led to the action.

Baiting appeared to improve hunting success in the regions where the practice was most common (i.e., UP and NLP). And a baiting ban was least acceptable in these same areas (Figure 15). Hunters generally supported imposing carcass disposal and transport rules—even within the CWD areas where nearly 50% supported such rules (Table 21 and Figure 16).

Most Michigan deer hunters did not support the MDNR taking no actions to control CWD, but they also were unwilling to accept outcomes that resulted in fewer deer, fewer bucks, and fewer bucks with large antlers. Hunters generally were supportive of liberalized hunting seasons (Figure 16) but did not support using trained shooters to kill deer or issuing permits to landowners to shoot deer outside the hunting season (Figure 15). Hunters generally indicated that management actions that involved hunters were more acceptable than most other options, although sustained culling by trained shooters has been the only management action that appeared to control CWD (Uehlinger et al. 2016).

Overall, hunters had high levels of confidence in the MDNR's ability to provide information about CWD, but hunters were less confident in the MDNR's ability to make the right decisions and to carry out effective management. Furthermore, the lowest levels of confidence were expressed by hunters within the CWD areas, especially with respect to making good decisions and properly addressing CWD. Similar results have been reported in Illinois (Stafford et al. 2007).

Meat processors played a vital role in deer hunting in Michigan because they handled over 50% of the deer harvested during 2017 (i.e., full processing was completed for 45% of deer and partial processing was done for 6% of the deer). Similarly, only 40% of Indiana deer hunters in 2010 always processed their own deer (Responsive Management 2011). In contrast, 38% of Indiana hunters rarely or never processed their deer and 21% sometimes processed their deer.

Because most deer hunters normally use meat processors to butcher their deer, it is not surprising that 12% of Michigan deer hunters that normally used a processor reported that they would stop hunting deer if a processor wasn't available and 28% of hunters were uncertain whether they would continue hunting. Thus, processors may be critical for retaining many deer hunters (Tables 11-12).

Chronic Wasting Disease can be transmitted to wild deer by the improper disposal of infected carcasses (Miller et al. 2004, International Association of Fish and Wildlife Agencies 2006, New York State Department of Environmental Conservation 2013). Because 45% of the deer harvested (i.e., whole carcasses) in Michigan were handled by meat processors, processors could be a major source of transmission of CWD if infected carcasses aren't handled properly. In New York and Tennessee, 50% of the deer carcasses handled by processors were disposed of in a landfill (i.e., a preferred disposal option); however, the disposal of the remaining carcasses probably did not follow best-management practices (New York State Department of Environmental Conservation 2013, Schuler et al. 2018).

Approved methods of disposing of material infected with prions include incinerating at high temperatures ($\geq$1,000 degrees Celsius or $\geq$1,832 degrees Fahrenheit), reducing by high-pressure alkaline hydrolysis, or burial of raw waste in an approved landfill (Gillin et al. 2018). The residue that remains after incineration or alkaline hydrolysis should also be buried in an approved landfill. Composting waste material may also significantly reduce prion infectivity. Burial of raw material and composting does not completely inactivate prions.

In Michigan, 69% of processors used rendering services to dispose of unused carcass parts from processed animals (Schweihofer et al. 2014). These processors primarily handled domestic cattle and pigs, although about 16% of the animals processed were game animals. Other disposal methods used by processors included burial (11%), placing in a landfill (8%), composting (6%), and incinerating (6%). Schweihofer et al. (2014) estimated that Michigan meat processors handled about 92,000 game animals in 2013; however, this estimate was 43% lower than our estimate of the number of deer handled by processors in 2017. Thus, we were uncertain that Schweihofer et al. (2014) accurately described the number of deer processed and how the processors disposed of the waste from deer carcasses.

Despite our concerns with the estimates reported by Schweihofer et al. (2014), their results were the only estimates available to describe the fate of deer carcasses handled by processors in Michigan. They suggested that most of the waste from deer carcasses handled by processors in Michigan probably has been disposed of by rendering; however, this method of disposal is not completely effective for destroying prions. Material from CWD-positive animals cannot be used in any animal feed or feed ingredients (Sec. 402(a)(5) of the Federal Food, Drug, and Cosmetic Act). Furthermore, the Food and Drug Administration (2016)

recommended that rendering services stop taking cervid parts from known CWD areas (i.e., areas declared by state agencies to be endemic for CWD or to be a CWD eradication zone). This will impact processors that dispose of their waste through rendering services. The most common alternative for processors to dispose of this material is an approved landfill.

Collecting biological samples from deer harvested by hunters has been the most common approach for monitoring CWD in North America (Gillin et al. 2018). The MDNR has traditionally collected biological data (e.g., age and sex) from harvested deer that hunters voluntarily brought to a check station. With the emergence of CWD, data collection at check stations expanded to include sample collection for CWD monitoring. In 2016, MDNR collected data (e.g., age and sex) from about 30,000 deer and collected heads from about 19,500 deer for disease testing (CWD and bovine tuberculosis), and most of these collections occurred at check stations (MDNR 2017). Although the MDNR has expanded the role of check stations, this expansion may not be the best way to achieve effective disease surveillance and monitoring programs. The Wisconsin Department of Natural Resources (2010) spent $5 million annually on CWD management during 2002- 2006, and about 50% of these costs were associated with collecting and testing samples for CWD. Thus, efforts to improve the efficiency of surveillance methods would greatly affect the overall costs of CWD management (Gillin et al. 2018).

In Michigan, about 10% of harvested deer were taken to a check station (MDNR unpublished data), while about 45% of harvested deer (i.e., whole carcasses) were taken to a meat processor. In 2016, the MDNR collected heads from about 19,500 deer at 82 check stations. In contrast, about 58,000 deer were handled by the 67 largest processors (MDNR unpublished data). Thus, meat processors appear to be an under-utilized source of deer for data and sample collection in Michigan. More importantly, the North Carolina Wildlife Resources Commission (2015) compared different ways of monitoring their deer harvest and concluded that data collected at meat processors were more representative than data collected at voluntary check stations.

Working cooperatively with processors to collect data and samples would allow the MDNR to share directly with the processors the best management practices for handling deer and disposal of waste materials (Saskatchewan Ministry of Health 2011, Wisconsin Department of Natural Resources 2017). Because disease prevention is the most efficient strategy in combating CWD (MDNR 2012, Gillin et al. 2018), establishing a working relationship with processors should lead to better handling of deer carcasses and ultimately reduce the likelihood of disease transmission.

Both the MDNR and meat processors have a mutual interest in identifying deer infected with CWD. Both the MDNR and meat processors want to produce disease-free venison products for their customers and limit the spread of the disease among wild deer. Currently, meat processors have access to tissue samples needed for disease testing but have limited access to disease testing services. In contrast, the MDNR has disease-testing services but has to expend a lot of time and effort collecting samples at check stations. Thus, creating a formal business relationship between the MDNR and meat processors could benefit both groups.

MANAGEMENT IMPLICATIONS

Most Michigan deer hunters wanted the MDNR to take actions to control CWD, but most hunters also were unwilling to accept outcomes that resulted in fewer deer, fewer bucks, and fewer bucks with large antlers. Michigan hunters were highly successful, but it may be unrealistic that these levels of success can be maintained while trying to manage CWD. In addition, restricting the use of bait will be difficult in the NLP and UP where it was popular and appeared to improve hunting success. Our results suggest additional discussions with Michigan deer hunters and other stakeholders are required in order to determine what tradeoffs are acceptable in order to address CWD while also addressing MNRC and MDNR goals to provide quality recreation.

CWD was first found in Michigan's wild deer herd in 2015, and the MDNR has placed increased resources on reducing and containing the spread of this disease. However, combating this disease will likely require additional resources and a long-term surveillance program (MDNR 2012). Because combating CWD is expensive and requires a long-term commitment, it's important to adapt management practices and strategies (MDNR 2012, Gillin et al. 2018). For example, collecting data and samples at meat processors may be more efficient than collecting at check stations. It also may be difficult to sustain interest among hunters for long-term disease surveillance programs. In addition, designing a sampling program that solicits samples from volunteers can lead to suboptimal sampling because we are reluctant to bypass additional samples even when goals have been met. In 2017, we set a goal to test 9,900 deer for CWD in Michigan; however, we tested 17,403 deer (i.e., 75% over our goal). In 2018, we set a goal to test 16,090 deer but have tested 29,903 deer as of January 7, 2019 (i.e., 86% over our goal). It may be easier to maintain an effective long-term surveillance program by collecting samples at processors than at check stations because submissions are not dependent on maintaining hunters' interest and because submissions are more easily aligned with sampling goals. The MDNR also needs to work with processors to learn how they dispose of unused carcass parts and determine how the MDNR can assist with maintaining processors. Partnering with processors may also be a proactive strategy for retaining hunters.

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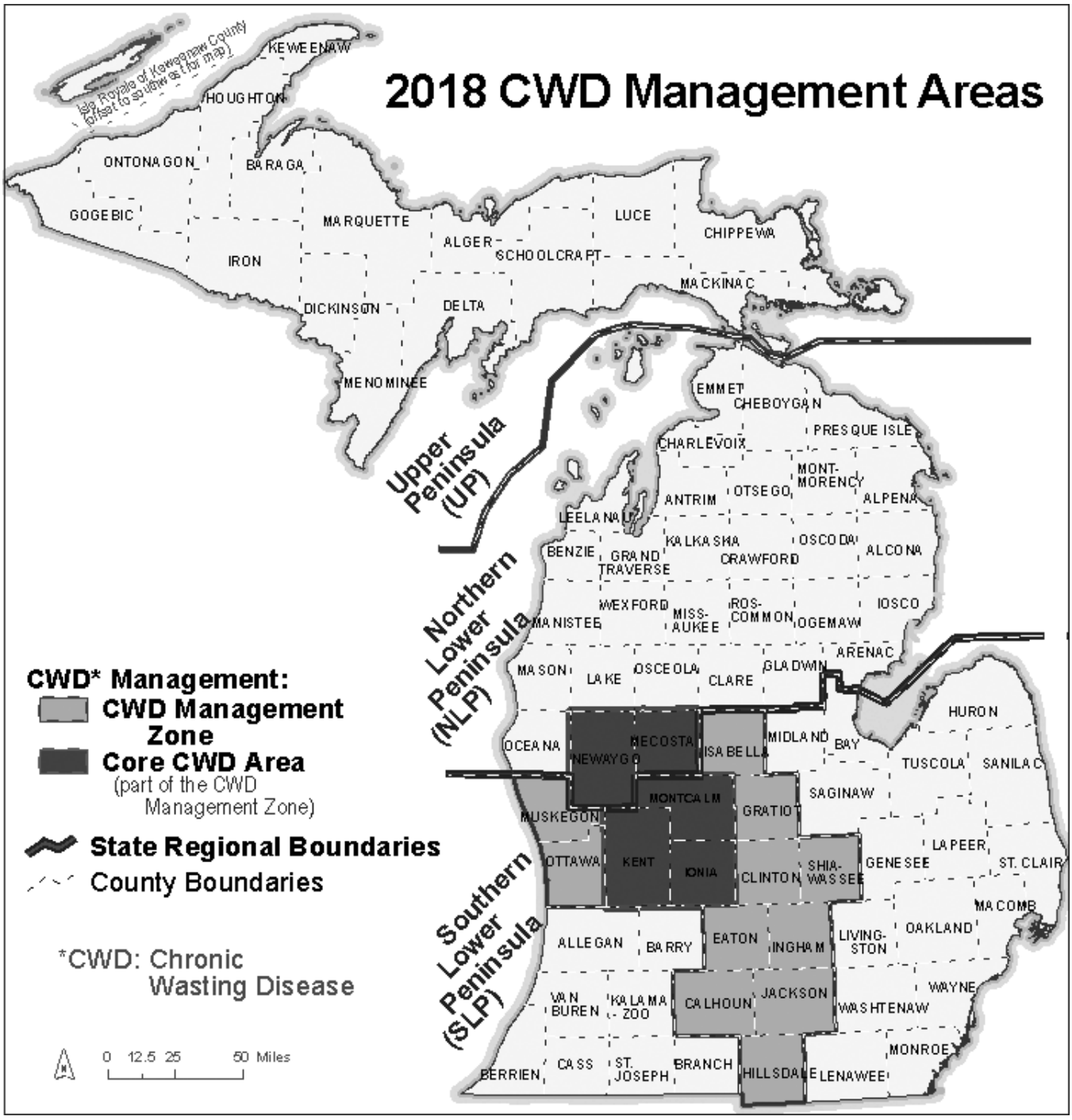

Figure 1. Regions used for summarizing estimates for the 2018 Michigan CWD survey. Regions matched the three ecoregions (UP, NLP, and SLP), the 16-county CWD management zone (Calhoun, Clinton, Eaton, Gratiot, Hillsdale, Ingham, Ionia, Isabella, Jackson, Kent, Mecosta, Montcalm, Muskegon, Newaygo, Ottawa, and Shiawassee) and the 5-county CWD core area (Ionia, Kent, Mecosta, Montcalm, and Newaygo) were within the SLP.

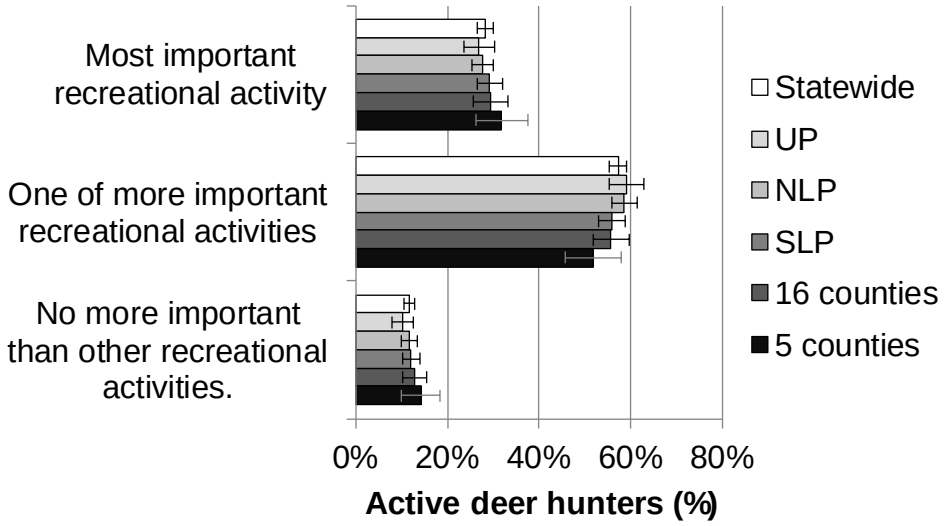

Figure 2. Importance of deer hunting compared to other recreational activities among Michigan deer hunters in 2017, summarized by area hunted most frequently.

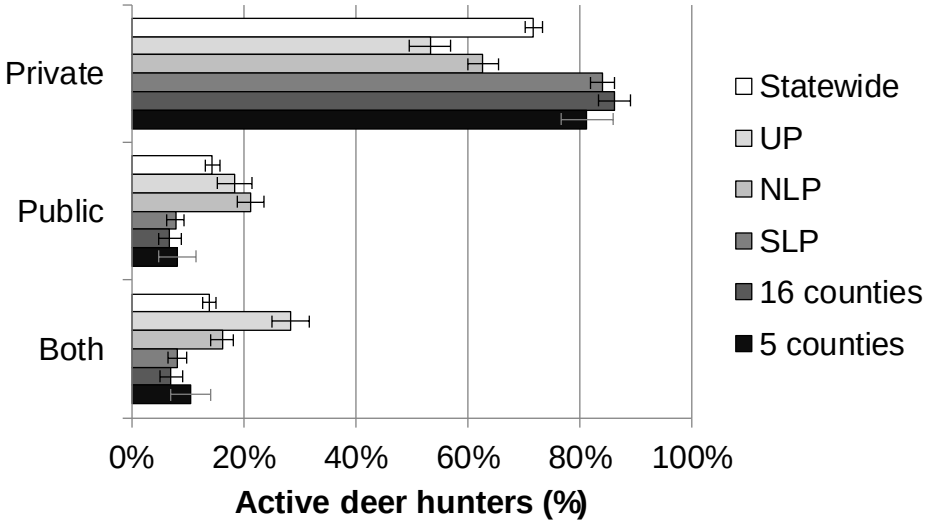

Figure 3. Estimated proportion of people hunting on private and public lands during the 2017 Michigan deer hunting season, summarized by area hunted most frequently.

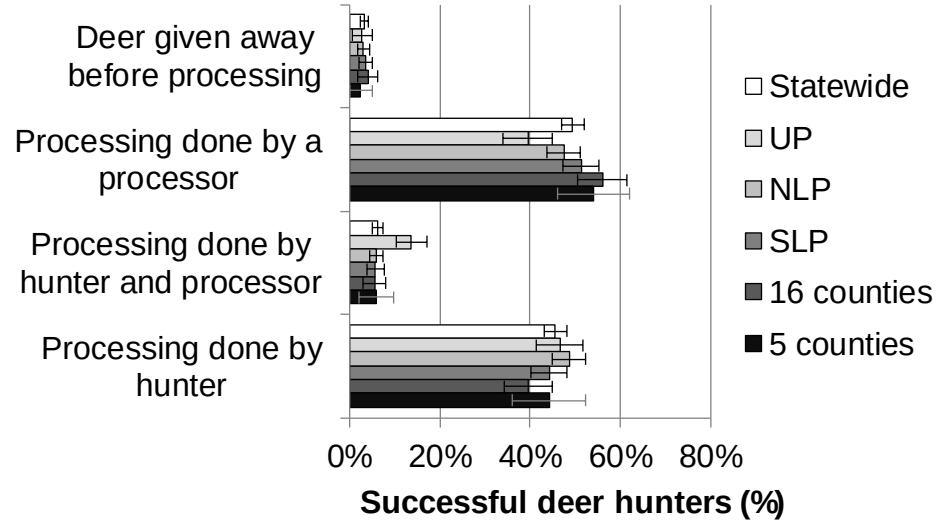

Figure 4. Proportion of successful hunters using various processing method during the 2017 Michigan deer hunting seasons, summarized by area hunted most frequently.

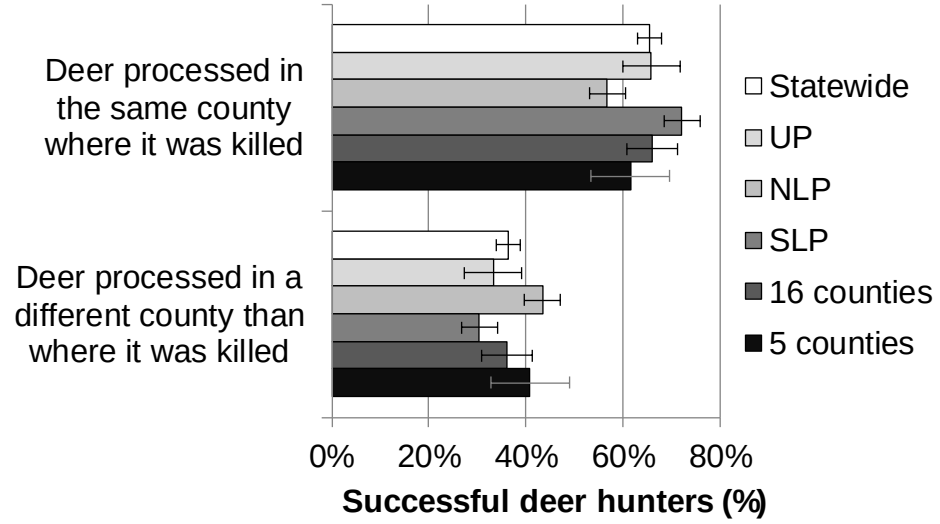

Figure 5. Estimated proportion of people processing deer within and outside the county where it was killed during the 2017 Michigan deer hunting season, summarized by area hunted most frequently.

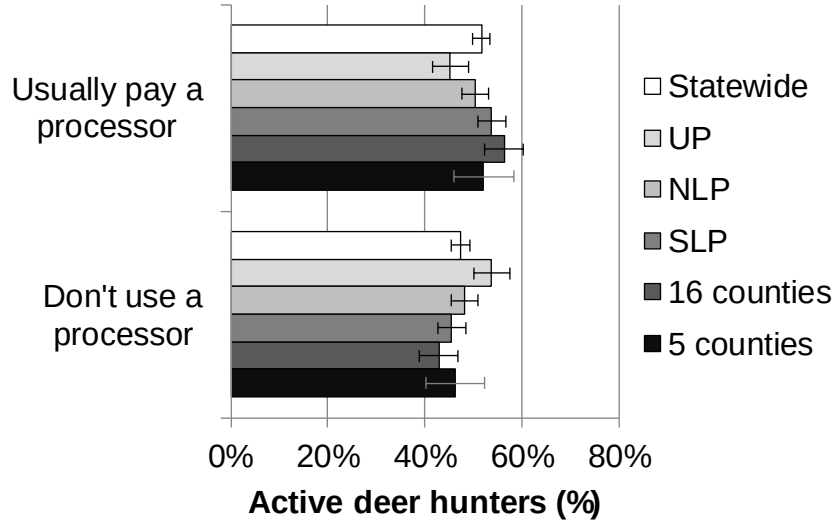

Figure 6. Proportion of Michigan deer hunters that usually paid a meat processor to butcher their deer, summarized by area hunted most frequently.

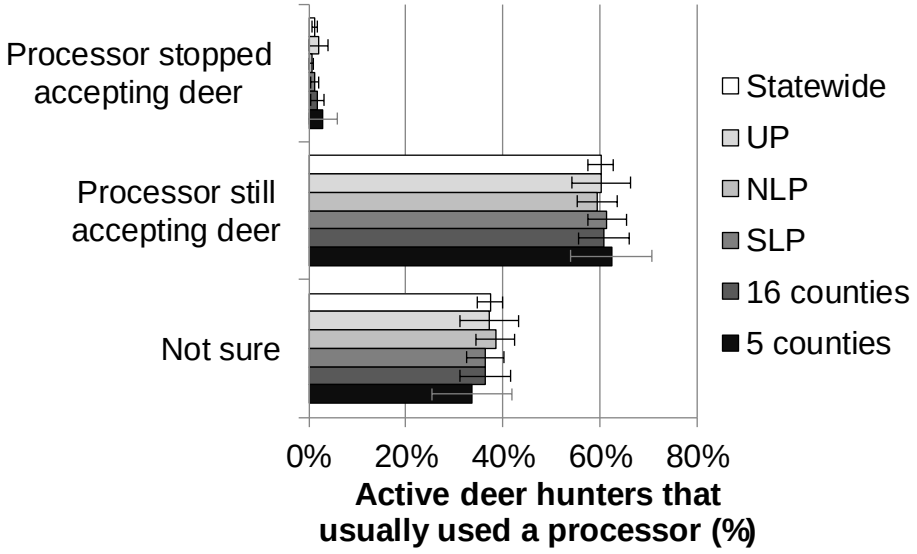

Figure 7. Proportion of Michigan deer hunters that reported that their processor stopped accepting deer in 2017 because of CWD. Estimates for active hunters that usually paid a processor, summarized by area hunted most frequently.

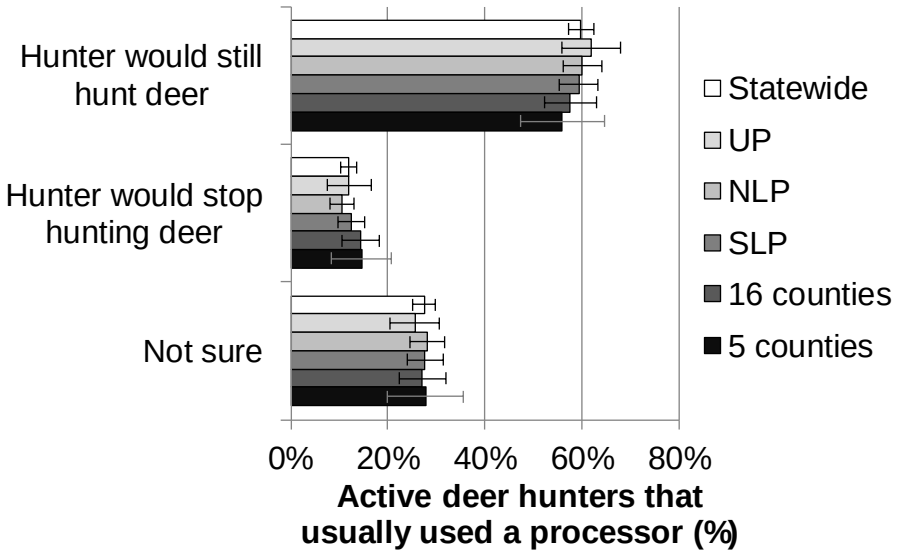

Figure 8. Proportion of Michigan deer hunters that indicated that their future hunting activity would be affected if CWD caused all meat processors to stop processing deer, summarized by area hunted most frequently.

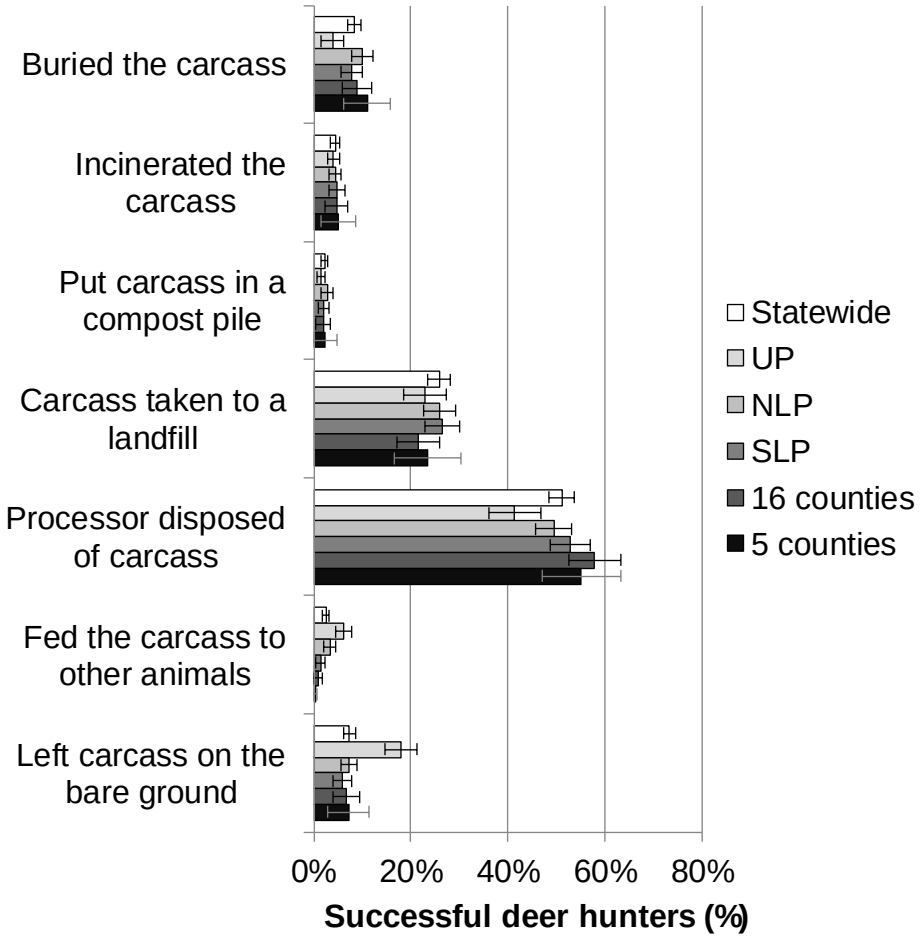

Figure 9. Proportion of Michigan deer hunters that disposed of deer carcasses using various methods, summarized by hunt area.

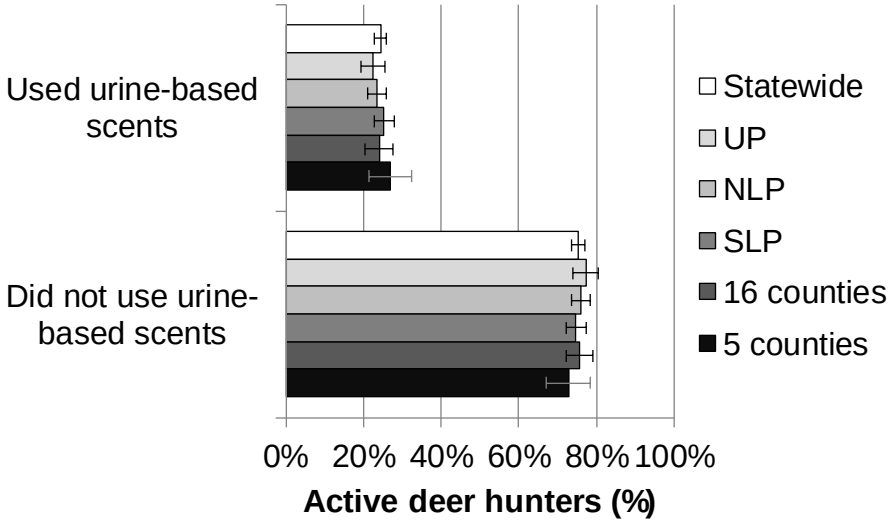

Figure 10. Proportion and number of Michigan deer hunters that used urine-based scents in 2017, summarized by area hunted most frequently.

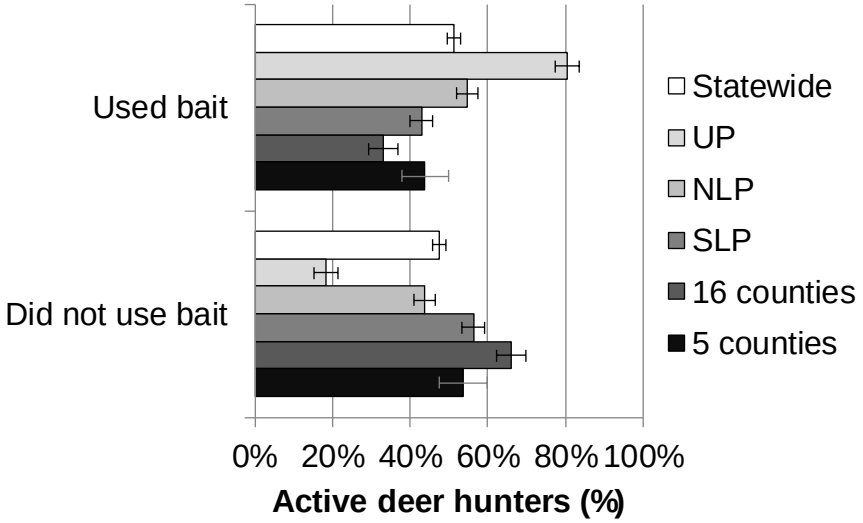

Figure 11. Proportion and number of Michigan deer hunters that used bait in 2017, summarized by area hunted most frequently.

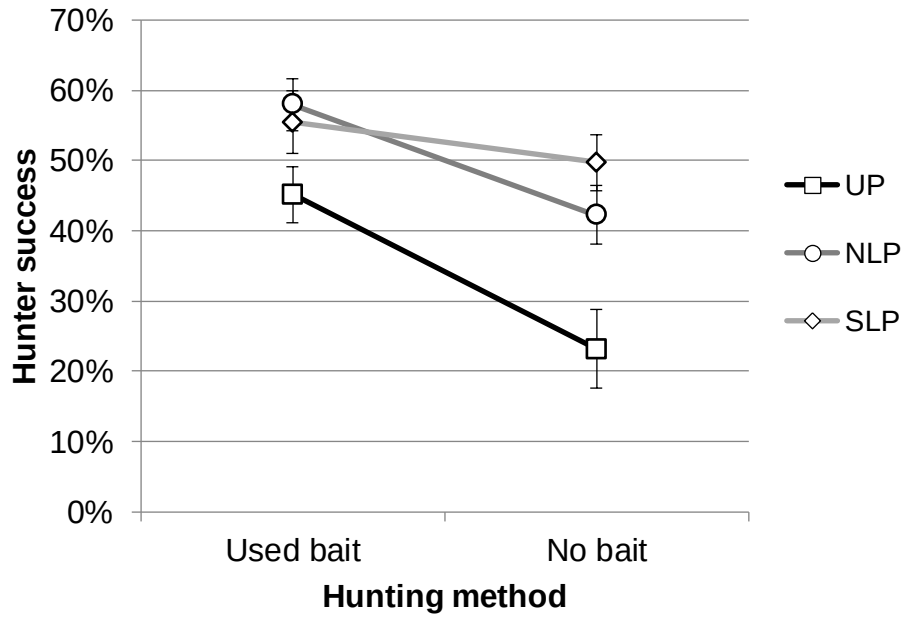

Figure 12. Estimated Michigan deer hunter success by hunter groups in 2017. Groups defined by a combination of hunt region (UP, NLP, and SLP) and hunting method (bait and no bait).

Figure 13. Estimated Michigan deer hunter success by hunter groups in 1999 (Frawley 2000). Groups defined by a combination of hunt region (UP, NLP, and SLP) and hunting method (bait and no bait).

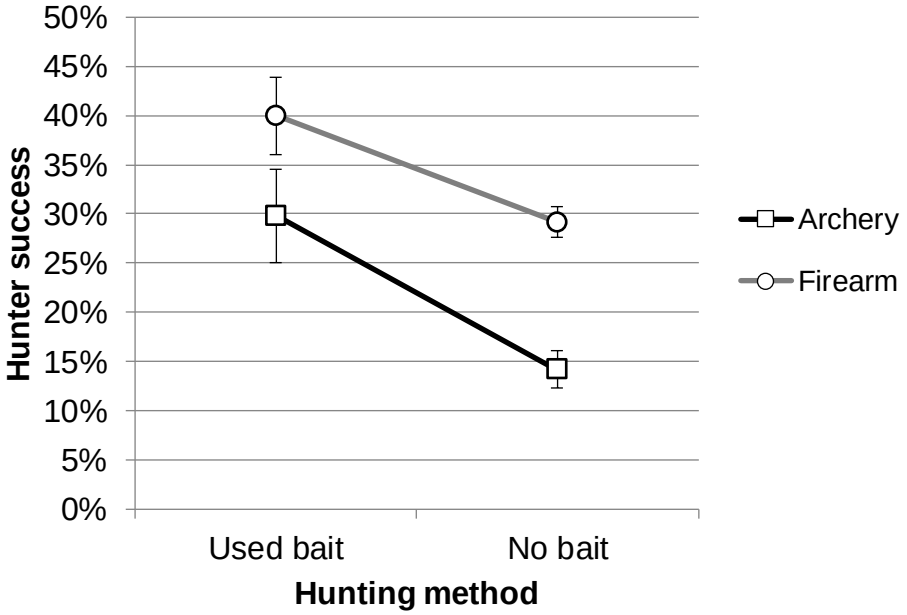

Figure 14. Estimated Michigan deer hunter success by hunter groups in the NELP during 2001 (Frawley 2002). Groups defined by a combination of hunting season (archery and regular firearm) and hunting method (bait and no bait). NELP included Alcona, Alpena, Montmorency, Oscoda, and Presque Isle counties.

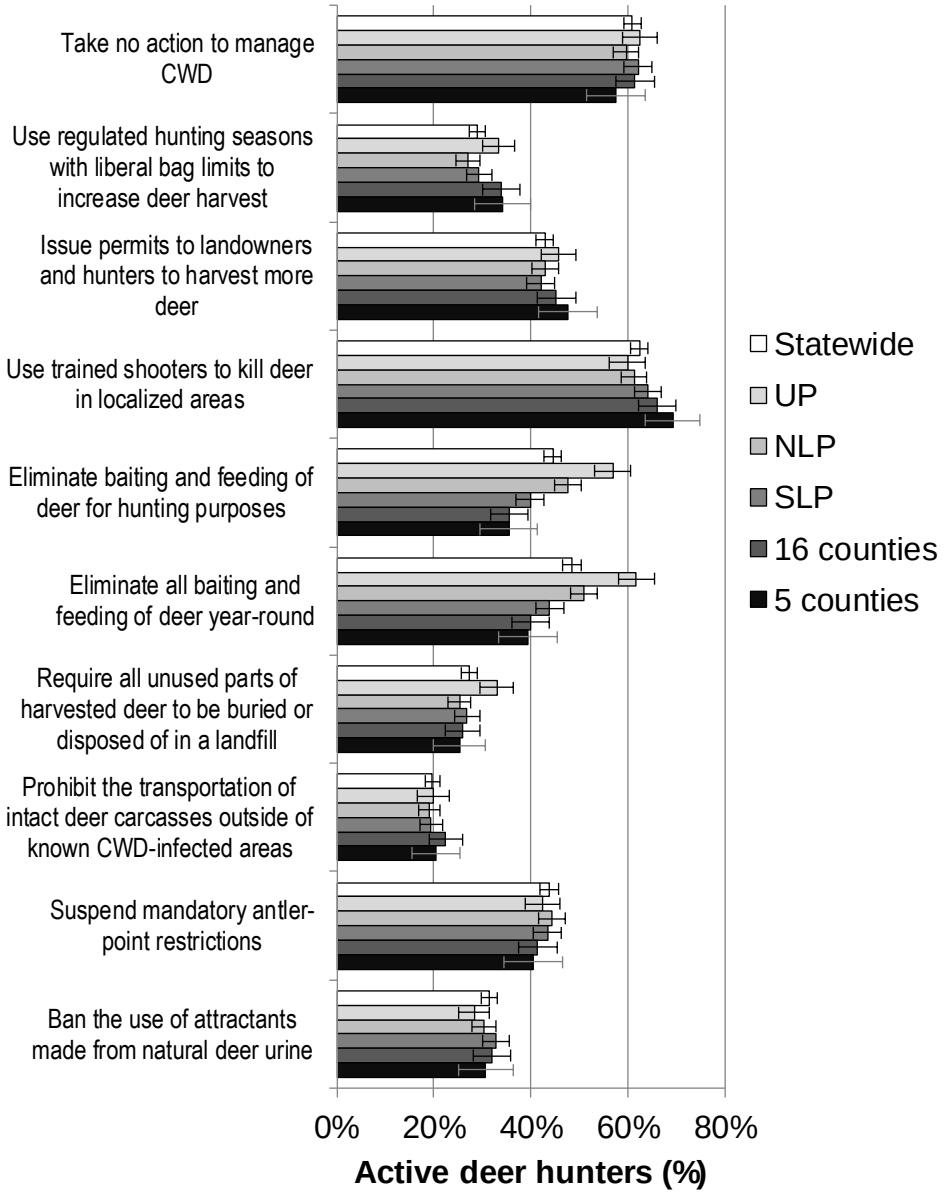

Figure 15. The proportion of Michigan deer hunters that indicated that various management options for controlling CWD were unacceptable, among active hunters.

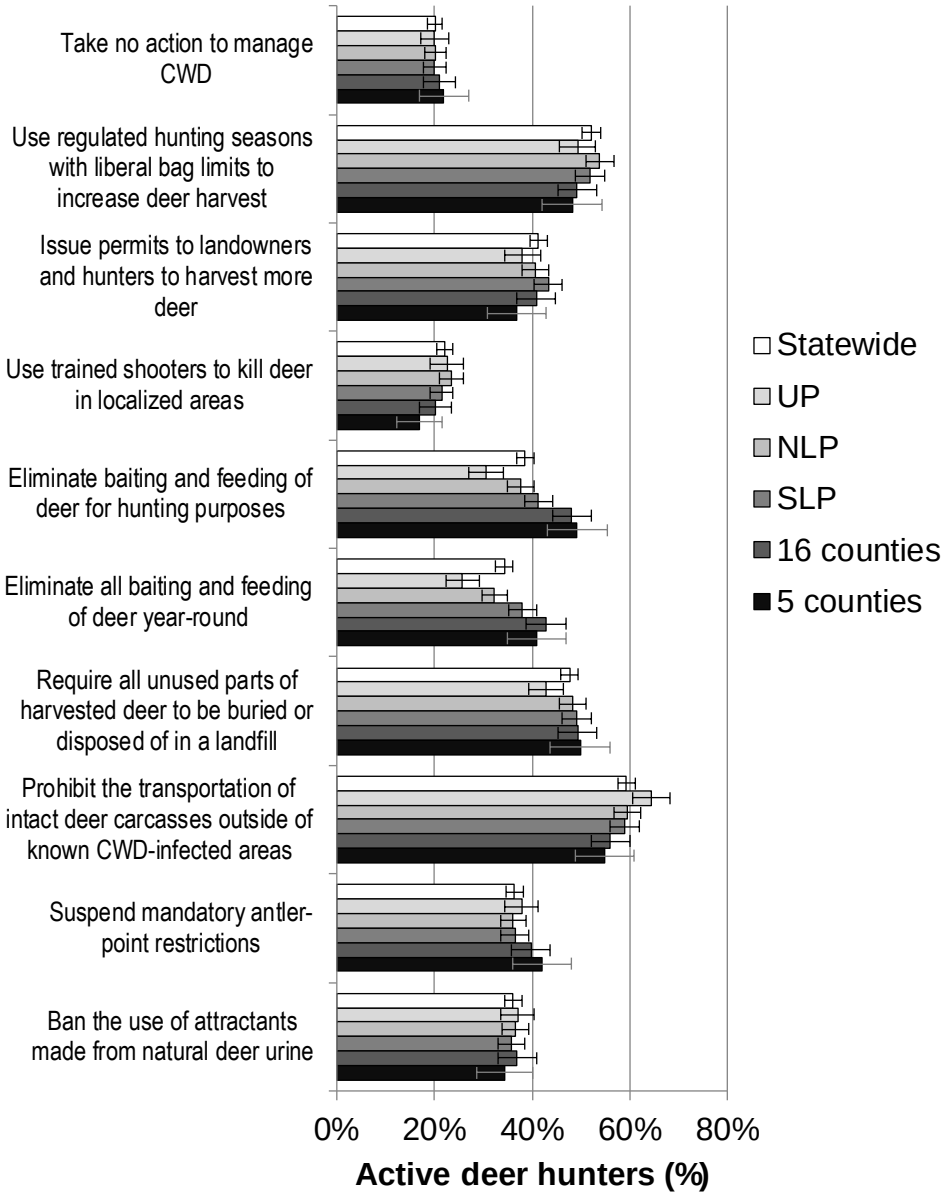

Figure 16. The proportion of Michigan deer hunters that indicated that various management options for controlling CWD were acceptable, among active hunters.

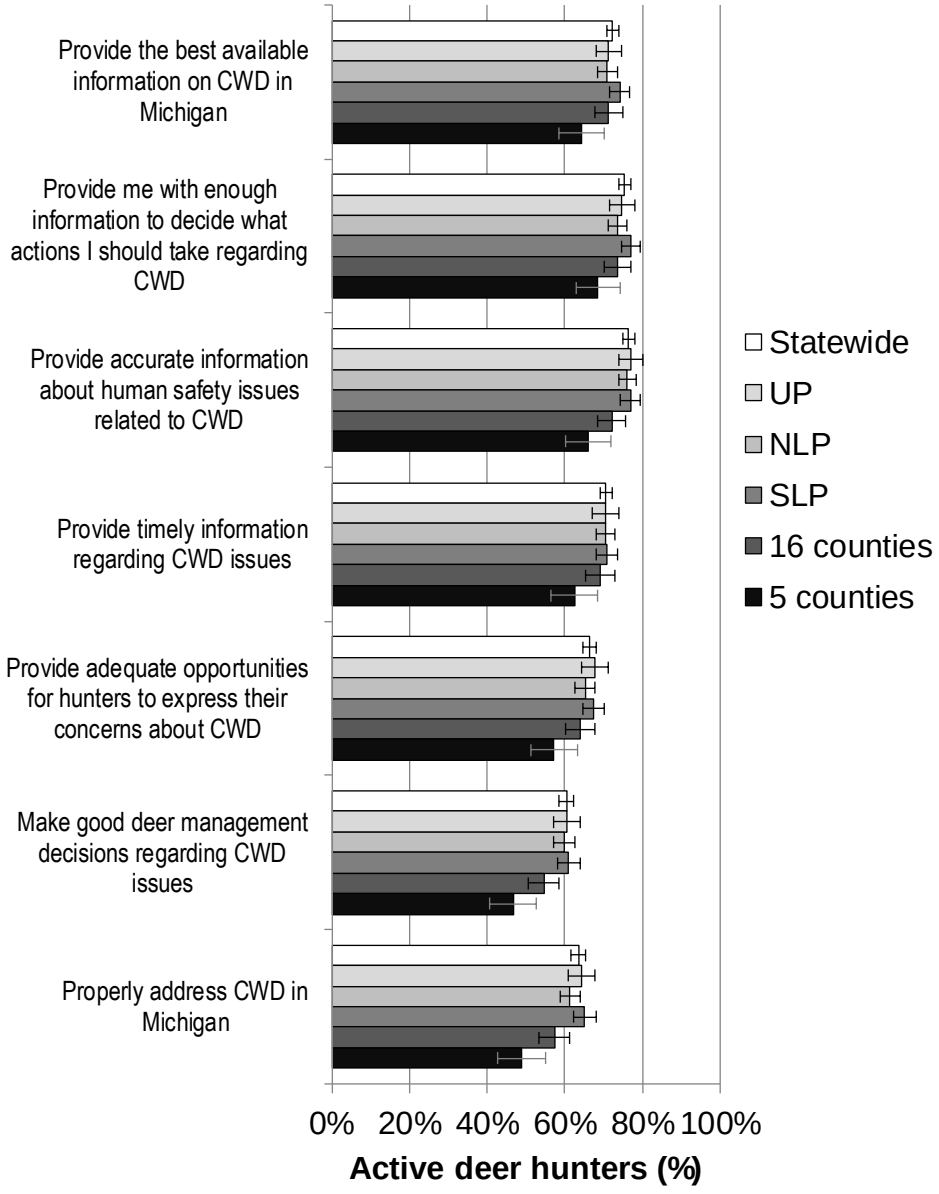

Figure 17. Estimated proportion of Michigan deer hunters that were confident that the DNR would do the following actions regarding CWD in Michigan.

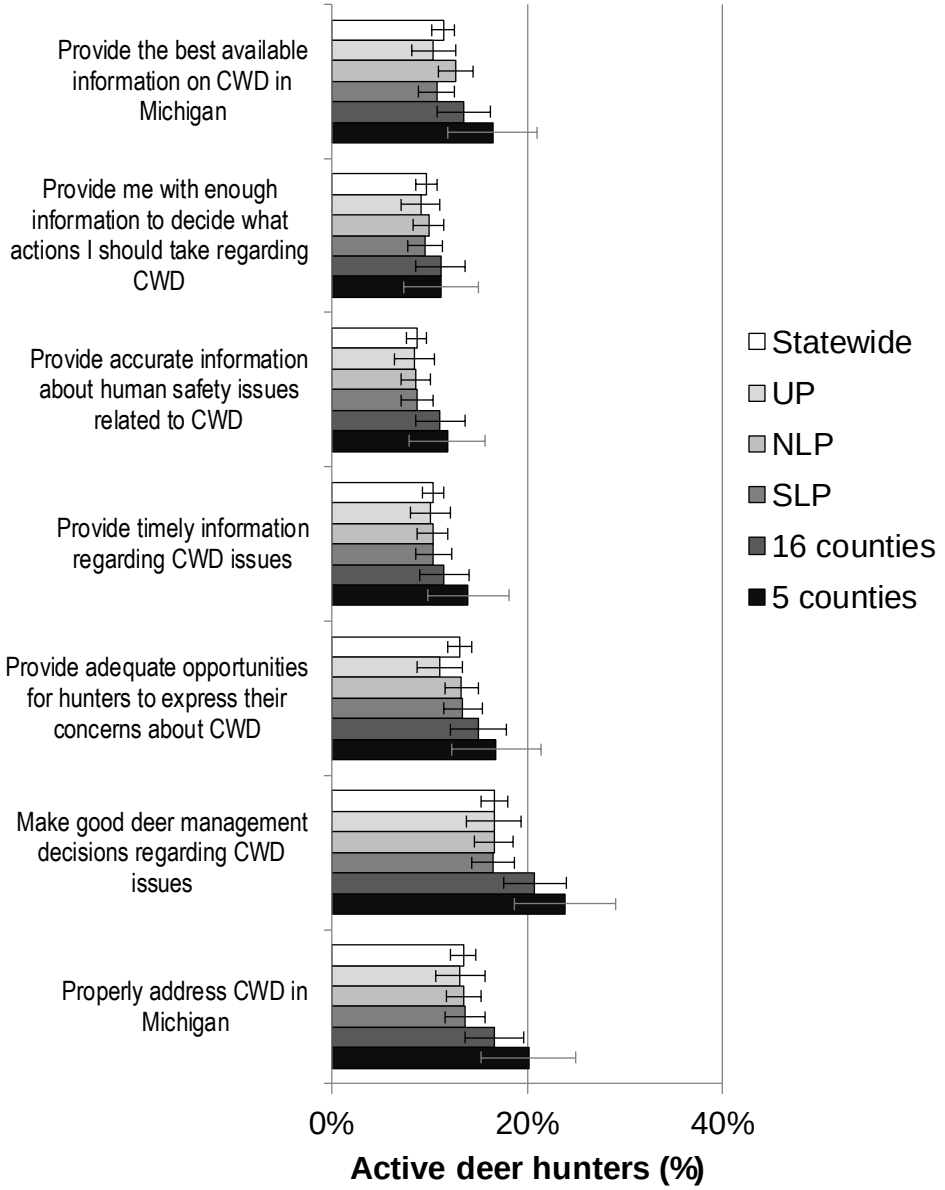

Figure 18. Estimated proportion of Michigan deer hunters that were not confident that the DNR would do the following actions regarding CWD in Michigan.

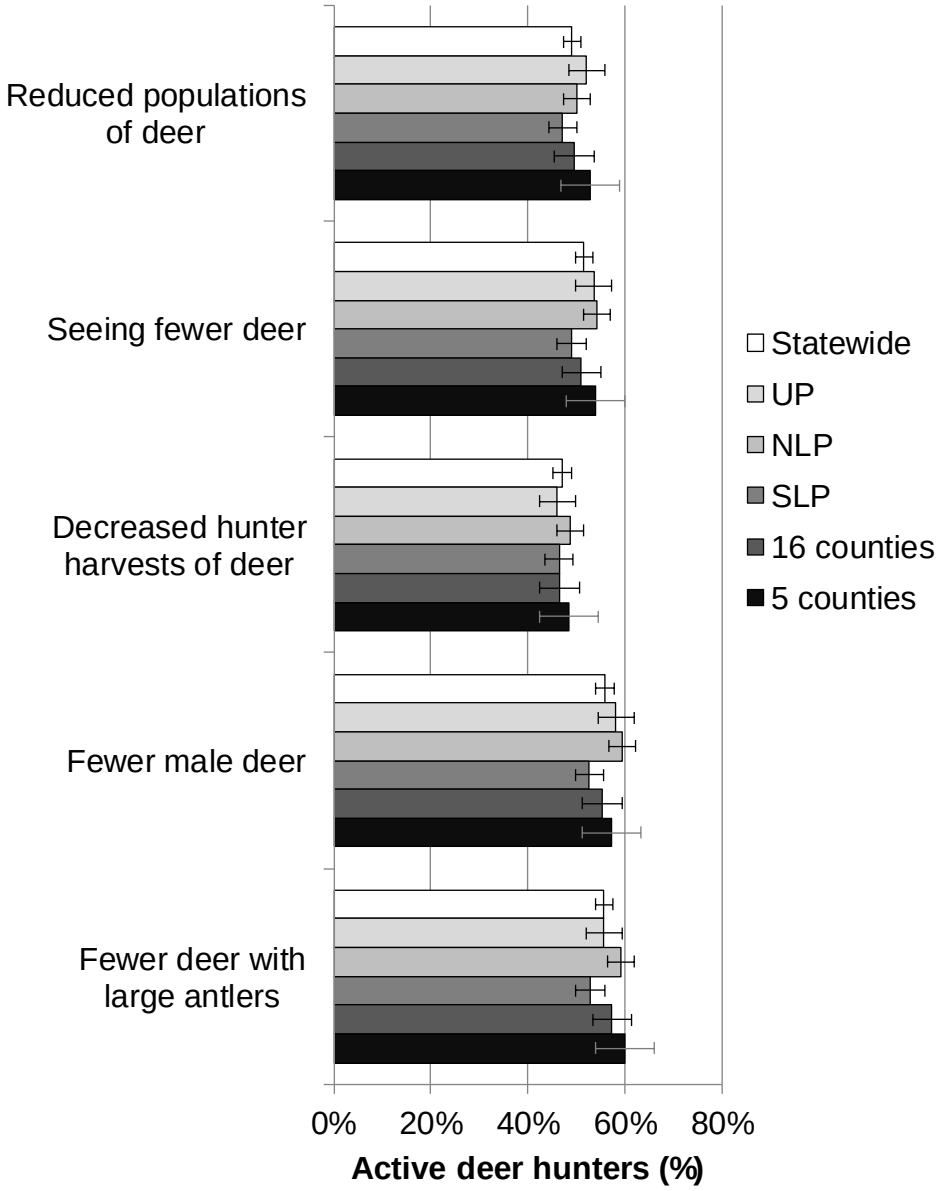

Figure 19. The estimated proportion of Michigan deer hunters that indicated that various outcomes of CWD management were not acceptable.

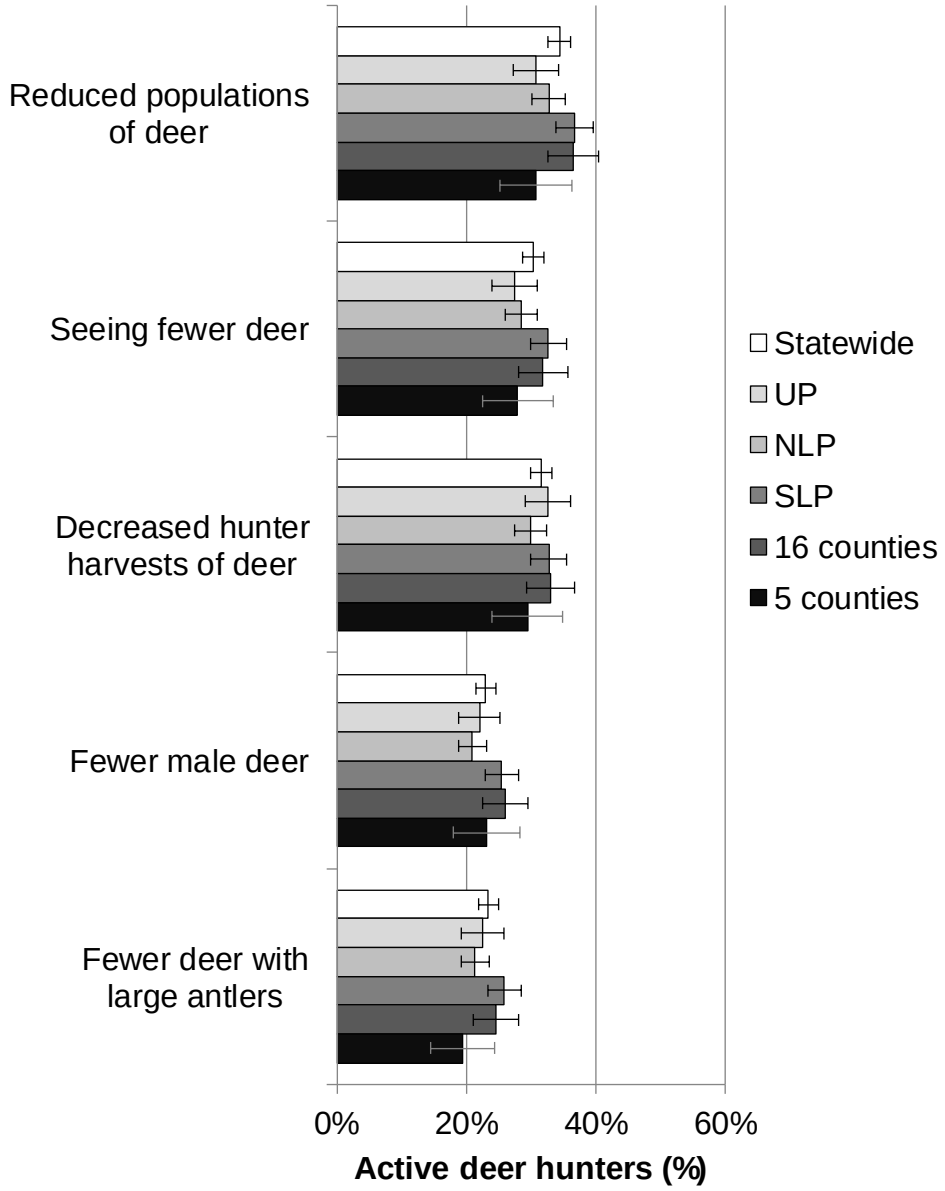

Figure 20. The estimated proportion of Michigan deer hunters that indicated that various outcomes of CWD management were acceptable.

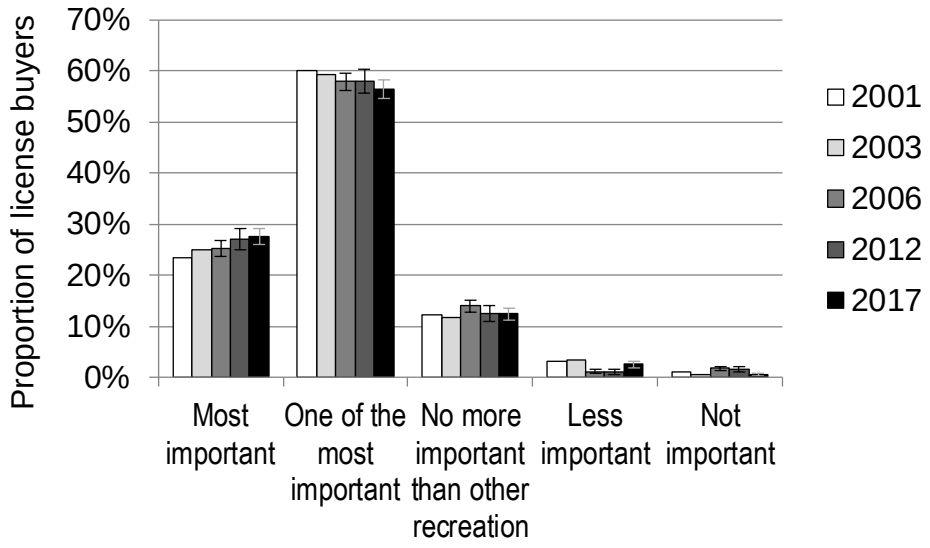

Figure 21. Importance of deer hunting as a recreational activity among deer hunting license buyers (% of license buyers) in Michigan. Sources of previous estimates: 2001 (Peyton and Bull 2001), 2003 (Bull et al. 2006), 2006 (Frawley and Rudolph 2008), and 2012 (Frawley and Rudolph 2014).

Table 1. Importance of deer hunting compared to other recreational activities among active deer Michigan hunters in Michigan during 2017, summarized by sample group and frequently hunted area.

	Most important		One of more important		No more important than other		Less important than other		Not at all important		Unknown	
Hunter group[a]	%	95% CL[b]	%	95% CL	%	95% CL	%	95% CL	%	95% CL	%	95% CL
Statewide (mail)	28	2	57	2	12	1	2	1	<1	<1	<1	<1
UP	27	3	59	4	10	2	3	2	<1	<1	<1	<1
NLP	28	2	59	3	12	2	2	1	<1	<1	<1	<1
SLP	29	3	56	3	12	2	2	1	<1	<1	<1	<1
16-county CWD zone	29	4	56	4	13	3	2	1	0	0	<1	<1
5-county core CWD area	32	6	52	6	14	4	2	2	0	0	<1	<1
Statewide (online)	44	1	52	1	3	<1	1	<1	<1	<1	0	0

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 2. Proportion and number of deer hunting license buyers that hunted deer during the 2017 deer hunting seasons in Michigan, summarized by hunter group.

	Deer hunters			
Hunter group[a]	%	95% CL[b]	Number	95% CL[b]
Statewide (mail sample)	97	1	508,877	3,424
UP	10	1	52,699	3,443
NLP	37	2	187,063	8,160
SLP	49	2	250,283	8,852
Unknown area	4	1	18,832	3,630
16-county CWD zone	25	2	125,058	8,525
5-county CWD core	10	1	49,933	5,776
Avid hunters	28	2	144,175	8,549
Generalist hunters	57	2	291,399	9,507
Statewide (online sample)	99	<1	523,192	958

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 3. Estimated number of active hunters, hunter success, and harvest during the 2017 Michigan deer hunting seasons, summarized by group.

	Hunters		Successful hunters		Hunter success		Harvest		harvest per hunter ($\bar{x}$)	
Hunter group[a]	Total	95% CL[b]	Total	95% CL[b]	%	95% CL[b]	Total	95% CL[b]	Mean	95% CL[b]
Statewide (mail)	508,877	3,424	257,412	9,544	51	2	363,372	17,099	0.71	0.03
UP	52,699	3,443	21,548	2,112	41	4	24,959	2,520	0.47	0.04
NLP	187,063	8,160	95,387	6,324	51	3	130,777	9,619	0.70	0.04
SLP	250,283	8,852	131,097	8,719	52	3	194,825	15,763	0.78	0.06
16-county zone	125,058	8,525	68,251	6,838	55	4	98,990	11,390	0.79	0.07
5-county core	49,933	5,776	27,945	4,434	56	6	41,460	7,482	0.83	0.12
Avid	144,175	8,549	86,852	7,056	60	3	135,816	13,279	0.94	0.07
Generalist	291,399	9,507	147,226	8,548	51	2	200,507	13,748	0.69	0.04
Statewide (online)	523,192	958	341,555	5,272	65	1	550,880	11,227	1.05	0.02

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 4. Estimated proportion of active hunters that pursued deer on private and public lands during the 2017 Michigan deer hunting season, summarized by group.

	Land type					
	Private lands		Public lands		Both private and public lands	
Hunter group[a]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	72	2	14	1	14	1
UP[b]	53	4	18	3	28	3
NLP[b]	63	3	21	2	16	2
SLP[b]	84	2	8	2	8	2
16-county zone[b]	86	3	7	2	7	2
5-county core[b]	81	5	8	3	11	4
Avid[b]	69	3	15	2	16	2
Generalist[b]	72	2	14	2	14	2
Statewide (online)	68	1	13	1	19	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 5. Estimated proportion of successful hunters using various methods to process a deer during the 2017 Michigan deer hunting seasons, summarized by group.[a]

	Deer given away before processing		Processing done by a processor		Processing done by hunter and processor		Processing done by hunter		Other	
Hunter group	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[a]
Statewide (mail)	3	1	49	3	6	1	46	3	<1	<1
UP	3	2	40	5	14	3	47	5	<1	<1
NLP	3	1	48	4	6	2	49	4	0	0
SLP	4	2	51	4	6	2	44	4	0	0
16-county	4	2	56	5	6	2	39	5	0	0
5-county	3	2	54	8	6	4	44	8	0	0
Avid	3	1	47	4	7	2	50	4	<1	<1
Generalist	3	1	51	3	6	2	43	3	<1	<1
Statewide (online)	3	<1	51	1	7	1	47	1	<1	<1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample). Row total could exceed 100% because hunters could report more than one method if more than one deer was harvested.

[b]95% confidence limits.

Table 6. Estimated number of deer processed by various methods during the 2017 Michigan deer hunting seasons, summarized by hunter group.

	Deer given away before processing		Processing done by a processor		Processing done by hunter and processor		Processing done by hunter		Other	
Hunter group	Total	95% CL[b]	Total	95% CL[b]	Total	95% CL[b]	Total	95% CL[b]	Total	95% CL[a]
Statewide (mail)	9,973	3,044	162,082	11,959	21,731	4,920	169,542	13,714	44	60
UP	674	507	9,311	1,862	3,380	848	11,550	1,374	44	60
NLP	3,115	1,318	55,077	6,243	7,395	2,059	65,190	7,135	0	0
SLP	5,768	2,656	89,771	10,437	10,755	4,397	88,530	11,975	0	0
16-county	3,298	1,881	52,028	7,996	5,233	3,013	38,431	7,390	0	0
5-county	760	708	20,014	4,737	1,944	1,332	18,743	5,370	0	0
Avid	2,874	1,536	53,786	7,657	7,814	3,126	71,319	10,426	22	42
Generalist	6,184	2,515	95,263	9,664	12,541	3,736	86,497	9,495	22	42
Statewide (online)	13,062	2,126	254,160	8,579	32,157	3,360	249,965	9,256	1,536	748

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 7. Estimated proportion of successful hunters that processed a deer within and outside the county where it was killed during the 2017 Michigan deer hunting season, summarized by group.

	Processing location					
	Deer processed in the same county where they were killed		Deer processed in a different county than where they were killed		Unknown	
Hunter group	%	95% CL[a]	%	95% CL[a]	%	95% CL[a]
Statewide (mail)	65	2	36	3	1	1
UP[b]	66	6	33	6	2	1
NLP[b]	57	4	43	4	3	1
SLP[b]	72	4	30	4	<1	<1
16-county zone[b]	66	5	36	5	1	1
5-county core[b]	62	8	41	8	2	2
Avid[b]	64	4	39	4	2	1
Generalist[b]	66	3	35	3	1	1
Statewide (online)	62	1	44	1	0	0

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample). Row total could exceed 100% because hunters could report more than one location if more than one deer was harvested.
[b]95% confidence limits.

Table 8. Estimated number of deer processed within and outside the county where it was killed during the 2017 Michigan deer hunting season, summarized by group.

	Processing location					
	Deer processed in the same county where they were killed		Deer processed in a different county than where they were killed		Unknown	
Hunter group	Total	95% CL[a]	Total	95% CL[a]	Total	95% CL[a]
Statewide (mail)	239,195	15,161	118,861	10,965	5,316	2,403
UP[b]	16,601	1,597	7,900	1,994	459	252
NLP[b]	76,142	6,546	51,050	7,086	3,584	1,485
SLP[b]	139,708	13,966	53,963	8,550	1,154	1,860
16-county zone[b]	63,854	9,071	33,864	6,939	1,273	1,875
5-county core[b]	24,203	5,215	15,985	4,902	1,273	1,875
Avid[b]	87,367	10,749	45,964	7,601	2,485	2,080
Generalist[b]	133,324	11,720	64,591	8,229	2,592	1,185
Statewide (online)	328,182	10,079	222,698	8,187	0	0

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 9. Proportion and number of active deer hunters that usually paid a meat processor to butcher their deer in Michigan during 2017, summarized by group.

	Deer hunters			
Hunter group	%	95% CL[a]	Number	95% CL[a]
Statewide (mail sample)	52	2	262,826	9,525
UP[b]	45	4	23,832	2,821
NLP[b]	50	3	94,313	6,879
SLP[b]	54	3	134,453	8,775
16-county CWD zone[b]	56	4	70,435	6,988
5-county CWD core[b]	52	6	26,036	4,358
Avid hunters[b]	48	3	69,384	6,632
Generalist hunters[b]	54	2	156,448	8,838
Statewide (online sample)	52	1	274,285	5,461

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 10. Proportion and number of active Michigan deer hunters that reported that their processor stopped accepting deer in 2017 because of CWD. Estimates were calculated for active hunters that usually paid a processor.

	Deer hunters			
Hunter group	%	95% CL[a]	Number	95% CL[a]
Statewide (mail sample)	1	1	3,334	1,542
UP[b]	2	2	490	483
NLP[b]	1	<1	537	347
SLP[b]	1	1	1,615	1,192
16-county CWD zone[b]	2	1	1,213	1,014
5-county CWD core[b]	3	3	752	790
Avid hunters[b]	2	1	1,087	918
Generalist hunters[b]	1	1	1,541	1,044
Statewide (online sample)	1	<1	2,990	768

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 11. Proportion of Michigan deer hunters that normally used a processor that indicated their future hunting activity would be affected if CWD caused all meat processors to stop processing deer.

	Future hunting activity							
	I would still hunt deer		I would stop hunting deer altogether		Not sure		Unknown	
Hunter group	%	95% CL[a]	%	95% CL[a]	%	95% CL[a]	%	95% CL[a]
Statewide (mail)	60	3	12	2	28	2	1	<1
UP[b]	62	6	12	4	26	5	1	<1
NLP[b]	60	4	10	2	28	4	1	1
SLP[b]	59	4	12	3	28	4	1	1
16-county zone[b]	58	5	14	4	27	5	1	1
5-county core[b]	56	9	15	6	28	8	2	2
Avid[b]	70	5	10	3	20	4	0	1
Generalist[b]	61	3	10	2	28	3	1	1
Statewide (online)	67	1	10	1	23	1	0	0

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 12. Number of Michigan deer hunters that normally used a processor that indicated their future hunting activity would be affected if CWD caused all meat processors to stop processing deer.

	Future hunting activity							
	I would still hunt deer		I would stop hunting deer altogether		Not sure		Unknown	
Hunter group	Total	95% CL[a]	Total	95% CL[a]	Total	95% CL[a]	**%**	95% CL[a]
Statewide (mail)	157,176	8,850	31,215	4,661	72,307	6,714	2,128	1,230
UP[b]	14,735	2,227	2,862	1,159	6,080	1,400	155	112
NLP[b]	56,688	5,545	9,878	2,398	26,525	3,952	1,221	938
SLP[b]	79,812	7,456	16,740	3,732	37,208	5,423	692	781
16-county zone[b]	40,541	5,509	10,087	2,854	19,116	3,923	692	781
5-county core[b]	14,564	3,246	3,789	1,718	7,221	2,403	461	638
Avid[b]	48,279	5,642	6,646	2,241	14,206	3,218	253	453
Generalist[b]	95,888	7,497	16,018	3,388	43,172	5,342	1,370	949
Statewide (online)	184,260	5,209	26,798	2,344	63,227	3,487	0	0

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 13. Proportion of successful Michigan deer hunters that disposed of deer carcasses using various methods in Michigan during 2017, summarized by group.

	Buried the carcass		Incinerated the carcass		Put carcass in a compost pile		Carcass taken to a landfill		Processor disposed of carcass	
Hunter group[a]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	8	1	4	1	2	1	26	2	51	3
UP	4	2	4	1	1	1	23	4	41	5
NLP	10	2	4	1	3	1	26	3	49	4
SLP	8	2	5	2	2	1	27	4	53	4
16-county zone	9	3	5	2	2	1	22	4	58	5
5-county core	11	5	5	4	2	2	24	7	55	8
Avid	9	3	5	2	3	2	28	4	47	4
Generalist	8	2	4	1	2	1	25	3	53	3
Statewide (online)	7	1	4	1	2	<1	30	1	51	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample). Row total could exceed 100% because hunters could report more than one method if more than one deer was harvested.
[b]95% confidence limits.

Table 13 (continued). Proportion of successful deer hunters that disposed of deer carcasses using various methods in Michigan during 2017, summarized by group.

	Fed the carcass to other animals		Left carcass on the bare ground		Other method		Unknown method	
Hunter group[a]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	2	1	7	1	2	1	1	<1
UP	6	2	18	3	3	2	1	1
NLP	3	1	7	2	2	1	1	<1
SLP	1	1	6	2	2	1	1	1
16-county zone	1	1	7	3	1	1	<1	<1
5-county core	<1	<1	7	4	<1	<1	<1	<1
Avid	2	1	7	2	2	1	1	1
Generalist	3	1	7	2	2	1	1	1
Statewide (online)	2	<1	9	1	2	<1	0	0

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample). Row total could exceed 100% because hunters could report more than one method if more than one deer was harvested.
[b]95% confidence limits.

Table 14. Estimated number of deer carcasses disposed of by various methods in Michigan, summarized by hunter group.

	Buried the carcass		Incinerated the carcass		Put carcass in a compost pile		Carcass taken to a landfill		Processor disposed of carcass	
Hunter group[a]	Total	95% CL[b]	Total	95% CL[b]	Total	95% CL[b]	Total	95% CL[b]	Total	95% CL[b]
Statewide (mail)	27,879	5,219	16,378	4,275	9,037	3,745	96,162	11,115	169,188	12,293
UP	986	576	931	297	399	224	5,609	1,161	9,820	1,876
NLP	12,125	2,603	5,935	1,769	3,674	1,673	34,782	5,829	57,603	6,381
SLP	14,276	4,491	9,229	3,858	4,845	3,340	52,922	9,473	93,694	10,792
16-county zone	8,853	3,412	4,340	2,293	2,025	1,699	21,307	5,778	54,283	8,217
5-county core	3,948	1,722	2,033	1,561	1,102	1,292	11,258	4,700	20,655	4,837
Avid	12,092	4,005	6,856	2,708	5,395	3,393	40,652	8,366	55,343	7,795
Generalist	13,775	3,274	9,008	3,287	2,912	1,478	48,825	7,384	100,419	10,033
Statewide (online)	35,104	3,842	22,764	3,131	11,683	2,226	163,084	7,754	254,115	8,658

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 14 (continued). Estimated number of deer carcasses disposed of by various methods in Michigan during 2017, summarized by group.

	Fed the carcass to other animals		Left carcass on the bare ground		Other method		Unknown method	
Hunter group[a]	Total	95% CL[b]	Total	95% CL[b]	Total	95% CL[b]	Total	95% CL[b]
Statewide (mail)	9,387	3,140	25,995	5,373	7,084	3,128	2,262	1,929
UP	1,618	441	4,569	836	851	521	177	120
NLP	4,420	1,651	9,585	2,588	2,295	1,155	358	518
SLP	3,350	2,638	11,484	4,632	3,521	2,816	1,504	1,819
16-county zone	931	1,061	5,337	2,336	1,734	2,350	179	259
5-county core	119	232	2,226	1,453	60	116	60	116
Avid	3,052	1,851	9,353	3,493	2,203	1,377	871	1,263
Generalist	5,689	2,489	14,597	3,974	4,077	2,714	1,206	1,447
Statewide (online)	10,123	2,297	43,458	4,551	10,550	2,315	0	0

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 15. Proportion and number of active deer hunters that used urine-based scents in Michigan during 2017.

	Deer hunters using urine-based scents			
Hunter group	%	95% CL[a]	Number	95% CL[a]
Statewide (mail sample)	24	2	124,119	8,182
UP[b]	22	3	11,832	1,818
NLP[b]	24	2	44,064	4,848
SLP[b]	25	3	63,073	6,806
16-county CWD zone[b]	24	3	30,022	4,816
5-county CWD core[b]	27	6	13,490	3,211
Avid hunters[b]	33	3	47,501	5,559
Generalist hunters[b]	23	2	67,962	6,473
Statewide (online sample)	37	1	192,725	5,295

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 16. The types of urine-based products used by in 2017 among active Michigan deer hunters that used urine-based scents.

	Products made from natural urine		Products made from synthetic urine		Products made from both natural and synthetic urine		Not sure		Unknown	
Hunter group[a]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	35	4	6	2	22	3	36	4	1	1
UP	37	8	5	2	18	6	40	8	<1	1
NLP	36	5	7	3	21	5	34	6	1	1
SLP	34	6	5	3	24	5	36	6	2	2
16-county zone	28	7	5	3	30	8	36	8	1	2
5-county core	31	11	3	4	26	11	39	12	<1	1
Avid	40	6	5	3	23	5	32	6	1	1
Generalist	31	5	5	2	23	4	39	5	2	1
Statewide (online)	33	2	4	1	30	2	32	2	0	0

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 17. Proportion and number of active deer hunters that used bait in Michigan during 2017.

	Deer hunters using bait			
Hunter group	%	95% CL[a]	Number	95% CL[a]
Statewide (mail sample)	51	2	261,181	9,486
UP[b]	81	3	42,430	3,063
NLP[b]	55	3	102,422	6,634
SLP[b]	43	3	107,344	8,245
16-county CWD zone[b]	33	4	41,371	5,460
5-county CWD core[b]	44	6	21,876	3,928
Avid hunters[b]	56	3	81,436	6,777
Generalist hunters[b]	51	2	147,465	8,275
Statewide (online sample)	65	1	339,347	5,087

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 18. Estimated Michigan deer hunter success and mean harvest per active hunter summarized by hunter groups in 2017. Groups defined by a combination of hunt region (UP, NLP, or SLP), hunter type (Avid or Generalist), and hunting method (bait or no bait).

Hunter group	Successful hunters (%)	95% CL[a]	Mean harvest per hunter	95% CL[a]
UP, Avid, Used bait	54	8	0.54	0.08
UP, Avid, No bait	25	13	0.25	0.13
UP, Generalist, Used bait	46	5	0.46	0.05
UP, Generalist, No bait	24	7	0.24	0.07
NLP, Avid, Used bait	70	6	0.70	0.06
NLP, Avid, No bait	54	8	0.54	0.08
NLP, Generalist, Used bait	56	5	0.56	0.05
NLP, Generalist, No bait	42	5	0.42	0.05
SLP, Avid, Used bait	62	8	0.62	0.08
SLP, Avid, No bait	58	8	0.58	0.08
SLP, Generalist, Used bait	54	6	0.54	0.06
SLP, Generalist, No bait	52	5	0.52	0.05
UP, Used bait	45	4	0.52	0.05
UP, No bait	23	6	0.26	0.06
NLP, Used bait	58	4	0.80	0.06
NLP, No bait	42	4	0.57	0.07
SLP, Used bait	55	4	0.84	0.09
SLP, No bait	50	4	0.72	0.07

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted (UP, NLP, or SLP), hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 19. Estimated Michigan deer hunter success and mean harvest per active hunter summarized by hunter groups. Groups defined by a combination of study year (1999 or 2001), hunt region (UP, NLP, SLP, or NELP), season (archery, regular firearm, or all seasons combined) and hunting method (bait or no bait).

Hunter group	Successful hunters (%)	95% CL[a]	Mean harvest per hunter	95% CL[a]
1999, UP, All seasons, Used bait	57	3	0.80	0.05
1999, UP, All seasons, No bait	46	5	0.67	0.08
1999, NLP, All seasons, Used bait	54	2	0.79	0.04
1999, NLP, All seasons, No bait	43	2	0.66	0.04
1999, SLP, All seasons, Used bait	49	2	0.73	0.04
1999, SLP, All seasons, No bait	50	2	0.87	0.05
2001, NELP, Archery, Used bait	30	5	0.40	0.08
2001, NELP, Archery, No bait	14	2	0.19	0.03
2001, NELP, Firearm, Used bait	40	4	0.50	0.06
2001, NELP, Firearm, No bait	29	2	0.37	0.02

[a]95% confidence limits.
[b]Data used for 1999 estimates from Frawley (2000) and for 2001 estimates from Frawley (2002). NELP included Alcona, Alpena, Montmorency, Oscoda, and Presque Isle counties.

Table 20. The proportion of active Michigan deer hunters that indicated that various management options for controlling CWD were unacceptable.

	Take no action to manage CWD		Use regulated hunting seasons with liberal bag limits to increase deer harvest		Issue permits to landowners and hunters to harvest more deer		Use trained shooters to kill deer in localized areas		Eliminate baiting and feeding of deer for hunting purposes	
Hunter group[a]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	61	2	29	2	43	2	62	2	45	2
UP	62	4	33	3	46	4	60	4	57	4
NLP	60	3	27	2	43	3	61	3	48	3
SLP	62	3	29	3	42	3	64	3	40	3
16-county zone	61	4	34	4	45	4	66	4	35	4
5-county core	58	6	34	6	48	6	69	6	35	6
Avid	55	3	34	3	47	3	68	3	49	3
Generalist	63	2	28	2	43	2	63	2	45	2
Statewide (online)	64	1	38	1	53	1	71	1	52	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 20 (continued). The proportion of active Michigan deer hunters that indicated that various management options for controlling CWD were unacceptable.

	Eliminate all baiting and feeding of deer year-round		Require all unused parts of harvested deer to be buried or disposed of in a landfill		Prohibit the transport of intact deer carcasses outside of known CWD-infected areas		Suspend mandatory antler-point restrictions		Ban the use of attractants made from natural deer urine	
Hunter group[a]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	48	2	27	2	20	1	44	2	31	2
UP	62	4	33	3	20	3	42	4	28	3
NLP	51	3	25	2	19	2	44	3	30	3
SLP	44	3	27	3	19	2	43	3	33	3
16-county zone	40	4	26	4	22	3	41	4	32	4
5-county core	39	6	25	5	20	5	40	6	31	6
Avid	54	3	29	3	23	3	50	3	37	3
Generalist	49	2	26	2	19	2	44	2	30	2
Statewide (online)	55	1	24	1	24	1	53	1	35	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 21. The proportion of active Michigan deer hunters that indicated that various management options for controlling CWD were acceptable.

Hunter group[a]	Take no action to manage CWD		Use regulated hunting seasons with liberal bag limits to increase deer harvest		Issue permits to landowners and hunters to harvest more deer		Use trained shooters to kill deer in localized areas		Eliminate baiting and feeding of deer for hunting purposes	
	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	20	1	52	2	41	2	22	2	39	2
UP	20	3	49	4	38	4	22	3	31	3
NLP	20	2	54	3	41	3	23	2	38	3
SLP	20	2	52	3	43	3	21	2	41	3
16-county zone	21	3	49	4	41	4	20	3	48	4
5-county core	22	5	48	6	37	6	17	5	49	6
Avid	25	3	48	3	38	3	19	3	38	3
Generalist	19	2	55	2	42	2	23	2	39	2
Statewide (online)	27	1	51	1	38	1	21	1	40	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 21 (continued). The proportion of active Michigan deer hunters that indicated that various management options for controlling CWD were acceptable.

	Eliminate all baiting and feeding of deer year-round		Require all unused parts of harvested deer to be buried or disposed of in a landfill		Prohibit the transport of intact deer carcasses outside of known CWD-infected areas		Suspend mandatory antler-point restrictions		Ban the use of attractants made from natural deer urine	
Hunter group[a]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	34	2	48	2	59	2	36	2	36	2
UP	26	3	43	4	64	4	38	3	37	3
NLP	32	3	48	3	59	3	36	3	37	3
SLP	38	3	49	3	59	3	36	3	36	3
16-county zone	43	4	49	4	56	4	40	4	37	4
5-county core	41	6	50	6	55	6	42	6	34	6
Avid	32	3	48	3	58	3	36	3	36	3
Generalist	35	2	49	2	60	2	36	2	36	2
Statewide (online)	38	1	59	1	66	1	35	1	45	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 22. The estimated proportion of active Michigan deer hunters that indicated that various outcomes of CWD management were unacceptable.

	Reduced populations of deer		Seeing fewer deer		Decreased hunter harvests of deer		Fewer male deer		Fewer deer with large antlers	
Hunter group[a]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	49	2	52	2	47	2	56	2	56	2
UP	52	4	54	4	46	4	58	4	56	4
NLP	50	3	54	3	49	3	59	3	59	3
SLP	47	3	49	3	46	3	53	3	53	3
16-county zone	50	4	51	4	46	4	55	4	57	4
5-county core	53	6	54	6	48	6	57	6	60	6
Avid	54	3	57	3	50	3	62	3	61	3
Generalist	50	2	52	2	49	2	57	2	57	2
Statewide (online)	55	1	59	1	49	1	66	1	63	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 23. The estimated proportion of active Michigan deer hunters that indicated that various outcomes of CWD management were acceptable.

	Reduced populations of deer		Seeing fewer deer		Decreased hunter harvests of deer		Fewer male deer		Fewer deer with large antlers	
Hunter group[a]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]	%	95% CL[b]
Statewide (mail)	34	2	30	2	32	2	23	2	23	2
UP	31	4	27	3	33	4	22	3	23	3
NLP	33	3	29	2	30	2	21	2	21	2
SLP	37	3	33	3	33	3	25	3	26	3
16-county zone	37	4	32	4	33	4	26	4	25	3
5-county core	31	6	28	5	29	5	23	5	19	5
Avid	31	3	27	3	31	3	20	3	22	3
Generalist	35	2	31	2	31	2	23	2	23	2
Statewide (online)	37	1	33	1	37	1	23	1	25	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 24. Estimated proportion of active hunters that were confident that the MDNR would do the following actions regarding CWD in Michigan.

	Hunters agreeing with statement							
	Provide the best available information on CWD in Michigan		Provide me with enough information to decide what actions I should take regarding CWD		Provide accurate information about human safety issues related to CWD		Provide timely information regarding CWD issues	
Hunter group	%	95% CL[a]	%	95% CL[a]	%	95% CL[a]	%	95% CL[a]
Statewide (mail)	72	2	75	2	77	2	71	2
UP[b]	71	3	75	3	77	3	71	3
NLP[b]	71	2	74	2	76	2	71	2
SLP[b]	74	3	77	2	77	2	71	3
16-county zone[b]	71	4	74	4	72	4	69	4
5-county core[b]	64	6	69	6	66	6	62	6
Avid[b]	68	3	72	3	73	3	66	3
Generalist[b]	74	2	77	2	79	2	73	2
Statewide (online)	65	1	67	1	71	1	67	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 24 (continued). Estimated proportion of active hunters that were confident that the MDNR would do the following actions regarding CWD in Michigan.

	Hunters agreeing with statement					
	Provide adequate opportunities for hunters to express their concerns about CWD		Make good deer management decisions regarding CWD issues		Properly address CWD in Michigan	
Hunter group	%	95% CL[a]	%	95% CL[a]	%	95% CL[a]
Statewide (mail)	67	2	60	2	64	2
UP[b]	68	3	61	4	64	3
NLP[b]	65	3	60	3	61	3
SLP[b]	68	3	61	3	65	3
16-county zone[b]	64	4	55	4	57	4
5-county core[b]	57	6	47	6	49	6
Avid[b]	62	3	52	3	57	3
Generalist[b]	68	2	62	2	65	2
Statewide (online)	61	1	46	1	48	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 25. Estimated proportion of active hunters that were not confident that the MDNR would do the following actions regarding CWD in Michigan.

	Hunters disagreeing with statement							
	Provide the best available information on CWD in Michigan		Provide me with enough information to decide what actions I should take regarding CWD		Provide accurate information about human safety issues related to CWD		Provide timely information regarding CWD issues	
Hunter group	%	95% CL[a]	%	95% CL[a]	%	95% CL[a]	%	95% CL[a]
Statewide (mail)	11	1	10	1	9	1	10	1
UP[b]	10	2	9	2	8	2	10	2
NLP[b]	13	2	10	2	9	2	10	2
SLP[b]	11	2	10	2	9	2	10	2
16-county zone[b]	13	3	11	3	11	3	11	3
5-county core[b]	16	5	11	4	12	4	14	4
Avid[b]	16	3	14	2	13	2	14	2
Generalist[b]	10	1	9	1	7	1	9	1
Statewide (online)	22	1	20	1	15	1	18	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 25 (continued). Estimated proportion of active hunters that were not confident that the MDNR would do the following actions regarding CWD in Michigan.

	Hunters disagreeing with statement					
	Provide adequate opportunities for hunters to express their concerns about CWD		Make good deer management decisions regarding CWD issues		Properly address CWD in Michigan	
Hunter group	%	95% CL[a]	%	95% CL[a]	%	95% CL[a]
Statewide (mail)	13	1	17	1	13	1
UP[b]	11	2	17	3	13	3
NLP[b]	13	2	17	2	13	2
SLP[b]	13	2	17	2	14	2
16-county zone[b]	15	3	21	3	17	3
5-county core[b]	17	5	24	5	20	5
Avid[b]	19	3	24	3	21	3
Generalist[b]	12	2	15	2	11	2
Statewide (online)	24	1	35	1	30	1

[a]Estimates were calculated separately for groups that were defined based on the area where a license buyer most often hunted, hunter type (avid or generalist), and the source of the data (random mail sample or non-random online sample).
[b]95% confidence limits.

Table 26. Estimated number of hunters, hunter success, and harvest of deer, elk, and moose outside of Michigan during 2017, summarized by group.

	Hunters		Successful hunters		Hunter success		Harvest		harvest per hunter ($\bar{x}$)	
Hunter group[a]	Total	95% CL[b]	Total	95% CL[b]	%	95% CL[b]	Total	95% CL[b]	Mean	95% CL[b]
Statewide (mail)	31,856	4,561	8,949	2,357	28	6	10,711	2,912	0.34	0.08
Statewide (online)	68,539	3,772	32,436	2,736	47	3	42,051	4,068	0.61	0.05

[a]Estimates for hunters that reported they hunted in 2017.
[b]95% confidence limits.

Appendix A

Questionnaire used for the 2018 Michigan CWD Study

Michigan Department of Natural Resources – Wildlife Division
PO Box 30030 Lansing MI 48909-7530

2018 MICHIGAN CWD STUDY

This information is requested under the authority of Part 435, 1994 PA 451, M.C.L. 324.43539.

Chronic Wasting Disease (CWD) is a fatal disease of deer, elk, and moose that causes degeneration of the brain. The Michigan Department of Natural Resources (MDNR) is conducting this study to better understand hunters' opinions about CWD. Results of this study will be used to help guide our decision making about CWD. It is important that you return this questionnaire even if you did not hunt or harvest a deer. If you want to provide your answers via the internet, visit our website at www.michigan.gov/deer.

1. As a recreational activity, how important is deer hunting to you compared to your other recreational activities? *(Select one choice.)*

1 ☐ My most important recreational activity.
2 ☐ One of my more important recreational activities.
3 ☐ No more important than other recreational activities.
4 ☐ Less important than most of my recreational activities.
5 ☐ Not at all important as a recreational activity.

2. Did you hunt deer in Michigan during the 2017 seasons?

1 ☐ Yes. 2 ☐ No. Skip to Question #15.

3. In which county did you hunt deer <u>most often</u> during the 2017 seasons?

Please write county name

4. What type of land did you hunt deer in the county you hunted <u>most often</u>?

1 ☐ Private 2 ☐ Public 3 ☐ Both private and public lands

5. If you hunted in the 2017 seasons, how many deer did you take? Only count deer that were tagged with your deer license.

_____ Report the number of deer you took. If you didn't take any deer, skip to question #9.

Questions continued on next page.

6. If you took a deer in 2017, report how many deer were processed (butchered) by each method listed below. The total number of deer described should match the number reported in question #5.

	Report the number of deer
a. I gave the deer away before it was processed.	_____deer
b. I took the entire deer somewhere and paid money to have it processed.	_____deer
c. I processed some of the deer myself (or with friends' help) but paid money to have some of the tasks done (for example, making burgers and sausage).	_____deer
d. I processed the entire deer myself (or with friends' help).	_____deer
e. Other (Please describe:_____)	_____deer

7. If you took a deer in 2017, report whether the deer was processed (butchered) inside or outside the county where it was killed. The number of deer reported should match the number reported in question #5.

_____ Report the number of deer processed in the same county where they were killed.

_____ Report the number of deer processed in a different county than where they were killed.

8. The method used to dispose of unused parts of harvested deer is not regulated currently. If you took a deer, report the number of carcasses disposed of by each method listed below. The number of carcasses reported should match the number reported in question #5. If parts of the carcass (excluding the gut pile) were disposed of in different ways, report how the bulk of unused parts of each carcass were disposed of.

	Report the number of deer
a. I buried the carcass.	_____deer
b. I incinerated (burned) the carcass.	_____deer
c. I placed the carcass in a compost pile.	_____deer
d. I put the carcass in the trash that was taken to a landfill.	_____deer
e. I let the processor take care of the disposal of the carcass.	_____deer
f. I fed the carcass to other animals.	_____deer
g. I left the carcass on the bare ground in a field or the woods.	_____deer
h. Other (Please describe:_____)	_____deer

9. Do you usually pay a meat processor to butcher your deer?

1 ☐ Yes. 2 ☐ No. Skip to Question #12.

10. If you normally pay a processor to butcher your deer, did the processor that you normally use stop accepting deer in 2017 because of CWD?

1 ☐ Yes. 2 ☐ No. 3 ☐ Not sure.

11. If CWD caused all meat processors to stop processing deer, how would this change your future deer hunting activity? *(Select one choice.)*

1 ☐ I would still hunt deer.

2 ☐ I would stop hunting deer altogether.

3 ☐ Not sure.

12. Did you use urine-based scent products to attract deer or mask hunter odors while hunting deer in Michigan during the 2017 seasons?

1 ☐ Yes. 2 ☐ No. Skip to Question #14

13. If you used urine-based scent products during the 2017 seasons, what type of products did you use? *(Select one choice.)*

1 ☐ I only used products made from natural urine.

2 ☐ I only used products made from synthetic urine.

3 ☐ I used products made from both natural and synthetic urine.

4 ☐ Not sure whether products were made from natural or synthetic urine.

14. Did you use bait while hunting deer in Michigan during the 2017 seasons? Baiting is the practice of placing food (e.g., minerals, grains, fruits, vegetables) in a hunting area to attract deer. Baiting does not include the planting of crops to attract animals.

1 ☐ Yes. 2 ☐ No.

15. Please rate your level of acceptance for each of the following management actions if implemented <u>in the county you hunted most often</u>. Most management actions (except no action option) are intended to limit the spread of CWD. *(Select one choice per item.)*	Completely Unacceptable	Somewhat Unacceptable	Neither	Somewhat Acceptable	Completely Acceptable	Unsure
a. Take no action to manage CWD.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
b. Use regulated hunting seasons with liberal bag limits to increase deer harvest.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
c. Issue permits to landowners and hunters to shoot deer outside of the hunting seasons.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
d. Use trained shooters to kill deer in localized areas to supplement harvest taken by hunters. Trained shooters would only be used after hunting seasons have ended and with the permission of landowners.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
e. Eliminate baiting and feeding of deer for hunting purposes.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
f. Eliminate all baiting and feeding of deer year-round.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
g. Require all unused parts of harvested deer (excluding guts) to be buried or disposed of in a landfill.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
h. Prohibit the transportation of intact deer carcasses outside of known CWD-infected areas.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
i. Suspend mandatory antler-point restrictions.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
j. Ban the use of attractants made from natural deer urine.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

16. To what extent do you agree or disagree with each of the following statements regarding your confidence in MDNR?
(Select one choice per item.)

I am confident the MDNR will …	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	Unsure
a. provide the best available information on CWD in Michigan.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
b. provide me with enough information to decide what actions I should take regarding CWD.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
c. provide accurate information about human safety issues related to CWD.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
d. provide timely information regarding CWD issues.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
e. provide adequate opportunities for hunters to express their concerns about CWD.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
f. make good deer management decisions regarding CWD issues.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
g. properly address CWD in Michigan.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

17. The following are potential outcomes from CWD management. How acceptable or unacceptable would the following outcomes of CWD management be in the area(s) where you hunt deer most frequently?
(Select one choice per item.)

	Completely Unacceptable	Somewhat Unacceptable	Neither	Somewhat Acceptable	Completely Acceptable	Unsure
a. Reduced populations of deer.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
b. Seeing fewer deer.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
c. Decreased hunter harvests of deer.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
d. Fewer male deer.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐
e. Fewer male deer with large antlers.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐

18. Did you hunt deer, elk or moose outside of Michigan during the 2017 seasons?

1 ☐ Yes. 2 ☐ No. Skip the last question.

19. If you hunted deer, elk or moose outside of Michigan in 2017, how many harvested animals did you bring back into Michigan? Only count animals taken with your hunting license.

_____ Report the number of deer, elk or moose taken outside of Michigan and brought back to Michigan.

Please return questionnaire in the enclosed postage-paid envelope.
Thank you for your help!