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Measuring Hunters' Perceptions about Chronic Wasting Disease (CWD), Concerns Associated with Increasing CWD Prevalence, and Support for CWD Management Alternatives

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Measuring Hunters' Perceptions about Chronic Wasting Disease (CWD), Concerns Associated with Increasing CWD Prevalence, and Support for CWD Management Alternatives

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Executive Summary

Background: Goal and objectives

In order to manage chronic wasting disease (CWD) and estimate disease prevalence across the state, Colorado Parks and Wildlife (CPW) relies on CWD monitoring and surveillance. One of the primary means to collect these data is through mandatory and voluntary harvest submissions from hunters. Thus, hunters represent a critical component in the management of CWD in Colorado. However, limited information about hunter's awareness of and attitudes about the disease exists. Additionally, information about hunter's concerns or perceptions of risk related to CWD are also limited.

The purpose of this study was to understand hunters' perceptions about chronic wasting disease (CWD), concerns associated with increasing CWD prevalence, and support for CWD management alternatives. Additionally, this study sought to examine potential differences between resident and nonresident hunters as well as those who purchased a license to hunt in low or high disease prevalence segments across each variable. These data will help CPW make decisions about how to manage the disease and address concerns hunters have about CWD.

Three primary objectives guided this research:

1. To describe hunters' knowledge about and concerns with CWD in deer in Colorado.
2. To determine hunters' attitudes toward potential CWD management alternatives and the likelihood they will continue hunting deer in Colorado under different disease prevalence scenarios.
3. To explore hunters' trust in CPW to manage wildlife populations at varying levels of disease prevalence and to provide the public with credible, scientific information about CWD.

Methods

An internal team of CPW staff developed and implemented a standard mail questionnaire to collect data for this study. An online option was also made available to hunters who preferred to participate electronically. The sample consisted of 3,000 individuals who purchased a license to hunt in areas of the state where CWD had previously been detected. The sample was further stratified into two groups based on disease prevalence and residency. The questionnaire was implemented between August–October, 2018.

Key findings

- **Hunter motivations:** Nearly all respondents were motivated to hunt deer to spend time in nature (95%) and to spend time with friends and family (90%). This is consistent with findings from national and statewide research efforts. Additionally, about 83% hunt deer in Colorado to obtain wild game meat and 80% do so to contribute to wildlife management.
  - The mean responses of resident and nonresident hunters illustrates statistically significant differences between the two groups. Specifically, hunting to obtain a trophy and to spend time with friends and family were, on average, more important to nonresident than resident hunters. Obtaining game meat was rated higher among resident hunters than nonresident hunters.

- **Knowledge/awareness:** Most (80%) respondents agreed that they had enough information about which wildlife species can have CWD and about 60% believed they had enough information about where deer with CWD had been found. More than half (58%) agreed that they knew about precautions hunters should take and nearly the same percentage of hunter (57%) felt they had enough information about what causes CWD in wildlife. However, less than half believed they had enough information about: possible human health risks (42%), what CPW is doing about CWD (41%), and possible livestock health risks (38%).
  - About half (51%) of all respondents were aware that they purchased a license to hunt deer in either low or high disease prevalence areas of the state.
  - More resident (55%) than nonresident hunters (45%) were aware that they purchased a license to hunt in an area of high or low prevalence.

- **Beliefs about CWD:** Beliefs were highly variable with many respondents indicating that they neither disagreed nor agreed with various statements about the disease. Slightly more than one-quarter (27%) agreed with the statement that *CWD poses a risk to deer, but not to humans* with another 42% neither agreeing nor disagreeing. Similarly, about 52% agreed with the statement *CWD may pose a risk to humans but not enough is currently known to be sure*. Another 32% neither disagreed nor agreed with this statement. The only statement that most (80%) respondents agreed with was that effort should be taken to reduce the rate of CWD in deer.

- **Perceptions of risk:** Hunters are concerned about CWD. Specifically, they are concerned about it affecting the long-term health of deer herds in Colorado (88%) and with it negatively affecting their opportunity (85%) and future generations' ability (84%) to continue hunting deer in the state.

- **Behavioral intention:** Overall, if disease prevalence increases, the number of hunters who find alternative places to hunt deer in Colorado or stop hunting deer altogether is likely to increase.
  - "*Low prevalence" segment*: As disease prevalence increases from 5 to 20%, between 43 and 62% of respondents will find alternative places to hunt and about 22% are likely to stop hunting deer in Colorado.
  - "*High prevalence" segment*: As disease prevalence increases from 10 to 50%, between 38 and 62% of respondents will find alternative places to hunt and about 30% are likely to stop hunting deer in Colorado

- **Management preferences:** The most acceptable management alternatives were those that directly involved hunters in the process. Most respondents (82%) found it acceptable to use special disease management hunts to target areas of high prevalence and 70% found it acceptable to *use hunters to reduce the total population of deer (bucks and does) to the lower range of the herd objective identified in a Herd Management Plan*. Slightly more than one-third (38%) found it acceptable to *use trained CPW staff to reduce herds*. Again, taking no action was only acceptable to 21% of respondents.
  - The majority (86%) of respondents indicated that they would prefer CPW prioritize *striking a balance between controlling disease and preserving hunting opportunity*.
  - However, respondents were also asked if CPW should prioritize minimizing the effects of CWD on herd health regardless of how it might impact hunting opportunities or maximizing deer hunting opportunities regardless of how it might affect CWD prevalence or heard health. Sixty percent would prefer CPW minimize the effects of CWD on herd health regardless of how it might affect deer hunting opportunities. Only 25% believed CPW should prioritize maximizing deer hunting opportunities regardless of how they affect CWD prevalence or herd health.

- **Trust in CPW:** The majority of respondents have confidence in Colorado Parks and Wildlife's ability to manage and effectively communicate with stakeholders about CWD. Specifically, most are confident that CPW will: *provide truthful information about human safety issues related to CWD* (79%), *provide me with enough information to decide what action I should take regarding CWD* (77%), and *provide the best available information on CWD issues* (75%).

- **Communication:** Most respondents receive information about CWD from hunting regulations brochures (70%), CPW's website (67%), and hunting magazines (44%). These methods plus the CPW E-newsletter were also the most preferred methods for learning or staying informed about CWD.
  - The majority of statistically significant differences between resident and nonresident hunters represented minimal effect size relationships with respect to the ways they obtain information about CWD. However, it is important to highlight that about half (51%) of nonresident hunters use hunting magazines to learn about CWD compared to 39% of resident hunters. Additionally, more resident hunters (74%) used the hunting regulations brochure than nonresident hunters (62%).

Summary

Findings from this research provided insight into hunters' awareness of and concerns about CWD. They also provided important information about hunter preferences with respect to managing CWD and the extent to which the disease may affect deer hunting in Colorado. The implications of these results are described in more detail in the discussion section.

Most hunters in this study believed they had enough information about which species can have CWD and where these animals have been detected. However, less than half believed they had enough information about the potential effects of CWD on human health and livestock. Nearly the same percentage of respondents were aware of what CPW is doing to manage the disease. Despite feeling less informed about how CPW is managing CWD, we also learned from this inquiry that hunters trust CPW to provide truthful, timely, and accurate information about the disease, disease management, and possible human safety concerns associated with it. Given the high degree of trust in CPW, the agency can use these findings to better inform hunters. Specifically, CPW can provide information about these and other topics on the agency website and in the regulations brochure. Respondents identified both sources as the primary mechanism they use to obtain information or stay informed about CWD.

Findings from this study also indicated that hunters were concerned about CWD and want CPW to manage the disease. With respect to the former, fewer hunters were concerned about their own health or the health of their family because of CWD than they were about the health of deer herds or about the disease negatively affecting their ability—or the ability of future generations—to hunt deer in Colorado. With respect to the latter, most respondents would prefer CPW prioritize finding a balance between controlling the disease and preserving hunting opportunity. However, if forced to choose between maximizing quality deer hunting opportunities and minimizing adverse effects of CWD on herd health, most respondents would prefer CPW prioritize herd health. Importantly, taking no action was not acceptable to the majority of respondents and most hunters would support management alternatives that used hunters versus paid staff to manage the disease.

Results also highlight how increasing disease prevalence is likely to influence deer hunting in Colorado. Nearly two-thirds of hunters are likely to find alternative places in Colorado to hunt deer and between 22 and 29% are likely to stop hunting deer altogether as disease prevalence reaches 20 and 50% in the low and high prevalence segments, respectively. The degree to which hunter behavior changes as a result of disease prevalence will directly affect CPW's ability to manage the disease and maintain lower limits of disease prevalence throughout the state. However, the extent to which these situations come to fruition is dependent upon hunters' being aware that they are hunting in areas of high or low disease prevalence. As we learned from this study, only about half of respondents were aware.

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Introduction

Background

Chronic wasting disease (CWD) is a fatal neurological disease found in five cervid species including deer (both mule deer and white-tailed deer), elk, and moose (Miller & Fischer, 2016). Caused by the abnormal folding of naturally occurring prion proteins, CWD infected animals behave abnormally, appear emaciated, and always die as a result of the disease (Edmunds et al., 2016). The effects of CWD were first recognized in 1967 by scientists studying captive mule deer at a research facility in northern Colorado. By the late 1970s to early 1980s, "symptomatic CWD cases were being diagnosed in free-ranging deer and elk in north-central Colorado and southeastern Wyoming" (CPW CWD Response Plan, 2018, p. 10).

Early efforts to manage the disease focused on containing it to the specific geographic areas of the state where it had been detected (i.e., northeast and north-central, Colorado). However, "in early 2002, a cluster of CWD cases was unexpectedly detected in mule deer entrapped in a captive wildlife facility near Pagoda in northwest Colorado" (CWD Response Plan, 2018, p.10). As a result, concerns among hunters increased and the Division of Wildlife (DOW) received nearly 25,000 voluntary harvest submissions of deer and elk. The following year the agency received nearly 20,000 voluntary submissions.

During the same time, national concerns about CWD were increasing and the Western Association of Fish and Wildlife Agencies (WAFWA) commissioned the Human Dimensions Committee to examine the social ramifications of the disease, specifically, on hunters' attitudes and behaviors. Hunters were surveyed in eight states including Colorado. Results revealed that hunters were in fact, concerned about CWD. Specifically, they were concerned about the health of deer/elk herds. Additionally, respondents expressed interest in having the DOW take action to manage the disease (or minimize its spread) and trusted the agency to do so. Findings also indicated that hunters were more likely to reduce their hunting participation under different, hypothetical scenarios of increasing disease prevalence (Needham, Vaske, & Manfredo, 2005).

Between 2007 and 2014, agency priorities shifted, concerns about CWD decreased, and the number of voluntary submissions declined precipitously. By 2014, Colorado Parks and Wildlife (CPW) only received 673 voluntary deer harvest submissions and was no longer confident in the reliability of statewide disease prevalence estimates. This served, in part, as the impetus for CPW to develop a statewide CWD response plan outlining efforts to bolster surveillance and monitoring over a 15-year timeframe. The present study sought to better understand hunters' perceptions about CWD, concerns associated with increasing CWD prevalence, and support for CWD management alternatives. Additionally, the study examined potential differences between resident and nonresident hunters as well as those who purchased a license to hunt in low or high disease prevalence segments across each of these attributes. Results from this study helped inform the Parks and Wildlife Commission and supported the approval of the response plan (Colorado Chronic Wasting Disease Response Plan, 2018).

Objectives

Three primary objectives guided this research.

1. To describe hunters' knowledge about and concerns with CWD in deer in Colorado.
2. To determine hunters' attitudes toward potential CWD management alternatives and the likelihood they will continue hunting deer in Colorado under different disease prevalence scenarios.
3. To explore hunters' trust in CPW to manage wildlife populations at varying levels of disease prevalence and to provide the public with credible, scientific information about CWD.

Methods

We used a standard mail survey instrument to collect data for this study. A unique web link was included in the cover letter allowing individuals to participate online. Data were collected during August–October 2018.

Sampling design and implementation

The sampling frame for this effort consisted of anyone who purchased a Colorado deer hunting license during the 2017–2018 hunting seasons in areas of low or high CWD disease prevalence. CPW staff defined low disease prevalence units as ≤ 5%. High disease prevalence consisted of units with ≥ 10%. In total, approximately 30,000 licensed deer hunters were included in the sampling frame. A random sample of 3,000 individuals were included in the final sample representing about 10% of the total population. Specifically, 1,500 individuals from low prevalence units

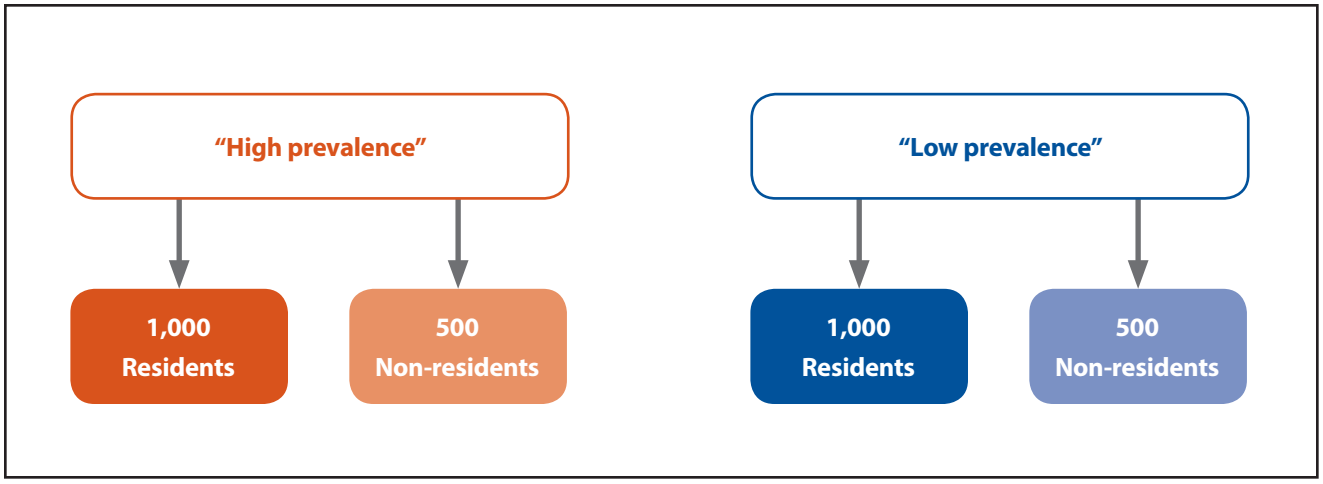

Figure 1. Sampling design.

and 1,500 from high prevalence units were included in the final sample (Figure 1). To ensure adequate representation from in- and out-of-state hunters the sample was further stratified into resident (n = 1,000) and nonresident (n = 500) hunters.

Survey instrument

An internal team of CPW staff developed two separate survey instruments, one targeting individuals who hunted in low CWD disease prevalence units, the other targeting individuals who hunted in high prevalence units. The questionnaires were identical except for questions 9–11 which assessed respondents' behavioral intentions under varying scenarios of increasing disease prevalence (Appendix). We explored a variety of topics in the questionnaire including: hunter motivations, knowledge and beliefs about CWD, perceptions of risk or concerns associated with CWD, behavioral intentions, management preferences, trust (or confidence) in Colorado Parks and Wildlife, and sociodemographic attributes.

Survey implementation

Survey implementation included four unique contacts between August and September, 2018 (Dillman, Smyth, & Christian, 2014). First, we mailed a questionnaire and cover letter explaining the purpose of the study to everyone included in the sample. About one week later, we mailed a reminder postcard to all non-respondents. A second questionnaire and cover letter were mailed to non-respondents about three weeks after the reminder postcard. We mailed a final reminder postcard to non-respondents about one week after mailing the second round of questionnaires.

Survey Measures

Motivations

Hunter motivations are an important part of the hunting experience because they represent the reasons why people participate in the activity, are indicators of the types of experiences someone expects to have while hunting, and provide insight into hunters' future behavior. We assessed hunter motivations by asking how important a suite of reasons were to their decision to hunt deer in Colorado, using a 4-point, scale.

Knowledge and beliefs about CWD

We assessed respondents' knowledge about and awareness of CWD using two questions. The first asked respondents to identify whether they had enough information about a range of CWD topics using a 5-point, disagree-agree, Likert scale. Example statements included having enough information about what causes CWD in wildlife; what precautions hunters should take because of CWD; possible human health risks associated with CWD; and what Colorado Parks and Wildlife is doing about CWD in Colorado (Appendix). The second question-assessed respondents' level of agreement with five items using a 5-point, agree/disagree scale. The items were: "concerns about CWD have been exaggerated," "effort should be taken to reduce the rate of CWD in wild deer populations," "CWD poses a risk to deer, but not to humans," "CWD may pose a risk to humans but not enough is currently known to be sure," and "because of CWD in deer, I have concerns about eating deer meat (for myself or my family)."

Risk perceptions
The degree to which hunters believe "they are or may be subjected to a hazard such as CWD" represents their perception of risk (Vaske, Miller, Ashbrook, & Needham, 2018). In the context of hunting and CWD, risk perception is an important consideration as it influences hunters decisions to continue or cease participation over time (Vaske, Timmons, Beamon, & Petchenik, 2004). We measured hunters' risk perceptions by asking how concerned they were with six different items including: "your or your family's health," "the health of affected deer herds in Colorado," "not having enough healthy deer to hunt in Colorado," "future generations ability to enjoy hunting deer in Colorado because of CWD," "the potential for CWD to reduce deer hunting opportunity in Colorado," and "eating meat from a deer harvested in an area of high CWD prevalence." The items were measured using a 4-point, concern scale from not at all concerned (1) to very concerned (4).

Behavioral intention
We used four questions to examine hunters' future behavior. Respondents in both low and high disease prevalence segments were asked three questions about how likely they would be to continue hunting deer in the same location, find alternative places in Colorado to hunt deer, and stop hunting deer in the state under three different, hypothetical disease prevalence scenarios. Because hunters in the low and high prevalence segments were responding based on different starting points of disease prevalence (i.e., at 5% for low prevalence and at 10% for high prevalence), the hypothetical scenarios ranged from 5- to 10- to 20% for the low prevalence segment and from 10- to 20- to 50% in the high prevalence segment.

Management preferences
Monitoring hunters' perceptions about CWD deer management decisions is an important indicator of their willingness to support or oppose various alternatives. Thus, we asked respondents two questions about their perceptions regarding CWD management. The first examined the acceptability of six potential management actions (e.g., taking no action, using hunters to reduce deer populations, etc.) using a 7-point, acceptability scale. The second question measured hunters' perceptions about what Colorado Parks and Wildlife should prioritize regarding deer harvest management decisions.

Trust
The degree to which individuals trust fish and wildlife management agencies to manage diseases such as CWD influences their risk perception and ultimately, their hunting behavior (Lyon & Vaske, 2010). To measure hunters' trust in CPW, we asked how confident they were that CPW would provide truthful, accurate, adequate, and the best available information about CWD using a 5-point agreement scale. We also included items assessing respondents' perceptions about CPWs ability to make good deer management decisions about CWD and properly address CWD to keep infection rates low.

Analysis

Descriptive statistics were analyzed using the Statistical Package for Social Science software (SPSS 23) and are provided below. Chi square tests and independent samples *t*-tests were used to determine if there were statistically significant differences across hunters in either segment (i.e., resident and nonresident hunters; hunters from low and high disease prevalence segments). Differences were compared using p-values of $\leq .05$ and phi (ϕ) and Cohen's *d* were used to measure the effect size of statistically significant differences for Chi square and independent samples *t*-tests, respectively. Only those measures of phi and Cohen's *d* considered "typical" or "substantial" were reported below (see Appendices A and B for all effect size results).

Results

Response rate
In total, 1,468 surveys were completed. After removing 36 individuals due to invalid addresses, the final response rate was 50%. In both high and low prevalence segments, more Colorado residents responded to the survey than nonresidents (Figure 2).

Respondent characteristics and hunting experience
On average, respondents were 52 years old and the vast majority (94%) were male. About 94% identified as White (non-Hispanic/Latino), 4% identified as Hispanic/Latino and about 2% identified as either Black/African American, American Indian or Native Alaskan, Asian, or Native Hawaiian or other Pacific Islander. The majority (89%) went hunting during the 2017–2018 deer hunting season. The remaining 11% had previously hunted deer in Colorado but not in

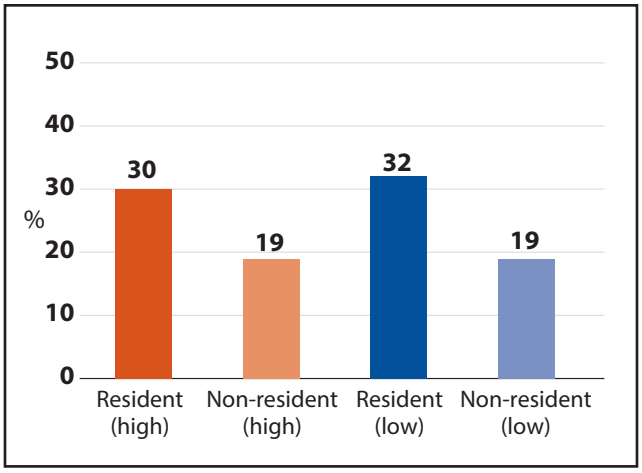

Figure 2. Percentage of responses based on sampling stratification.

2017–2018. About half (52%) harvested a deer during the 2017–2018 hunting season and slightly more than half (55%) were satisfied with their hunting experience. One-third were unsatisfied and about 12% were neither unsatisfied nor satisfied. Additionally, fewer (44%) resident hunters harvested a deer during the hunting season than nonresident hunters (63%).

In addition, we asked respondents how likely they are to go deer hunting in Colorado in the next three years. Overall, the vast majority (92%) of respondents intend to hunt deer in Colorado sometime during the next three years. Of these individuals, about 79% are very likely to hunt in the next three years.

Hunter motivations

The vast majority of respondents hold multiple motivations. For example, nearly all (95%) respondents indicated spending time in nature as an important reason why they hunt deer in Colorado (Figure 3). About 90% identified spending time with family and friends as important to them and many (83%) indicated being able to obtain wild game meat as important. These findings are consistent with national and statewide research efforts (Duda, Jones, Criscione, & Banovich, 2010; Quartuch et al. 2017). Additionally, about 40% of respondents identified harvesting a trophy as moderately-to-very important to them.

On average, more nonresident deer hunters identified harvesting a trophy ($t(1447.00) = -15.776$, $p \leq .001$) and spending time with friends and family ($t(1382.97) = -5.93$, $p \leq .001$) as important reasons to hunt deer in CO than resident hunters (Table 1). More resident hunters identified game meat as an important reason to hunt deer than nonresident hunters ($t(1459.00) = 11.12$, $p \leq .001$).

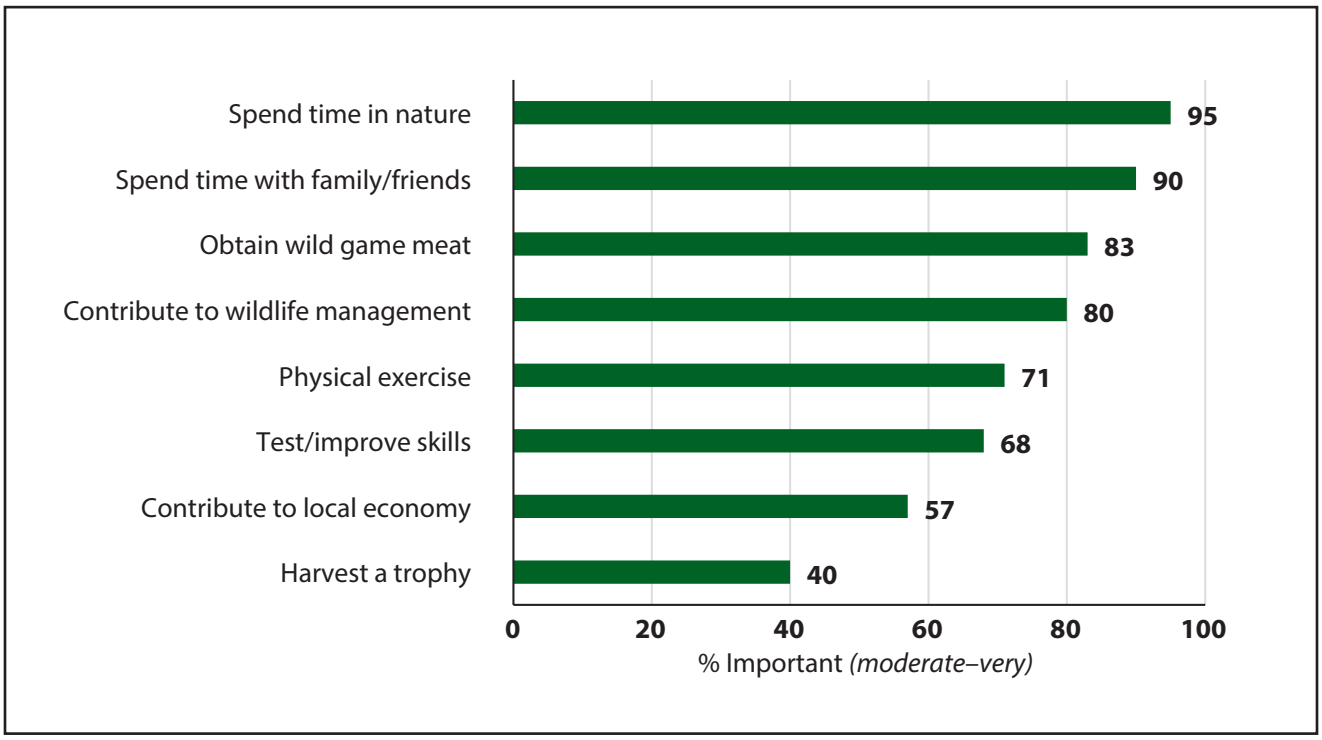

Figure 3. Reasons to hunt deer in Colorado

Table 1. Mean differences between resident and nonresident hunters' motivations.

To harvest a trophy	Mean*
Resident	1.9
Nonresident	2.7
Spend time with family/friends	
Resident	3.4
Nonresident	3.7
To obtain wild game meat	
Resident	3.4
Nonresident	2.9

*Mean is based on a 4-point, scale from 1 (not important) to 4 (very important).

Knowledge/awareness of CWD

Respondents' knowledge about CWD varied substantively. Most (80%) agreed that they had enough information about which species can have CWD in Colorado. However, the percent who agreed with the remaining statements about CWD declined precipitously after that (Figure 4). For example, between 58 and 60% believed they had enough information about the precautions hunters should take because of CWD and that they had enough information about where deer with CWD have been found in Colorado, respectively. Less than half (42%) believed they had enough information about human health risks associated with CWD and fewer (41%) agreed that they had enough information about what CPW is doing to manage the disease. Only 38% felt sufficiently informed about possible livestock health risks associated with CWD. Statistically significant differences between resident and nonresident hunters were also detected with respect to what CPW is doing to manage the disease. On average, fewer resident hunters (Mean = 2.9) believed they had enough information about what CPW is doing to manage the disease than nonresident hunters (Mean = 3.3) ($t(1461.00) = -6.01$, $p \leq .001$).

Additionally, we asked respondents in both low and high segments whether they were aware they purchased a license to hunt deer in an area where CWD rates were less than or equal to 5% (for low segment) or were 10% or higher (for high segment). Results were identical across segments. Roughly half (51%) were aware they purchased a license in either low or high prevalence units.

Beliefs about CWD

One theme that was pervasive throughout the survey results was the extent to which respondents believed something should be done to manage CWD in wild deer populations in Colorado. For example, more than three-quarters (79%) agreed with the statement that efforts to reduce the rate of CWD in deer should be taken (Table 1). Less than one-quarter (21%) agreed that concerns about CWD have been exaggerated and

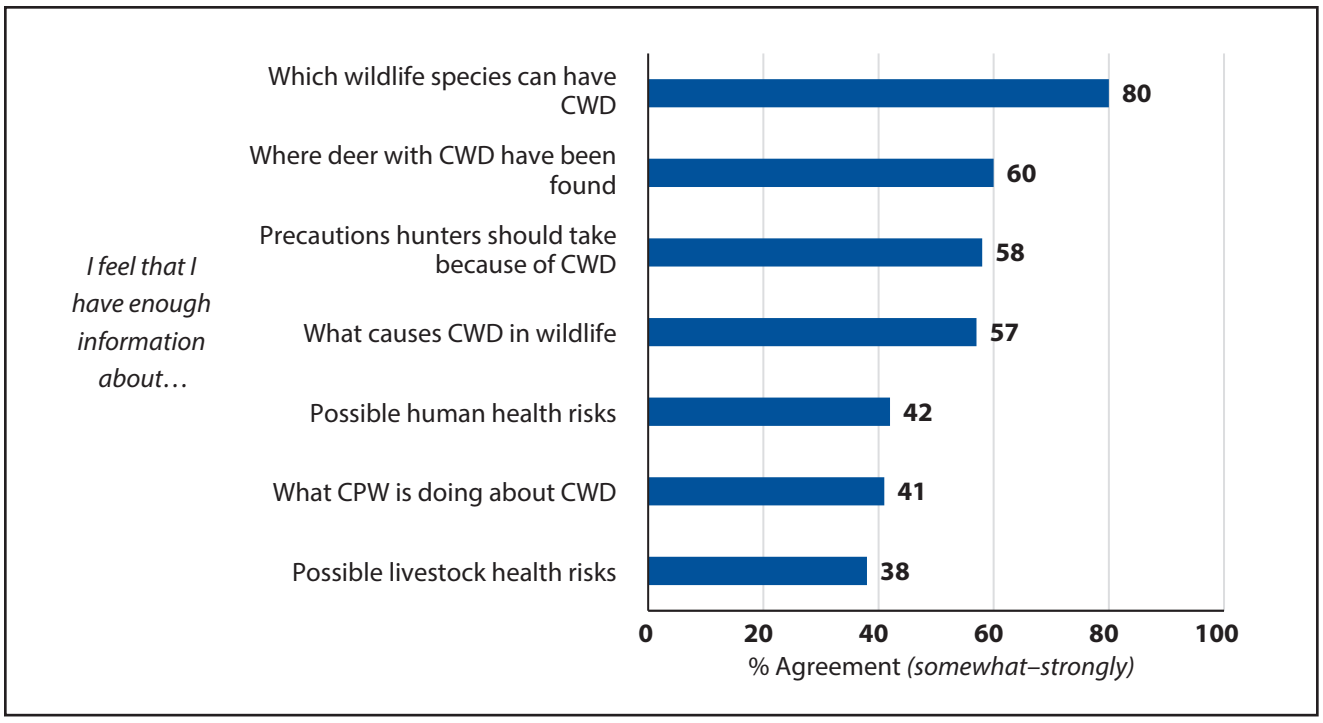

Figure 4. Respondents' awareness about CWD.

Table 2. Respondents' beliefs about CWD.

	Disagree (%)*	Neither disagree nor agree (%)*	Agree (%)*
Concerns about CWD have been exaggerated	37	42	21
Efforts should be taken to reduce the rate of CWD in deer	6	15	79
CWD poses a risk to deer, but not to humans	31	42	2
CWD may pose a risk to humans, but not enough is known to be sure	16	32	52
Because of CWD, I have concerns about eating meat (myself/my family)	36	20	44

*Percentages rounded to the nearest whole number.

27% agreed that CWD poses a risk to deer but not to humans. It is also important to acknowledge the high percentage of respondents who neither agreed nor disagreed with belief-based statements about CWD. For example, 42% of respondents neither disagreed nor agreed that CWD poses a risk to deer but not humans and that concerns about CWD had been exaggerated. Similarly, nearly one-third (32%) of respondents neither disagreed nor agreed that CWD may pose a risk to humans but not enough is currently know about the disease to be sure.

Risk perceptions

Overall, hunters were concerned about CWD. Specifically, they were concerned about herd health and hunting opportunity for themselves and for future generations of hunters. The majority (88%) were concerned about the health of affected deer herds in Colorado and 85% were concerned about the potential for CWD to reduce deer hunting opportunity in Colorado (Figure 5). Additionally, 84% were concerned about future generation's ability to enjoy deer hunting in the state because of the disease and 81% were concerned about not having enough healthy deer to hunt in Colorado. Nearly two-thirds (63%) were concerned about eating meat from a deer harvested in an area of *high* CWD prevalence though only 52% were concerned about their own health or the health of their family.

Statistically significant differences were detected across resident and nonresident hunters for four out of the six potential concerns with CWD. While the effect sizes for each of these differences were minimal it is important to highlight that, on average, more nonresidents were concerned about each of them than resident hunters were.

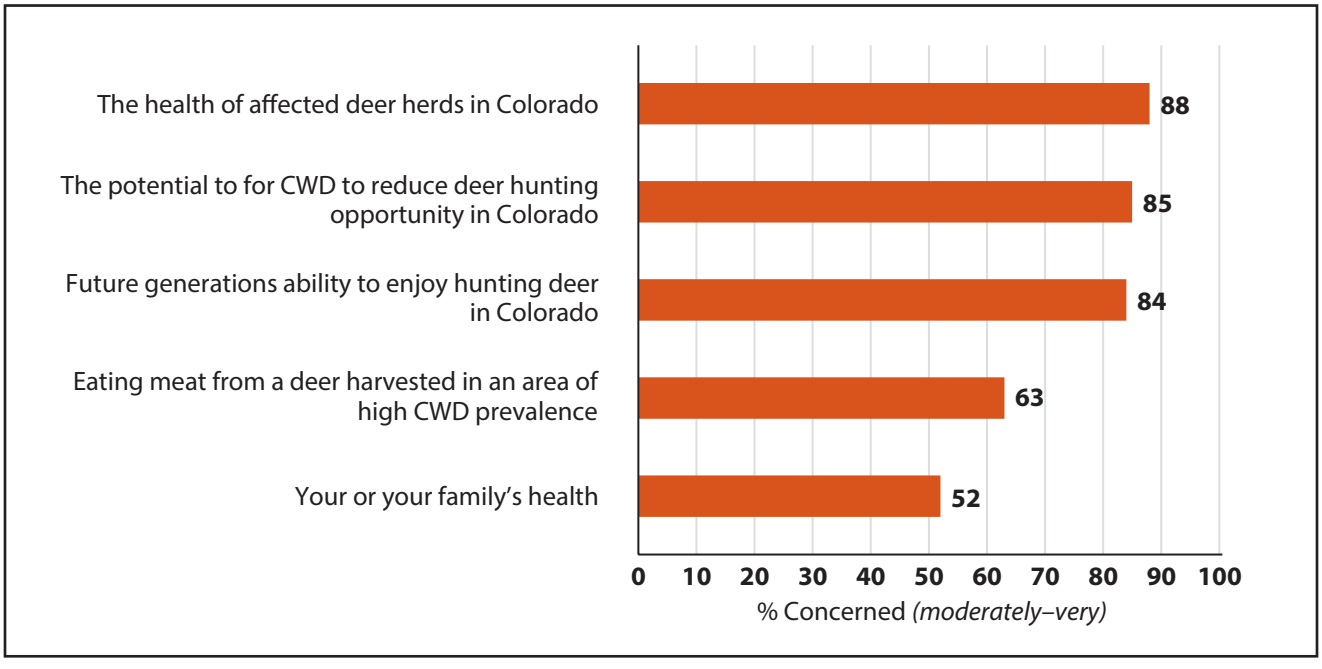

Figure 5. Hunters' risk perceptions about CWD.

Future hunting behavior under different CWD disease prevalence scenarios

Findings across both low and high disease prevalence segments indicate a greater likelihood to find alternative places to hunt in Colorado and to stop hunting altogether as disease prevalence increases.

Low prevalence segment

At 5% disease prevalence, 79% of respondents are likely to continue hunting deer in the same location (Figure 6). However, as prevalence increases to 10 and 20%, the percentage of respondents who intend to continue hunting at the same location decreases to 63 and 44%, respectively. Overall, this represents a 35% total decrease.

As CWD prevalence increases from 5 to 10 to 20%, about 20% of respondents will find other places to hunt deer in Colorado. At 5% disease prevalence, 43% of respondents are likely to find other places to hunt deer in the state (Figure 6). This percentage increased to 53 and 62% at 10 and 20% disease prevalence. A similar trend was detected with respect to individuals who no longer intend to hunt deer in Colorado. At 5% disease prevalence, only 9% of respondents are likely to stop hunting deer. However, as prevalence increases to 10 and then 20%, 15 and 22% of respondents are likely to quit hunting deer in Colorado.

High prevalence segment

The percentage of hunters who are likely to find alternative places to hunt deer in Colorado or stop hunting altogether increases by nearly 25 and 20%, respectively (Figure 7). For example, at 10% disease prevalence, more than one-third (38%) of respondents are likely to find alternative places to hunt deer. This percentage increases to 53 and 62% when prevalence increases from 10 to 20 to 50%. Similarly, at 10% prevalence, only 10% of respondents are likely to stop hunting deer in Colorado. However, at 20% disease prevalence, 17% of respondents are likely to stop hunting deer and at 50% prevalence, nearly 30% are likely to stop hunting deer in the state.

Several statistically significant differences between resident and nonresident hunters in both low and high disease prevalence segments were detected. On average, nonresident hunters were more likely to stop hunting deer in Colorado than resident hunters were across all disease prevalence scenarios (e.g., 5%, 10%, and 20%) and across both low and high prevalence segments (Table 3).

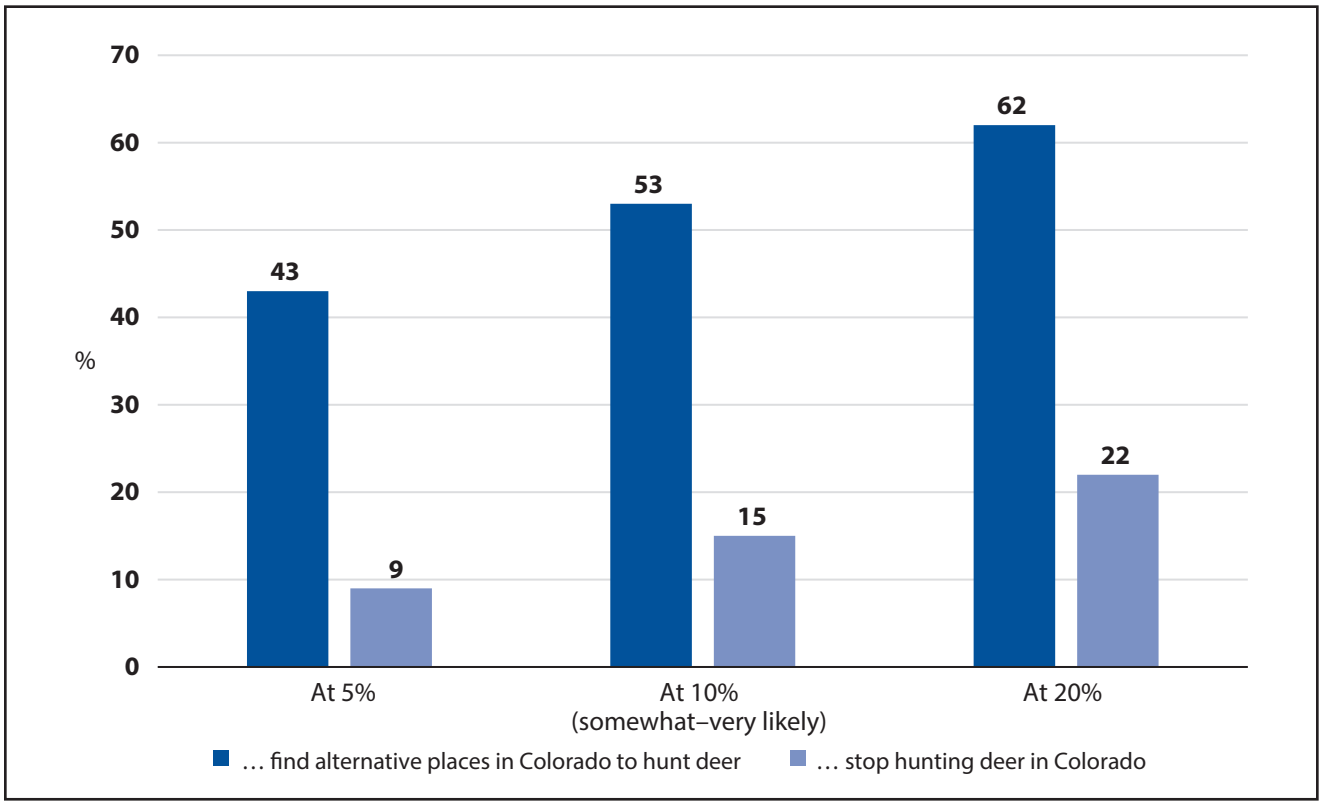

Figure 6. Respondents' behavioral intentions at different levels of disease prevalence (low prevalence segment).

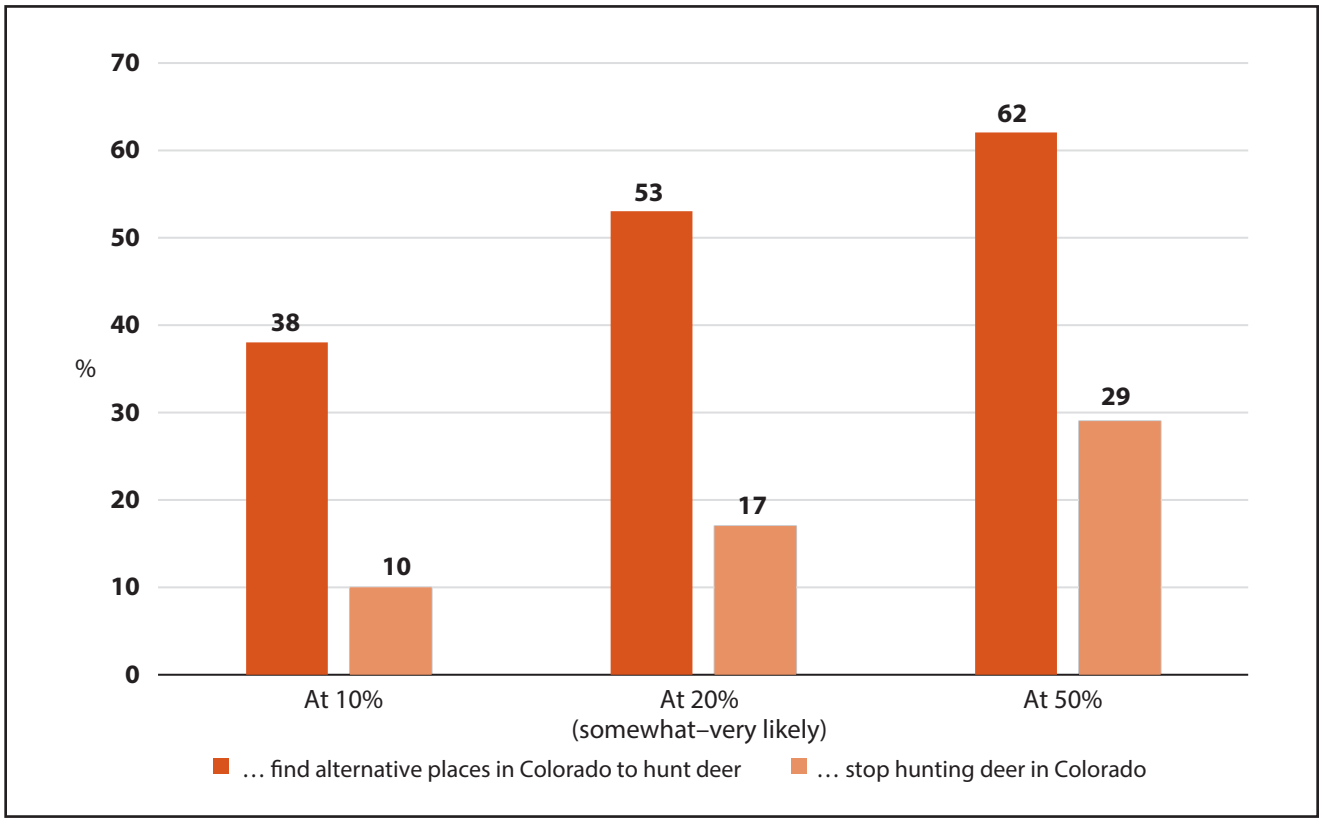

Figure 7. Respondents' behavioral intentions at different levels of disease prevalence (high prevalence segment).

Table 3. Mean differences between resident and nonresident hunters' likelihood to stop deer hunting in Colorado.

"Low" prevalence segment	**Mean at 5% prevalence***	**Mean at 10% prevalence***	**Mean at 20% prevalence***
Resident	1.5	1.6	1.8
Nonresident	1.9	2.1	2.4
"High" prevalence segment	**Mean at 10% prevalence***	**Mean at 20% prevalence***	**Mean at 50% prevalence***
Resident	1.5	1.8	2.0
Nonresident	1.8	2.2	2.7

*Mean is based on a 5-point, Likert scale from 1 (very unlikely) to 5 (very likely).

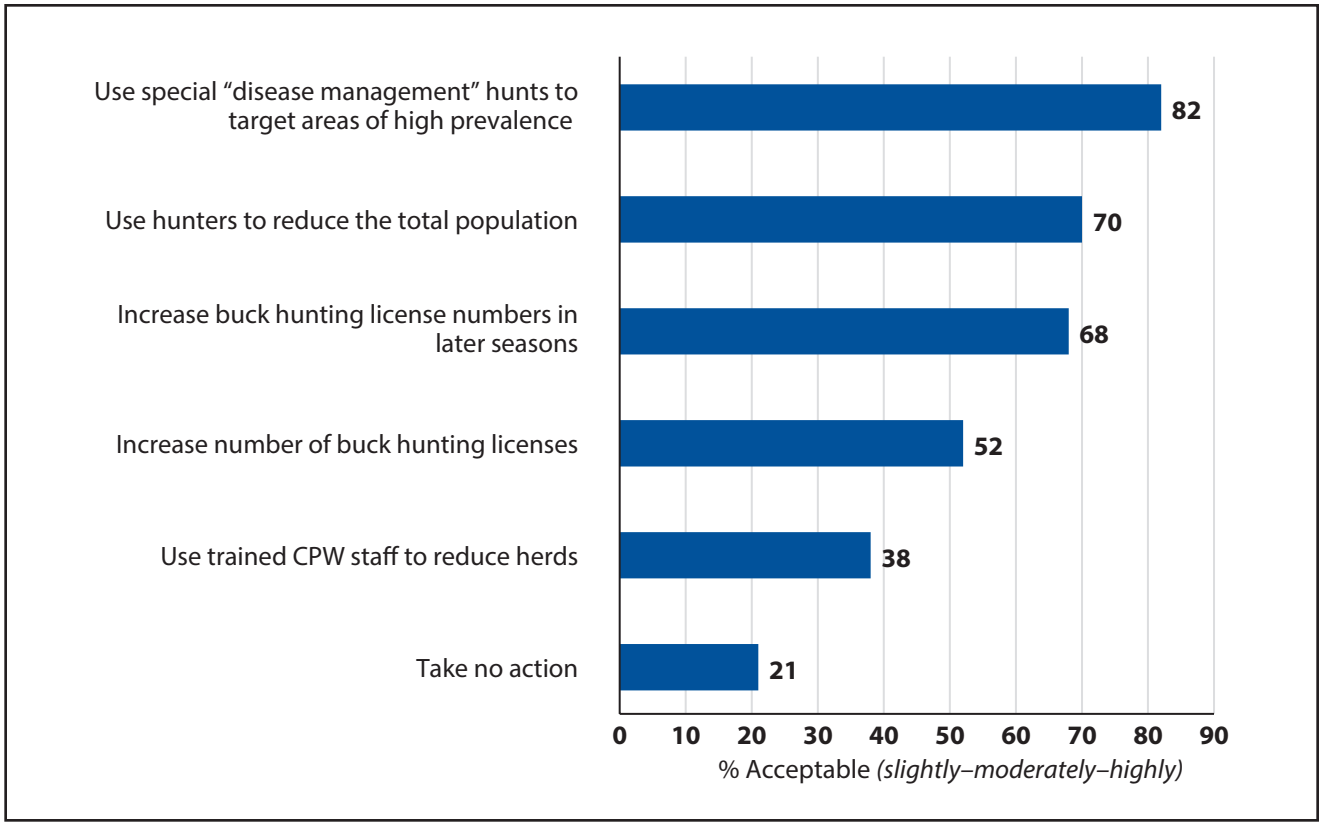

Figure 8. Respondents' level of acceptance with seven potential management actions.

Management preferences

The majority (82%) of respondents identified using special disease management hunts to target areas of high prevalence with minimum impact on overall deer numbers as acceptable (Figure 8). Nearly 70% indicated using hunters to reduce deer numbers to the lower end of the population objective range identified in a Herd Management Plan (i.e., the smallest herd size that was approved by the public within the targeted population range) as acceptable and 68% found increasing buck hunting license numbers in later seasons (in affected areas) as acceptable. Few respondents (38%) found it acceptable to use trained CPW staff to reduce herd numbers and fewer (21%) found it acceptable to take no action, allowing CWD to take its natural course.

Differences were detected across resident and nonresident hunters' management preferences. On average, more resident hunters supported a greater variety of options to increase hunting opportunities than nonresident hunters (Table 4). For example, the mean for resident hunters who found it acceptable to use special disease management hunts was 5.7 versus 5.4 for nonresident hunters ($t(1109.34) = 3.462$, $p \leq .001$). Similarly, the mean response for resident hunters who found it acceptable to increase buck hunting license numbers in later seasons was 5.2 compared to 4.6 for nonresident hunters ($t(1467.00) = 6.601$, $p \leq .001$).

Table 4. Mean differences between resident and nonresident hunters' management preferences.*

	Increase number of buck hunting licenses	Use hunters to reduce the total population of deer	Increase buck hunting license numbers in later seasons	Use special disease management hunts
Resident	4.7	5.2	5.2	5.7
Nonresident	4.1	4.7	4.6	5.4

*Mean is based on a 7-point, Likert scale from 1 (highly unacceptable) to 7 (highly acceptable).

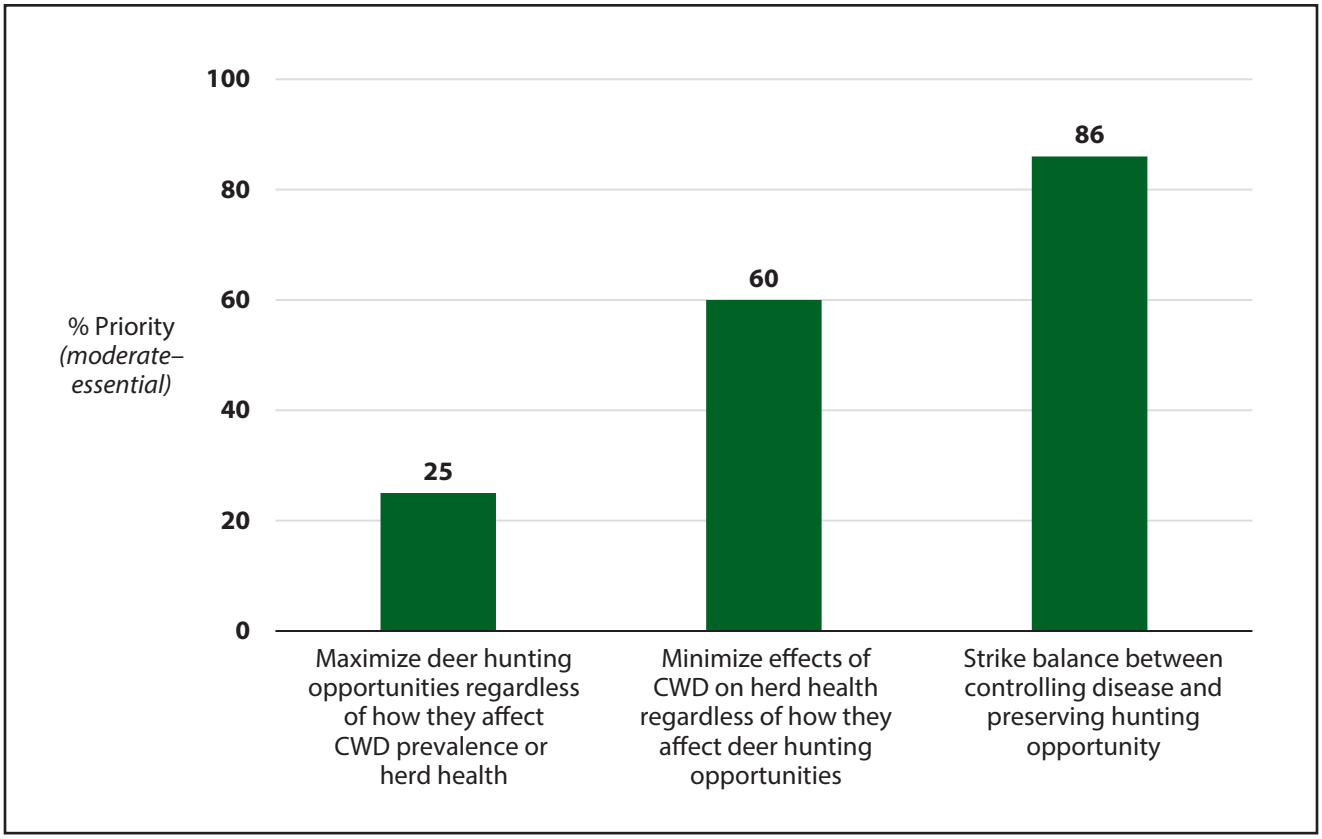

Figure 9. Respondents' perceptions about CWD management priorities for CPW.

Overall, the majority of respondents (86%) believed that striking a balance between controlling CWD and preserving hunting opportunity should be a moderate-to-essential priority of CPW (Figure 9). However, the two remaining statements—representing mutually exclusive priorities—provided additional insight into respondents' management preferences. The first focused on maximizing quality deer hunting opportunities (i.e., trophy bucks) regardless of how doing so might affect CWD prevalence or overall herd health. Only one-quarter of respondents indicated that this option should be a moderate-to-essential priority of the agency. The second statement, which emphasized minimizing adverse effects of CWD on overall herd health regardless of how they affect quality deer hunting opportunities (i.e., trophy bucks), received more support. About 60% of respondents identified this option as a moderate-to-essential priority of CPW (Figure 9). With respect to resident and nonresident priority preferences, more nonresident hunters (Mean = 2.9) than resident hunters (Mean = 2.3) would prefer CPW prioritize maximizing quality deer hunting opportunities (i.e., trophy bucks) regardless of how they affect CWD prevalence or overall herd health ($t(1469) = -8.552$, $p \leq .001$).

Trust in Colorado Parks and Wildlife

Most respondents trust CPW to manage deer herds and to manage CWD to the best of their ability. In fact, nearly 75% of respondents agreed with all six of the statements measuring hunters' trust in CPW (Figure 10). For example, more than three-quarters of respondents are confident that CPW will provide hunters with enough information to decide what actions they should take (77%) and to provide truthful information about human safety issues related to CWD (79%).

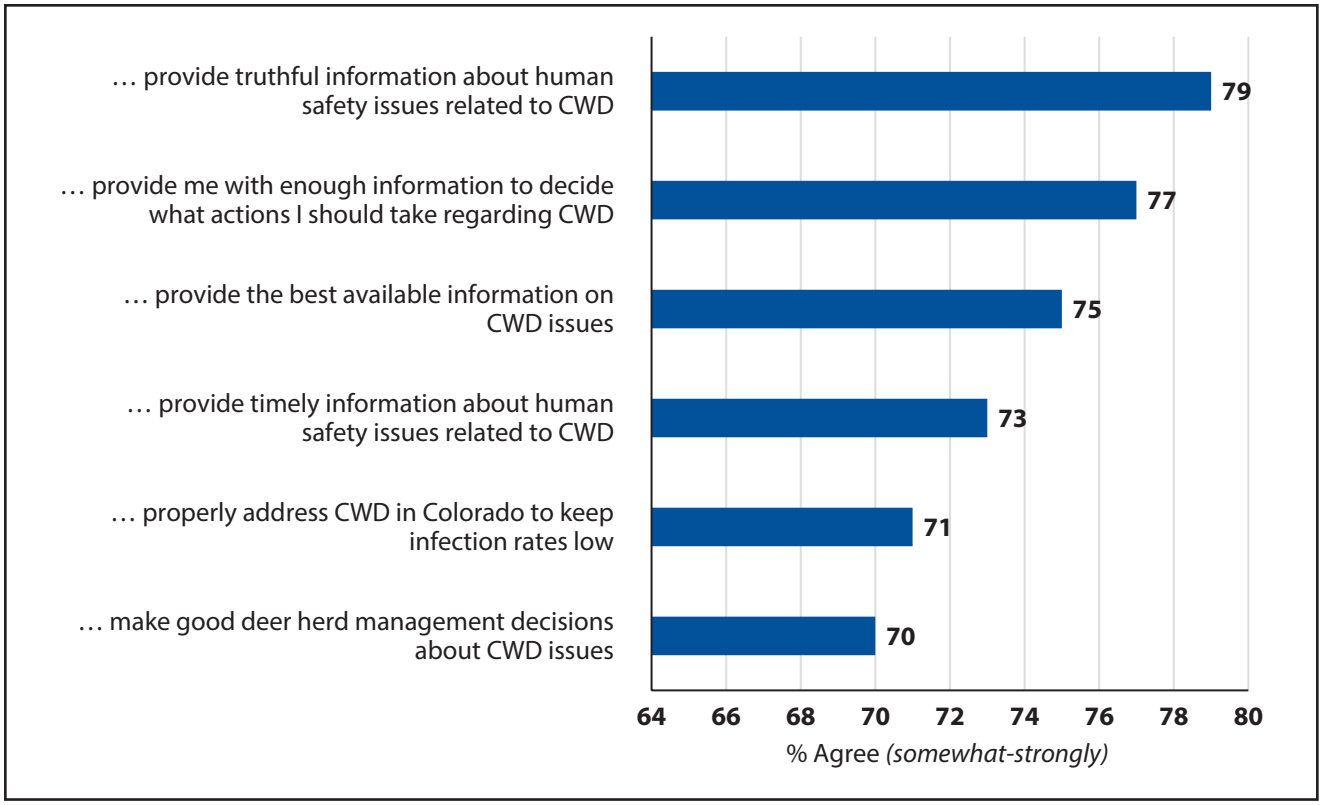

Figure 10. Respondents' trust in Colorado Parks and Wildlife.

Communication

The majority of hunters receive information about CWD through the CPW website (67%) and CPW regulations brochure (69%). Nearly half (44%) learn about CWD from hunting magazines and another 36% do so through word of mouth. Slightly more than one-quarter (26%) obtain information through online searches and approximately 18% do so from the CPW E-newsletter and from social media.

Nearly three-quarters (74%) of resident hunters use the CPW regulations brochure compared to 62% of nonresident hunters. Similarly, about 70% of resident hunters use the CPW website to learn about CWD versus 62% of nonresident hunters. However, more nonresident hunters (51%) use hunting magazines than resident hunters (39%).

Discussion

Findings from this study provided evidence about respondents' awareness about CWD and illustrated the highly variable nature of it. For example, most respondents felt knowledgeable about *which wildlife species can have CWD* and *where deer with CWD have been found in Colorado*. However, fewer felt they had enough information about possible *human health risks*, *livestock risks*, and *what CPW was doing about CWD in Colorado*. It's likely that hunters perceptions about the disease are contributing to specific concerns they have about CWD. For example, results indicated that more hunters were concerned about the health of deer herds in the state as well as their ability and the ability of future generations to continue hunting deer in Colorado than they were about possible human health risks associated with it. These results mirror those from Needham et al. (2004). However, it is important to note that about half of all respondents were concerned about their health or the health of their family and most did not feel they had adequate information about potential human health risks associated with consuming CWD positive meat.

Increasing hunters' awareness about CWD and addressing potential concerns they have about human health risks because of CWD would be beneficial. It is also important to share with hunters what CPW is doing to manage the disease. If this information were conveyed in a way that resonated with individuals it would likely be accepted by the majority of hunters given the high degree of confidence respondents have

in CPW's ability to manage CWD and provide timely, accurate, and reliable information about it. In order to effectively communicate with hunters about CWD.

Results also illustrate an interesting dynamic between general awareness, perceptions about disease prevalence, and behavioral intentions. Using three different scenarios of increasing disease prevalence, we learned that hunters were much more likely to find alternative places to hunt and to stop hunting deer in Colorado altogether as disease prevalence increased. Specifically, as disease prevalence reached 20 or 50%, the percentage of respondents that would hunt elsewhere or stop hunting, increased by more than 20%, regardless of whether they were in the low or high disease prevalence segments. However, license demand does not seem to have diminished in many areas of the state even as prevalence has increased. However, nonresident hunters were more likely to stop hunting deer in Colorado than resident hunters were. They also perceived, on average, greater concerns related to CWD than resident hunters. Future research should attempt to discern whether resident and nonresident hunters actually hunted elsewhere in the state (or stopped hunting altogether) primarily in areas of the state where disease prevalence increased.

The impact of hunters' decisions to find alternative locations to hunt deer or stop hunting deer altogether are important because they may reduce CPW's ability to manage certain deer herds by limiting the options available to control prevalence or reduce the spread of CWD. However, and importantly, the degree to which these behaviors are realized is contingent upon hunters' awareness. As we learned from this study, only half of all respondents were even aware that they purchased a license to hunt in an area of low or high disease prevalence. This research highlights another important consideration: disease prevalence (e.g., low or high) may not resonate with hunters *until* it reaches a certain threshold. Additionally, for hunters to make informed decisions about whether to continue hunting in the same location(s) or seek alternative areas to hunt deer, they'll need to be aware about disease prevalence estimates. Otherwise, they stand to make decisions that run counter to their own preferences and concerns about CWD.

Results from this study also illustrate hunters' desires to be part of the solution with respect to managing CWD. Most were opposed to any methods of managing the disease that involved paid staff or other entities harvesting deer. Instead, hunters would prefer that opportunities to harvest deer remain with them. Regardless of how the disease is managed, hunters expressed a strong desire for something to be done. Put simply, doing nothing and allowing the disease to run its natural course was unacceptable to the majority of hunters. This finding also corroborates those of Needham et al. (2004). Future research should continue to explore ways to effectively communicate with hunters about CWD. Doing so will help hunters and the non-hunting public understand what the agency is doing to manage the disease while assuring them that CPW is actively managing and monitoring the situation. This will lead to a more informed citizenry overall.

Conclusion

This study represents the first attempt since 2004 to systematically survey hunters about their awareness, perceptions, concerns, and attitudes about CWD; how these attributes affect hunter behavior; and how CPW should manage the disease. We collected data using a mail-survey and implemented it with stratified sample of 3,000 resident and nonresident hunters from areas of both high and low disease prevalence. Since there were no statistically significant differences between respondents from the low and high prevalence segments, we combined results from both groups. Overall, hunters were concerned about CWD and want the agency to take action to manage it. Specifically, hunters wanted to be involved in management efforts and believed the agency should prioritize finding a balance between sustaining deer herds and providing hunting opportunities. These and other findings illustrate the importance of clearly communicating with hunters about the disease, the extent to which humans are at risk, and how it may affect deer herds and hunting opportunity in Colorado. However, results also illustrate how important it is for hunters to know how their actions (e.g., continuing to hunt in areas where CWD is prevalent and submitting harvested animals for testing) already play an important role in managing CWD in Colorado. As disease prevalence increases, hunters say that they will begin seeking alternative places in the state to hunt deer or they may stop hunting deer altogether. Specifically, nonresident hunters were more likely to stop hunting deer in Colorado than resident hunters were. These actions could compromise CPW's ability to monitor disease prevalence and maintain healthy deer herds in the state.

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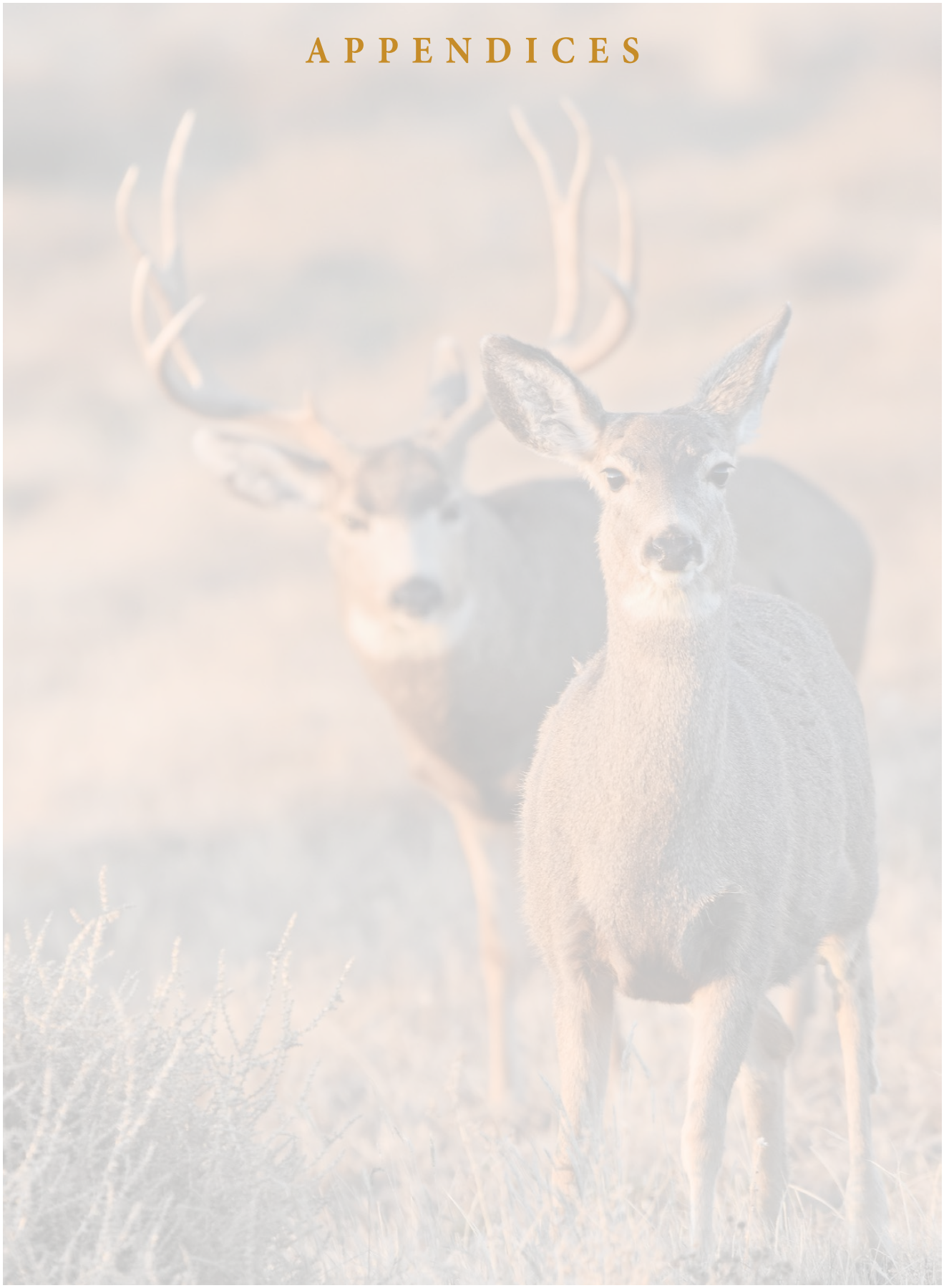
APPENDICES



Appendix A: Effect size results

Resident and nonresident comparison (Chi-square tests)

Question	Chi square (χ^2)	Degrees of freedom	p-value (≤.05)	Phi (ϕ)	Strength of relationship
Q2: Harvested	44.978	1	.001	.184	Minimal
Q8: Aware	11.712	1	.001	-.090	Minimal
Q16b: Media (CPW website)	9.290	1	.002	-.080	Minimal
Q16c: Media (Online searches)	14.113	1	.001	-.098	Minimal
Q16d: Media (TV/radio)	12.197	1	.001	-.091	Minimal
Q16e: Media (Hunting mags)	17.498	1	.001	.109	Minimal
Q16f: Media (Local newspaper)	70.733	1	.001	-.220	Minimal-to-typical
Q16h: Media (Hunting regulations)	24.858	1	.001	-.130	Minimal
Q16i: Media (ENewsletter)	4.919	1	027	.058	Minimal

Resident and nonresident comparison (independent samples *t*-test)

Question	*t*-test	Degrees of freedom	p-value (≤.05)	Cohen's *d*	Strength of relationship
Q3: Satisfaction	-2.198	1062.21	.028	0.123	Minimal
Q4a Motivations: Nature	2.750	1458	.008	0.150	Minimal
Q4b Motivations: Trophy	-15.776	1447	.001	0.849	Substantive
Q4c Motivations: Family	-5.932	1382.97	.001	0.319	Minimal-to-typical
Q4d Motivations: Game meat	11.120	1459	.001	0.593	Typical
Q4e Motivations: WL management	2.296	1457	.022	0.119	Minimal
Q4f Motivations: Local economy	-2.726	1201.88	.007	0.152	Minimal
Q4g Motivations: Skills	2.132	1107.48	.033	0.114	Minimal
Q4h Motivations: Physical exercise	3.808	1110.57	.001	0.199	Minimal
Q5 Information: Where deer found	2.304	1461	.021	0.127	Minimal
Q5 Information: Livestock risks	-2.968	1460	.003	0.163	Minimal
Q5 Information: What CPW's doing	-6.012	1461	.001	0.327	Minimal-to-typical
Q6 Beliefs: Eating meat	-2.410	1459	.016	0.131	Minimal
Q7 Concerns: family	-3.277	1459	.001	0.182	Minimal
Q7 Concerns: Future generation	-2.979	1456	.002	0.158	Minimal
Q7 Concerns: Hunting opportunity	-2.052	1236.26	.040	0.099	Minimal
Q7 Concerns: Eat meat (high prev)	-3.506	1460	.001	0.191	Minimal

Resident and nonresident comparison (independent samples *t*-test) continued

Question	*t*-test	Degrees of freedom	p-value (≤.05)	Cohen's *d*	Strength of relationship
Low prevalence hunter segment					
Q9 at 5%: Stop hunting in CO	-4.581	762.61	.001	0.357	Minimal-to-typical
Q10 at 10%: Stop hunting in CO	-4.796	491.60	.001	0.378	Minimal-to-typical
Q11 at 20%: Find alternative place to hunt	2.184	541.13	.029	0.170	Minimal
Q11 at 20%: Stop hunting in CO	-5.620	493.46	.001	0.432	Minimal-to-typical
High prevalence hunter segment					
Q9 at 10%: Stop hunting in CO	-3.575	539.22	.001	0.276	Minimal
Q10 at 20%: Stop hunting in CO	-3.848	570.98	.001	0.295	Minimal
Q11 at 50%: Stop hunting in CO	-5.527	557.90	.001	0.425	Minimal-to-typical
Q12 Future hunting behavior	-3.958	1024	.001	0.216	Minimal
Q13 Management: Increased buck licenses	5.907	1463	.001	0.316	Minimal-to-typical
Q13 Management: Use hunters to reduce deer population	5.537	1124.26	.001	0.299	Minimal
Q13 Management: Later seasons	6.601	1467	.001	0.350	Minimal-to-typical
Q13 Management: Special disease unit hunts	3.462	1109.34	.001	0.189	Minimal
Q14 Maximize Quality	-8.552	1469	.001	0.455	Minimal-to-typical
Q15 Trust: Best available information	-3.947	1335.13	.001	0.208	Minimal
Q15 Trust: Information	-3.501	1335.61	.001	0.184	Minimal
Q15 Trust: Provide truthful information	-4.273	1335.44	.001	0.231	Minimal
Q15 Trust: Provide timely information	-4.466	1306.40	.001	0.236	Minimal
Q15 Trust: Good	-5.418	1355.84	.001	0.288	Minimal
Q15 Trust: Properly address CWD	-6.012	1363.41	.001	0.318	Minimal-to-typical
Q17 Age	4.880	1238.39	.001	0.261	Minimal

Appendix B: Effect size results

Hunters in "low" and "high" disease prevalence segments (Chi-square tests)

Question	Chi square (χ^2)	Degrees of freedom	p-value (≤.05)	Phi (ϕ)	Strength of relationship
Q2: Harvested	19.18	1	.001	-.120	Minimal
Q16c: Media (Online searches)	4.89	1	.027	- .058	Minimal
Q16g (Word of mouth)	4.29	1	.038	.054	Minimal

Hunters in "low" and "high" disease prevalence segments (independent samples *t*-test)

Question	*t*-test	Degrees of freedom	p-value (≤.05)	Cohen's *d*	Strength of relationship
Q6 Beliefs: Eating meat	3.448	1459.00	.001	0.177	Minimal
Q7 Concerns: Eat meat (high prev)	2.701	1460.00	.007	0.177	Minimal
Q12 Future hunting behavior	-2.558	1417.12	.011	0.138	Minimal
Q13 Management: Increased buck licenses	1.926	1463.00	.054	0.099	Minimal
Q13 Management: Use hunters to reduce deer population	2.752	1470.00	.006	0.144	Minimal
Q15 Trust: Information	-2.491	1443.27	0.13	0.130	Minimal

Appendix C: Survey instrument ("high" disease prevalence)

Your Perspectives About Chronic Wasting Disease in Colorado

About This Questionnaire

Colorado Parks and Wildlife (CPW) is conducting a study about hunters' perspectives regarding chronic wasting disease in deer in Colorado. The purpose of this survey is to better understand hunters' interests, potential concerns about chronic wasting disease, and ways CPW might effectively manage affected deer herds in the state. Even if you are unfamiliar with chronic wasting disease, we still want to hear from you!

Please complete this questionnaire as soon as you can and return it in the postage-paid envelope. Your participation in this study is voluntary, but we strongly encourage you to take a few minutes to answer our questions. Your identity will be kept confidential and the information you give us will never be associated with your name.

THANK YOU FOR YOUR HELP!

Cover photo: A healthy-appearing mule deer buck that was found to be infected with chronic wasting disease.
Photo by M. W. Miller.

Background Information

1. Did you go deer hunting *(mule deer or white-tailed deer)* in Colorado during the 2017-2018 deer hunting season? (*Please check one.*)
   - ☐ Yes (*Please **CONTINUE** to question **2** below*)
   - ☐ No, not during the 2017-2018 hunting season but I **have hunted** deer in Colorado before (*Please **SKIP** to question **4***)
   - ☐ No, and I have **never** hunted deer in Colorado (*Please **RETURN** the survey by sealing it and placing it in any mailbox)*

2. Did you harvest any deer during the 2017-2018 deer hunting season in Colorado? (*Please check one.*)
   - ☐ No
   - ☐ Yes

3. Overall, how satisfied were you with your deer hunting experience during the 2017-2018 hunting season? (*Please check one.*)
   - ☐ Very unsatisfied
   - ☐ Somewhat unsatisfied
   - ☐ Neither unsatisfied nor satisfied
   - ☐ Somewhat satisfied
   - ☐ Very satisfied

Reasons Why You Hunt

4. How important to you is each of the following reasons to hunt deer in Colorado? (*Please check **one** response for **each** statement.*)

Reasons to hunt	Not important	Slightly important	Moderately important	Very important
To spend time in nature	❒	❒	❒	❒
To harvest a trophy	❒	❒	❒	❒
To spend time with family/friends	❒	❒	❒	❒
To obtain wild game meat	❒	❒	❒	❒
To contribute to wildlife management	❒	❒	❒	❒
To contribute to the local community (e.g., financial benefits from hunters)	❒	❒	❒	❒
To test/improve my skills	❒	❒	❒	❒
For physical exercise	❒	❒	❒	❒
Other (please specify): _____	❒	❒	❒	❒

Opinions About Chronic Wasting Disease (CWD)

Please read the following description before answering questions 5 - 10

Chronic wasting disease (**CWD**) is a disease of deer, elk, and moose. It is believed to be caused by an abnormal protein called a prion. In the early stages of the disease, infected animals appear healthy. In later stages, infected animals show changes in behavior and may appear thin or uncoordinated. Infected animals always die. The disease agent passes from animal to animal through saliva, feces, and other means and can persist in the environment for some time (*To note: the questions on this page and most of the remaining pages of this survey ask your opinions about CWD in **deer** specifically, in Colorado).* Infection with CWD shortens the lifespan of a deer and -- if infection becomes too common in a deer herd -- CWD can affect the herd's ability to sustain itself. Within infected deer herds, bucks tend to contract CWD at twice the rate of does.

5. To what extent do you disagree or agree with each of the following statements related to CWD? (*Please check **one** response for **each** statement.*)

I feel that I have enough information about…	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
… where deer with CWD have been found in Colorado	❒	❒	❒	❒	❒
…which wildlife species can have CWD	❒	❒	❒	❒	❒
…what causes CWD in wildlife	❒	❒	❒	❒	❒
…possible livestock health risks associated with CWD	❒	❒	❒	❒	❒
…possible human health risks associated with CWD	❒	❒	❒	❒	❒
…precautions that hunters should take because of CWD	❒	❒	❒	❒	❒
…what Colorado Parks and Wildlife is doing about CWD in Colorado	❒	❒	❒	❒	❒

6. To what extent do you disagree or agree with each of the following statements about CWD? (*Please check **one** response for **each** statement.*)

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
Concerns about CWD have been exaggerated	❒	❒	❒	❒	❒
Effort should be taken to reduce the rate of CWD in wild deer populations	❒	❒	❒	❒	❒
CWD poses a risk to deer, but not to humans	❒	❒	❒	❒	❒
CWD may pose a risk to humans, but not enough is currently known to be sure	❒	❒	❒	❒	❒
Because of CWD, I have concerns about eating deer meat (for myself or my family)	❒	❒	❒	❒	❒

Potential Concerns about CWD

7. Because of CWD in deer, how concerned are you about each of the following? (*Please check **one** response for **each** statement.*)

How concerned are you about…	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned
…your or your family's health?	❒	❒	❒	❒
…the health of affected deer herds in Colorado?	❒	❒	❒	❒
…not having enough healthy deer to hunt in Colorado?	❒	❒	❒	❒
…future generations ability to enjoy hunting deer in Colorado because of CWD?	❒	❒	❒	❒
…the potential for CWD to reduce deer hunting opportunity in Colorado?	❒	❒	❒	❒
…eating meat from a deer harvested in an area of high CWD prevalence (i.e., an area where 1 or more deer out of every 10 are infected)?	❒	❒	❒	❒

Hunting in Colorado

Please read the following information before answering questions 8 - 11

Our records indicate that you purchased a license last year to hunt deer in an area where one or more out of every 10 harvested bucks are infected with chronic wasting disease (CWD).

8. Were you aware that you purchased a license to hunt deer in an area where CWD rates were 10% or higher? (*Please check one.*)
   - ☐ Yes
   - ☐ No

9. Given that at least **1 in every 10** deer (10%) are infected with CWD in the area(s) where you currently hunt, how likely would you be to… (*Please check **one** response for **each** statement.*)

	Very unlikely	Somewhat unlikely	Neither	Somewhat likely	Very likely
…continue hunting deer in this location	❒	❒	❒	❒	❒
…support taking measures to control the disease	❒	❒	❒	❒	❒
…find alternative places in Colorado to hunt deer	❒	❒	❒	❒	❒
…stop hunting deer in Colorado	❒	❒	❒	❒	❒

10. If at least **1 in every 5** deer (20%) were to become infected with CWD in the area(s) where you currently hunt, how likely would you be to…(*Please check **one** response for **each** statement.*)

	Very unlikely	Somewhat unlikely	Neither	Somewhat likely	Very likely
…continue hunting deer in this location	❒	❒	❒	❒	❒
…support taking measures to control the disease	❒	❒	❒	❒	❒
…find alternative places in Colorado to hunt deer	❒	❒	❒	❒	❒
…stop hunting deer in Colorado	❒	❒	❒	❒	❒

11. If at least **1 in every 2** deer (50%) were to become infected with CWD in the area(s) where you currently hunt, how likely would you be to…(*Please check **one** response for **each** statement.*)

	Very unlikely	Somewhat unlikely	Neither	Somewhat likely	Very likely
…continue hunting deer in this location	❒	❒	❒	❒	❒
…support taking measures to control the disease	❒	❒	❒	❒	❒
…find alternative places in Colorado to hunt deer	❒	❒	❒	❒	❒
…stop hunting deer in Colorado	❒	❒	❒	❒	❒

12. How likely are you to go deer hunting in Colorado in the next three years? (*Please check one.*)

Very unlikely	Somewhat unlikely	Neither unlikely nor likely	Somewhat likely	Very likely
❒	❒	❒	❒	❒

Managing Chronic Wasting Disease

13. How unacceptable or acceptable would it be for Colorado Parks and Wildlife to take each of the following actions to stabilize or lower CWD infection rates (*i.e., prevalence*) in the area(s) where you hunt deer? (*Please check **one** response for **each** action.*)

	Highly un-acceptable	Moderately un-acceptable	Slightly un-acceptable	Neither	Slightly acceptable	Moderately acceptable	Highly acceptable
…take **no action** and allow CWD to take its natural course	❒	❒	❒	❒	❒	❒	❒
…increase the number of **buck** hunting licenses	❒	❒	❒	❒	❒	❒	❒
…use **hunters** to reduce the **total population** of deer (*bucks and does*) to the lower range of the herd objective identified in a Herd Management Plan	❒	❒	❒	❒	❒	❒	❒
…use **trained CPW staff** to reduce herds in affected areas to lower infection rates	❒	❒	❒	❒	❒	❒	❒
…increase buck hunting license numbers in **later seasons** in affected areas	❒	❒	❒	❒	❒	❒	❒
…use **special "disease management" hunts** to target areas of especially high prevalence with minimum impact on overall deer numbers	❒	❒	❒	❒	❒	❒	❒

14. How much of a priority should Colorado Parks and Wildlife place on the following herd and harvest management decisions in the area(s) where you currently hunt deer? (*Please check **one** response for **each** statement.*)

	Not a priority	Low priority	Neutral	Moderate priority	Essential priority
Striking a balance between controlling the disease and preserving hunting opportunity	❒	❒	❒	❒	❒
Maximizing quality deer hunting opportunities (i.e., trophy bucks), regardless of how they affect CWD prevalence or overall herd health	❒	❒	❒	❒	❒
Minimizing adverse effects of CWD on overall herd health regardless of how they affect quality deer hunting opportunities (i.e., trophy bucks)	❒	❒	❒	❒	❒
Other (*Please specify and also indicate priority level*): _____	❒	❒	❒	❒	❒

Confidence in Managing Agency

15. To what extent do you disagree or agree with each of the following statements regarding your confidence in Colorado Parks and Wildlife (CPW)? (*Please check **one** response for **each** statement.*)

I am confident CPW will…	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
…provide the best available information on CWD issues	❒	❒	❒	❒	❒
…provide me with enough information to decide what actions I should take regarding CWD	❒	❒	❒	❒	❒
…provide truthful information about human safety issues related to CWD	❒	❒	❒	❒	❒
…provide timely information about CWD issues	❒	❒	❒	❒	❒
…make good deer herd management decisions about CWD issues	❒	❒	❒	❒	❒
…properly address CWD in Colorado to keep infection rates low	❒	❒	❒	❒	❒

16. How do you currently receive information or stay informed about CWD in Colorado? (*Please check **any** of the following if you use them to learn about CWD.*)
    - **A.** ☐ Social media (e.g., Facebook, Twitter, Instagram)
    - **B.** ☐ Colorado Parks and Wildlife website
    - **C.** ☐ Online searches (e.g., Google, Explorer, Safari, etc.)
    - **D.** ☐ TV/Radio
    - **E.** ☐ Hunting magazines (e.g., Field & Stream, Outdoor Life, Colorado Outdoors)
    - **F.** ☐ Local newspapers
    - **G.** ☐ Word of mouth (from a friend/family member)
    - **H.** ☐ Hunting regulations brochures
    - **I.** ☐ Colorado Parks and Wildlife E-newsletter
    - **J.** ☐ I do not stay informed about CWD
    - **K.** ☐ Other (Please specify): _____

17. Based on your response to question 16 (**above**), which three options do you most prefer to use when learning about CWD? (*please write-in the **letters** that match your preference.)*

    Letters: #1_____, #2_____, #3_____,

About You

18. How old are you? (*Please **write-in** your response.*) _____ YEARS OLD

19. With what gender do you identify? (*Please check one.*)
    - ☐ Male
    - ☐ Female
    - ☐ Other (Please specify): _____
    - ☐ Prefer not to say

20. What is your current (residence) zip code? (*Please **write-in** the five-digit number.*)
    _____

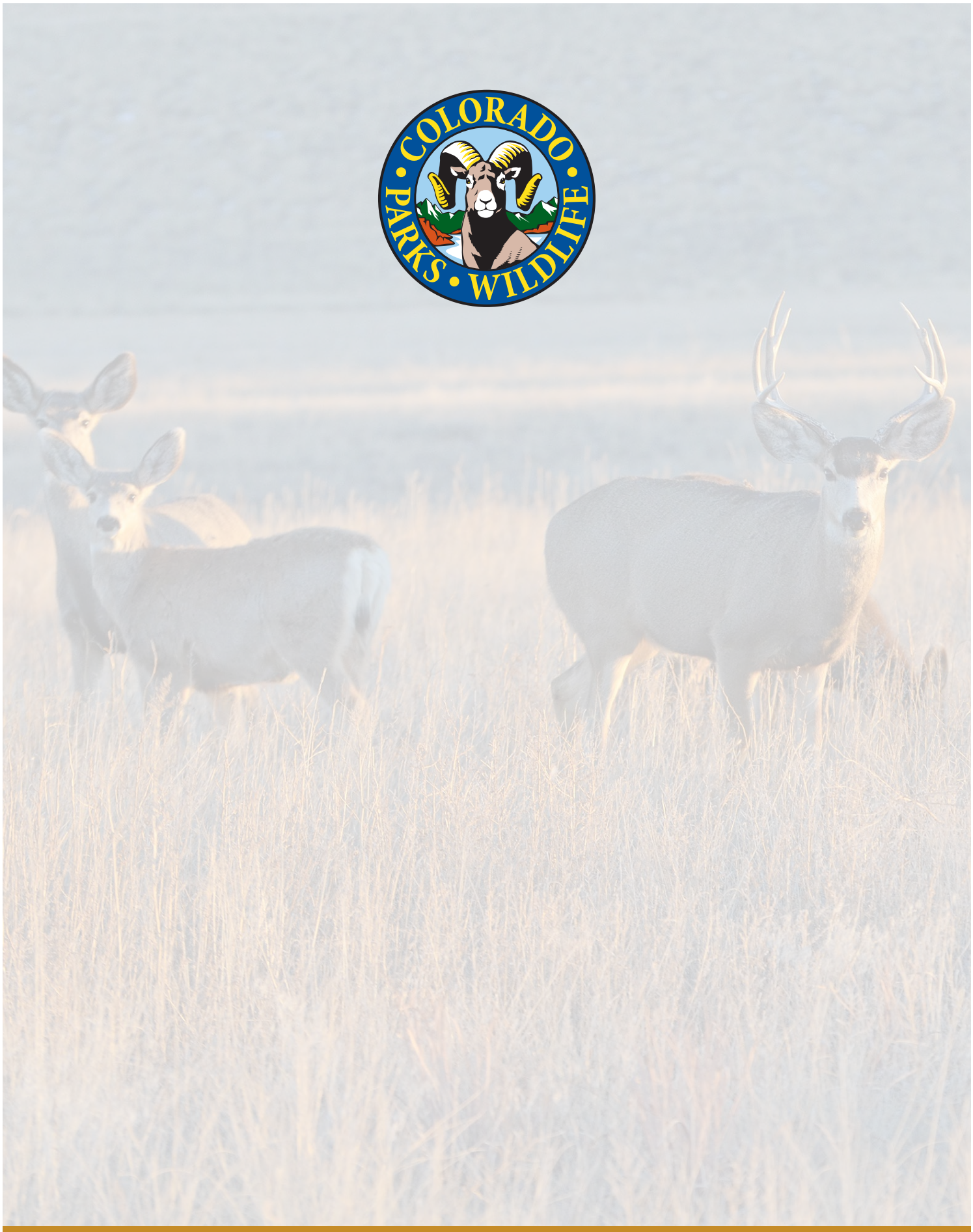
21. Approximately how many years have you lived in Colorado? (*Please **write-in** your response. (If currently **not a resident**, please write "not applicable" or "N/A."*)
    _____ YEARS

22. How would you describe your racial or ethnic background? *(Please check one.)*

- ☐ White, non-Hispanic/Latino
- ☐ Hispanic/Latino
- ☐ Black or African American
- ☐ American Indian or Native Alaskan
- ☐ Native Hawaiian or other Pacific Islander
- ☐ Asian
- ☐ Other (Please specify): _____

Please use the space below to provide any additional comments you may have about chronic wasting disease in Colorado.

Thank you!!!



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