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Hunter Beliefs and Behaviors Related to Chronic Wasting Disease in 2021

Findings from a baseline study

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EXECUTIVE SUMMARY

In 2020, the New York State Department of Environmental Conservation (DEC) was awarded funding from the U.S. Department of Agriculture (USDA APHIS project 14812) to develop a research-based digital media campaign to inform deer hunters about the risks of CWD and actions hunters can take to reduce those risks. The first phase of this project involved research to establish baseline data on New York State (NYS) deer hunters' social and digital media use, practice of CWD risk minimization actions, and perceptions about CWD as a threat to hunters and hunting. Herein we report findings from that 2021 baseline research.

We collected data through qualitative and quantitative methods. First, in December 2020 and January 2021, we completed three separate focus groups with a total of 25 NYS deer hunters. We facilitated group discussion using a semi-structured interview guide to initiate conversations about a common set of topics (i.e., use of deer urine-based scent lures, deer carcass disposal, processing deer taken outside NYS; views on CWD-related recommendations from DEC; perceptions of CWD). Second, NYSDEC and CCSS staff then collaborated to complete a web-based survey with a random sample of 25,000 NYS hunters. We received 6,013 completed questionnaires from a deliverable pool of 22,956 emails (26% response rate after adjusting the sample size to reflect deliverable emails).

Key Findings and Conclusions

CWD-Related Hunting Behaviors:

- Twenty-five percent of respondents had occasionally used deer urine-based scent lures when hunting deer over the past 5 years; 14% had used urine-based lures often or very often. About 33% of hunters who had killed a deer in the past 5 years had disposed of a deer carcass by placing it back on the landscape. Hunters in focus group discussions identified a range of perceived barriers to proper carcass disposal and avoiding use of deer urine-based lures. DEC could design messaging to that addresses these hunter-perceived barriers.

CWD-Related Beliefs, Attitudes, Perceptions:

- Over 30% of deer hunters were not aware that DEC prohibits import of whole deer carcasses from outside New York. More than 50% of deer hunters were unaware that DEC recommends hunters use no deer urine-based lures and dispose of deer remains in the trash or landfill. These results are consistent with results from a study of NYS deer hunters completed in 2019, and reinforced our sense that awareness building would be a

worthwhile goal in a DEC communication plan. The need for better communication between wildlife management agencies and wildlife management stakeholders is a recurrent theme that we have found across time and management programs, so it is not surprising to find that it is a challenge in CWD risk management, as well.

- Results from the hunter survey suggest that many hunters perceive CWD to be a threat to deer hunting quality, but they may not believe that CWD is likely to enter NYS in the near future. Focus group discussions uncovered a “seeing is believing” belief among some hunters. That is, a belief that CWD isn’t something to be concerned about until one sees it in NYS. Although we saw evidence that some hunters would be concerned about the impacts of CWD if it were to arrive in NYS, those concerns may not be motivating them to take actions that would keep CWD outside NYS. Future messaging could alert such hunters that the time to take action is before it reaches the state.
- Results from the hunter survey suggest that many hunters are unsure about or unconvinced of, the response efficacy of actions such as returning to NYS with only processed venison and clean skull caps, avoiding use of deer urine-based lures when deer hunting, and disposing of deer remains in trash pick-up or a landfill. Comments from the focus groups suggest that providing the rationale behind DEC recommendations and regulations will be particularly important in the case of CWD risk management, because hunters receive a mixture of messages from DEC and other entities (e.g., other state agencies, retail businesses). Messaging could focus on providing the rationale for recommendations, or could focus on providing support for effectiveness of taking recommended actions. Communicating the rationale for recommendations also may be helpful to address perceived inconsistencies in DEC recommendations.
- Most hunters trusted DEC to manage CWD risks. Focus group discussions suggested that trust is based on: (1) perceived expertise within DEC, (2) actions (doing what you say you will do), and (3) demonstrating (communicating) that DEC is taking actions (i.e., do it, and tell people you did it). These types of comments are consistent with literature on trust building. They increase our confidence that open, transparent, and regular communication with hunters about CWD, and DEC’s action to manage CWD-related risks on behalf of hunters, can build hunter trust in DEC as an information source and as a manager of CWD-related risks.

Use of Social Media and Digital Media:

- Approximately 71% of survey respondents who hunted deer used social or digital media platforms. Given this level of use, messaging on social or digital media has the potential to raise hunter awareness of actions hunters can take to reduce CWD-related risks.
- More than two-thirds of survey respondents used social or digital media, regardless of whether they identified themselves primarily as bow season hunters, regular gun season hunters, or multi-season hunters. Those findings suggest that communicating to hunters through the most popular social and digital media platforms could reach audiences of both resident bowhunters and gun hunters.
- About 29% of survey respondents who hunted deer did not use social or digital media, indicating a continuing need to include traditional communication channels in a comprehensive approach to communication about CWD risks and risk reduction actions.

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Nancy Connelly (Cornell Center for Conservation Social Sciences) provided consultation on sampling strategy. Deanna Kreinheder (Cornell Center for Conservation Social Sciences) and Katherine McComas (Cornell Department of Communication) contributed to study design.

Our survey instrument and request to conduct survey research was reviewed and approved by the Cornell University Office of Research Integrity and Assurance (Institutional Review Board for Human Participants Protocol ID# 1004001374).

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INTRODUCTION

Chronic wasting disease (CWD) is a prion disease that infects white-tailed deer and other members of the cervid family (e.g., mule deer, elk, moose). CWD is always fatal in infected hosts but no example of human infection has ever been observed. Prions are shed from infected animals (including carcasses) and can be transmitted directly or indirectly to other cervids (Saunders et al. 2012). Because prions are hard to inactivate and may persist in the environment for a long time, it is important to handle infectious material in a way that does not allow for further transmission (Gillin and Mawdsley 2018).

CWD was first discovered in New York in 2005, but was successfully controlled. No further cases have been identified in the state, but CWD is present in neighboring Pennsylvania, and many New York state residents travel to Pennsylvania and other CWD-positive states to hunt, raising the risk of disease reintroduction by deer hunters.

The New York State Interagency CWD Risk Minimization Plan (DEC 2018) is New York State's effort to respond to CWD risks. It is a collaboration between the New York State Department of Environmental Conservation (NYSDEC), the New York State Department of Agriculture and Markets (NYSDAM), and the Animal Health Diagnostic Center (Cornell University College of Veterinary Medicine). The risk minimization plan outlines three main goals: 1) keep infectious material out of NY, 2) prevent exposure of wild cervids to infectious material in NY, and 3) develop communication to increase stakeholder understanding of potential CWD risks. The overarching goal of the plan is to prevent new introductions of CWD to the state, which could harm both wild and captive cervid populations and associated recreational activities and businesses. As part of the plan, NYSDEC and NYSDAM collaborated to prohibit movement of live captive cervids into New York and to restrict importations of cervid carcasses. NYSDEC is also encouraging hunters to dispose of cervid carcasses and carcass parts in landfills and to avoid using deer urine-based scent lures (DEC 2019).

Wildlife management agencies are developing greater capacity to communicate with wildlife management stakeholders through digital media. Digital media includes any form of media that can be created, viewed, modified and distributed via electronic devices (e.g., videos, websites, social media, online advertising, streaming audio). Wildlife managers in DEC are interested in using digital media to communicate with deer hunters about CWD risk reduction. For example, DEC might design a digital media campaign that included efforts such as posting Facebook messages through local organizations, purchasing advertisements (on platforms like Facebook, streaming services like Spotify, or popular hunter podcasts like MeatEater), sponsoring promotional YouTube videos, or strategic use of Instagram or Snapchat feeds. Better understanding of how deer hunters use social and other digital media would help DEC managers understand how best to reach specific hunter audiences via those media.

In 2020, NYSDEC competed for and was awarded funding from USDA APHIS (Project 14812) to develop a research-based digital media campaign to reduce the risks of CWD. This grant will

help DEC to develop a digital media campaign with three goals: thoughtful integration of messages across multiple channels, efficient use of campaign resources, and effectiveness in influencing key behaviors of target audiences (e.g., bow hunters, hunters who use deer urine-based lures, New York State residents who hunt cervids outside the state).

DEC will complete the USDA APHIS project in several stages. A first step in the project is to collect baseline data on New York deer hunters. The Cornell Center for Conservation Social Sciences (CCSS) collaborated with NYSDEC to collect baseline data on deer hunters, including their use of social and digital media. In this publication we report findings from phase I of our project, which used both qualitative and quantitative data collection methods to address the four study objectives described below. Subsequent stages of the USDA APHIS project will involve generating and testing messages that may influence hunter behaviors and attitudes in relation to minimizing CWD risks.

Study Objectives

1. Identify the digital media platforms used most frequently by New York State hunters.
2. Characterize how digital media use differs across hunter and demographic groups.
3. Characterize how beliefs and attitudes relevant to CWD management differ across behavioral and demographic groups.
4. Identify volunteers to participate in later message testing research.

METHODS

In this phase of research, we collected data through qualitative methods (i.e., hunter focus groups) and quantitative methods (i.e., hunter survey).

Hunter Focus Groups

Because we were unaware of the full range of factors influencing hunter behaviors, we began this phase of the study with a qualitative approach: focus group meetings. The focus group approach is well suited to: obtain general background information about a topic of interest; generate hypotheses for further research; identify potential problems with or impressions about products (e.g., scent lures); and learn how a target audience talks about an object of interest (e.g., deer remains) (Morgan and Krueger 1993, DiCamillo 1995, Kaplowitz and Hoehn 2001). Qualitative methods such as focus groups are superior to surveys at discovering unanticipated influences and patterns because they allow participants (hunters, in this case) to describe their behaviors, experiences, and perspectives in their own words rather than being limited to a constrained set of choices (such as might be included on a standardized survey). Qualitative work provides depth and context (Bryman 2012), which can be valuable as the foundation for further quantitative research on the topic of interest. In this case, qualitative research on deer hunting behavior provided a foundation for future quantitative research on CWD-related messaging.

Identifying focus group participants We used two approaches to identify focus group participants. We contacted a random sample of 400 New York State hunters who lived in central or western New York and had provided an email address on their hunting license application. The hunter sample was provided by DEC. We contacted everyone in the sample twice, with an invitation to participate in a focus group discussion. Members of the sample were offered a \$25 Amazon gift card if they participated in a focus group. We also corresponded directly with representatives of several hunter and wildlife conservation organizations (i.e., New York Muzzleloaders Association, New York Bowhunters, Inc., and the NYS Conservation Council) and asked those representatives to publicize the call for focus group participants.

Data collection and analysis We convened focus group discussions with three groups of deer hunters. We held the focus group meetings on December 17, 2020, January 12, 2021, and January 13, 2021. Each meeting was 2 hours in length. We held the meetings remotely, using video conferencing. Two of the focus groups had 8 hunter participants; one group had 9 hunter participants (for a total of 25 participants). Participants were predominately male (22 out of 25) and white (24 out of 25).

We facilitated group discussion using a semi-structured interview guide (Appendix A) to initiate conversations about a common set of topics (i.e., use of scent lures, deer carcass disposal, and handling a deer taken outside NYS; views on CWD-related recommendations from DEC; perceptions of CWD). We made video and audio recordings of each meeting, transcribed the audio recordings, and analyzed transcriptions to identify themes related to topics such as: hunter beliefs, attitudes, and perceptions; habits; situational norms; decision-making heuristics; and people, places or things that hunters associated with CWD-related behaviors.

Hunter Survey

We followed focus group meetings with a quantitative survey of deer hunters. CCSS staff collaborated with DEC staff to develop a survey instrument that assessed deer hunting behaviors, behaviors related to CWD risk management, beliefs and attitudes related to CWD, and use of social media, digital media, and streaming audio services. The survey instrument also included a question asking if we could contact the participants again to invite them to participate in the next phases of DEC-sponsored research related to CWD.

We designed the baseline survey to learn more about subgroups of NYS deer hunters, including: overall awareness of CWD, the types of digital media they use most frequently, and some of their CWD-related attitudes, beliefs, and behaviors (i.e., deer carcass disposal methods, use of deer urine-based scent lures, hunting cervids outside New York State). We included questionnaire items that would allow us to address the following research questions:

- Which digital media platforms are used most frequently by NYS hunters, and, in particular: (1) resident hunters who leave NYS to hunt deer; (2) hunters who use deer urine-based lures; and (3) hunters who dispose of deer carcasses on the landscape
- How does use of digital media platforms differ across deer hunter activity groups (e.g., bow hunters vs. gun hunters) and age cohorts?
- How do CWD-related beliefs, attitudes, and behaviors differ across hunter activity groups and age cohorts?

Survey sampling and analysis DEC selected a random sample of 25,000 licensed hunters from the pool of all licensed hunters with a New York residence (i.e., nonresident hunters were excluded). The large sample size was needed in this case, because the survey served as a screening process to identify at least 1,250 volunteers to participate in subsequent phases of research.

Survey implementation DEC staff implemented the survey in February, 2021. On February 1, 2021 DEC staff distributed an initial email invitation to participate in the survey. Along with a message encouraging them to participate in the survey, each individual in the sample received a unique link to the website where they could complete their questionnaire. Nonrespondents received up to 4 reminder emails at multi-day intervals (distributed on February 8, 16, 23, and 26). DEC staff sent reminder emails at different times of day and on different days of the week.

Analysis We used IBM SPSS Statistics 24.0 software (IBM Corp. 2016) to calculate frequencies and measures of central tendency (e.g., mean, standard deviation). We placed respondents into groups (e.g., bow hunter, gun hunter, multi-season hunter) for comparison. We used the chi-square statistic and t-tests to test for significant differences between groups at the $P < 0.05$ level. We did not conduct any nonrespondent follow-up interviews in this study.

RESULTS

We received 6,013 completed questionnaires from a deliverable pool of 22,956 emails (26% response rate after adjusting the sample size to reflect deliverable emails). One-hundred fifty eight hunters refused to participate (i.e., unsubscribed themselves from the mailing list). About 94% of respondents (n=5,670) had hunted deer in New York State at least once during the past 5 years. We defined those respondents as active deer hunters. About 93% of active hunters were male; their mean age was 50 years old.

Approximately 59% (n=3,343) of active deer hunters considered themselves primarily multi-season hunters; 31% (n=1,727) considered themselves primarily regular firearms season gun hunters; 10% (n=574) considered themselves primarily bow hunters. We used these self-selected identity labels to create hunter groups for comparison across multiple variables measured in the survey.

In the sections that follow, we report findings from the hunter survey. Only active deer hunters were included in the analysis. Where appropriate we highlight findings and include participant quotes from hunter focus group discussions. Material from focus groups provides a richer understanding of why hunters may hold particular perceptions, or why they may or may not adopt recommended CWD risk reduction behaviors.

Behaviors Related to Deer Hunting and CWD Risk Management

This phase of research allowed us to characterize the rates at which deer hunters practice behaviors that can reduce risks of introducing or spreading CWD in New York State, and to gain some insights about why they may or may not change these behaviors in the future.

Hunting Cervids Outside New York State

About 18% of active deer hunters (n=1,028) had hunted cervids in a state other than New York. That included 26% of those who identified themselves as primarily bow hunters, 9% of those who identified as gun hunters, and 21% of those who identified as multi-season hunters (Table 1). Men were more likely than women to have hunted cervids outside New York State (men 19% vs. women 8%; chi square [1, n=5,670] = 29.09, p < 0.001).

Table 1. Frequency with which active deer hunters had hunted deer, elk, or moose outside of New York State within the past 5 years.

	All active deer hunters (n=5,670)	Active hunters by type		
		Bow hunters (n=574)	Gun hunters (n=1,727)	Multi-season hunters (n=3,343)
	%	%	%	%
Never	81.9	73.9	90.6	78.7
At least once	8.9	10.8	5.5	10.3
Multiple times	9.2	15.3	3.9	10.9
Total	100.0	100.0	100.0	100.0

Using Deer Urine-Based Scent Lures

DEC recommends that hunters avoid use of deer urine-based scent lures when hunting deer. In the hunter survey, questions documented use of urine-based scent lures, and in hunter focus groups we discussed hunter reasons used or did not use urine-based and synthetic deer lures.

Throughout this document the phrase “natural scent lures” refers to deer hunting products that contain elk or deer urine; the phrase “synthetic scent lures” refers to deer hunting products that do not contain elk or deer urine.

About 58% of active deer hunters (n=3,324) had used deer-urine based scent lures at some point when deer hunting during the past 5 years, though only 14% indicated using it often or very often. Use was more common among multi-season hunters and least common among those who considered themselves primarily regular season firearms hunters (Table 2). Men were more likely than women to have used deer urine-based lures when hunting deer sometime over the past 5 years (men 60% vs. women 45%; chi square [1, n=5,670] = 32.41, p < 0.001).

Table 2. Frequency with which active deer hunters had used deer urine-based lures when deer hunting over the past 5 years.

	All active deer hunters (n=5,670)	Active hunters by type		
		Bow hunters (n=574)	Gun hunters (n=1,727)	Multi-season hunters (n=3,343)
	%	%	%	%
Never	41.4	36.1	61.4	31.8
Rarely	20.1	24.0	15.8	21.8
Occasionally	24.8	26.1	15.6	29.4
Often	8.9	10.1	5.1	10.8
Very often	4.7	3.7	2.1	6.3
Total	100.0	100.0	100.0	100.0

Focus group discussions about use of scent lures highlight some of the potential barriers that could prevent adoption of the DEC recommendation to avoid use of natural lures.

- For some, use of scent lures is an embedded part of hunting practice.
- Hunters will keep using natural scent lures if they are perceived as effective.
- Hunters will not adopt synthetic lures if they are more costly to use or less available than natural lures.
- Bow hunters need to feel like they are doing something to increase their odds of seeing deer within bow range.
- Messages about scent lures made by DEC have to compete with messages from commercial marketers of scent lures.

- Part of the hunter population is likely to be unaware of synthetic scent lures.
- Part of the hunter population may not see use of natural scent lures as a CWD disease risk.

"... I think one of the obstacles you have when you're telling a bow hunter not to use it- bow hunting, for the vast majority, is an inactive sport. The vast majority sit in a tree and wait for the deer to come to them. There's not a lot going on. So, by putting scent out, by doing – putting a decoy out, it's a way the hunter perceives he's doing something actively to get a deer. And that's I think, psychologically, it has more value than- the hunter wants to do something. And just sitting there for two or three hours, he feels like, "well if I put scent around, I'm doing something a little more active to help myself." So, that's an obstacle I think bow hunters have, they want to do something. They want to put out feed, they want to put out scent, they want to take some activity to actually do something. Not just sit and wait." (R1)

"I think [name] made a great point, that if a study hasn't been done [on effectiveness of scent lures], one should be done. And before you go about a urine ban, show the hunters it doesn't really work. Then the next step would be, let's get rid of this stuff. But I think if a hunter thinks it's going to help him, trying to stop him is going to be an impossible task. Why not? Get some tests, some studies done about human urine and deer urine and what's actually there and a difference. Anything, using anything or nothing. Most of us are hearing, those of us who use it or don't use it don't really see a difference. How do we quantify that and get that word out before you just tell people, "Stop using urine." Prove to us you don't need it." (R1)

"I don't think many people realize, which ones are synthetic and which ones are actually whitetail material based, so it'd be hard to tell, just Because its store bought doesn't mean it's synthetic or that it's natural." (N2)

"Most people just have their favorites and they stay with that." (E2)

"We definitely use them [scent lures]. If I'm going to get up three o'clock in the morning and go sit in the cold with my nostrils dripping snotsickles and everything, I want to bring something home. ... they work. I've had, buck- literally just coming in the woods and I'll have a drag on and turn around and look back and you know there's a buck. 20 yards behind me, because I'm just dragging the scent lure. And I've been in a blind and doing something not paying attention and look out my blind and there's a buck ten yards away because there's a scent lure. ...And they work, we normally get a buck every season. ... They work. I don't think we abuse it, but you know that's been our experience with it." (M3)

" I think it's going to be a market-driven thing. If you've got good synthetic lures that are well advertised, then people are going to buy those find out that they work and use them. But if they don't work, then they're not going to get used. So I think it's more of a supply demand and market situation." (C3)

Disposal of Deer Remains

About 78% of active deer hunters (n=5,670) had killed a deer in the past 5 years (Table 3). About 33% of those hunters had put a deer carcass back on the land (Table 4). A small percentage of those hunters used their deer remains to bait predators or attract wildlife (Appendix B, Table B1). These findings suggest that about a third of successful hunters have disposed of a deer carcass in a way that could expose wild deer to the prions that cause CWD.

About two-thirds of hunters who had killed a deer in the past 5 years had never put a deer carcass back on the landscape. About 38% of hunters who had killed a deer in the past 5 years had never processed their own deer; deer processors are required to dispose of deer carcasses in a landfill. About a quarter of successful deer hunters had put deer remains in their regular trash pick-up; about 8% had taken a deer carcass to a landfill (Table 4). About 4% reported disposing of deer remains by some “other” means, several of which would prevent live deer from coming into contact with those carcasses (i.e., burying, burning, placing remains in a dumpster, taking remains to a transfer station or dump) (Appendix B, Table B1). These findings suggest that about two-thirds of successful hunters had disposed of deer carcasses in ways that do not increase the risk of environmental exposure of wild deer to the prions that cause CWD.

Table 3. Proportion of active deer hunters who had harvested a deer and processed (butchered) one or more deer at home over the past 5 years.

	All active deer hunters	Active hunters by type		
		Bow hunters	Gun hunters	Multi-season hunters
Killed a deer in past 5 years	(n=5,670)	(n=574)	(n=1,727)	(n=3,343)
	%	%	%	%
No	21.8	23.3	36.4	13.8
	(n=1,236)	(n=134)	(n=629)	(n=463)
Yes	78.2	76.7	63.6	86.2
	(n=4,434)	(n=440)	(n=1,098)	(n=2,880)
	Active hunters who had killed a deer in past 5 years	Active hunters who had killed a deer in the past 5 years, by hunter type		
	(n=4,434)	Bow hunters	Gun hunters	Multi-season hunters
	%	(n=440)	(n=1,098)	(n=2,880)
		%	%	%
Processed one or more deer at home in past 5 years				
No	37.8	38.9	51.6	32.4
	(n=1,676)	(n=171)	(n=567)	(n=932)
Yes	62.2	61.1	48.4	67.6
	(n=2,758)	(n=269)	(n=531)	(n=1,948)

Table 4. How deer hunters who processed one or more of their own deer over the past 5 years had disposed of remains from those deer.

	Hunters who had killed 1 or more deer in past 5 years (n=4,434) % ¹	Active hunters who had killed a deer in the past 5 years, by hunter type		
		Bow hunters (n=440) %	Gun hunters (n=1,098) %	Multi-season hunters (n=2,880) %
Never processed their own deer (processor disposed of carcass)	37.8	38.9	51.6	32.4
Put remains back on the land	32.6	29.8	27.5	34.9
Put remains in trash pick-up	24.9	28.9	15.7	27.8
Took remains to a landfill	7.9	4.5	6.2	9.1
Other	3.8	3.9	3.2	4.0

¹ Note: columns add to >100% because some hunters who processed their own deer had used more than one method of deer carcass disposal.

Discussions about deer carcass disposal highlighted some of the potential barriers that could prevent adoption of the DEC recommendation to dispose of deer carcasses in a landfill.

- Leaving deer carcasses on the land is part of the traditional practice of deer hunting.
- Leaving carcasses on the land is viewed by some as natural and beneficial.
- Deer carcasses are used as a resource by deer hunters who also hunt coyote.
- Deer hunters enjoy viewing wildlife attracted to deer carcasses left on the land.
- The thought of deer bones as “trash” is offensive to some.
- Hunters may not have clear instructions about how to get their deer remains to a municipal landfill.
- Deer bones may not be perceived as a disease risk.

“There’s also the variable of the vast geography difference in the state. If you own property and you hunt your own land, there’s more likelihood to just dump the carcass for coyote or whatever. If you’re traveling from an urban area to hunt and you’re the kind of guy who, you lived in the suburbs, you bring the deer back, hang it in your garage, and butcher it yourself- you’re more likely to put it in the garbage. Regardless of where it ends up. But you put it in your trash, you don’t have property to dump it on. So, that’s also dependent upon where the hunter lives. We don’t all live in an area- I lived in [placename] for many years. I butchered many a deer in my shed and the bones went out with the garbage. And there were other

times, if I was hunting [placename], if I was hunting up in the Catskills, the carcass laid right where I could maybe shoot a coyote. So, it depends on where the deer are ending up. Like, a blanket policy, a blanket regulation is going to be very different for the hunting population.” (R1)

“I’m very conscientious about littering and human waste and stuff like that. But I’m less so worried about natural materials. Like my deer, I start in the backyard. I’m not usually keeping the skins. It’s probably goes back to nature into the woods behind the house. And never had a problem with it. Now I’ll bring the leg quarters and most of the bones come into the house with me and I finished the processing at the kitchen table. I clean all the bones and generally I’ll just drop them in a garbage bag. So part of my stuff goes back to nature and part of my stuff goes into the trash. ...And I’m not worried that much about spreading chronic wasting disease with a few bones in the woods. If they’re going to get it, they’re going to get it from a deer that dies in the woods, ... the few pieces that I throw out there are not going to make a whole lot of difference.” (R2)

“It’s natural, in my opinion. It just goes back and usually it’s eaten within a day or two anyway by the wildlife.” (C2)

“I believe it’s a natural process. ...I find, it seems a little repulsive to me to take any part of the deer and throw in the garbage, treating it like its garbage doesn’t seem right. Returning it to nature seems right, like treating it with respect. ... I just, it’s not garbage in my book, so I wouldn’t throw it in the garbage.” (K2)

Beliefs and Attitudes Related to CWD

CWD-Related Knowledge and Concern

A majority of active deer hunters reported knowing “some” or “a moderate amount” about CWD (Table 5). Mean level of self-reported knowledge about CWD was higher among bowhunters than among gun hunters (mean 3.22 for bow hunters vs. 2.84 for gun hunters, $df = 2,299$, $t = 8.49$, $p < 0.001$). Mean level of knowledge about CWD also was higher among multi-season hunters than among gun hunters (mean 3.24 for bow hunters vs. 2.84 for gun hunters, $df = 5,068$, $t = 15.00$, $p < 0.001$).

A majority of active hunters described themselves as slightly or moderately concerned about CWD (Table 6). Mean level of concern about CWD also was slightly higher among gun hunters than among multi-season hunters (mean 2.71 for gun hunters vs. 2.65 for multi-season hunters, $df = 5,068$, $t = 2.09$, $p = 0.04$). There was a positive, significant correlation between knowledge about CWD and concern about CWD (Pearson correlation 0.237, $n=5,670$, $p<0.001$). Increased knowledge about CWD was correlated with increased concern about CWD.

Table 5. Self-reported level of knowledge about chronic wasting disease.

How much hunters Knew about CWD ¹	All active deer hunters (n=5,670) (\bar{x} =3.12)	Active hunters by type		
		Bow hunters (n=574) (\bar{x} =3.22)	Gun hunters (n=1,727) (\bar{x} =2.84)	Multi-season hunters (n=3,343) (\bar{x} =3.24)
	%	%	%	%
Nothing at all	3.6	3.0	6.8	1.9
Very little	21.4	19.3	29.4	17.5
Some	40.5	37.8	39.8	41.4
A moderate amount	29.0	32.1	20.6	32.8
A lot	5.6	7.8	3.3	6.4
Total	100.0	100.0	100.0	100.0

¹ Values range from 1 – 5; 1=nothing at all, 2=very little, 3=some, 4=moderate amount, 5=a lot.

Table 6. Level of concern about chronic wasting disease, by hunter identity type.

Level of concern ¹	All active deer hunters (n=5,670) (\bar{x} =2.69)	Active hunters by type		
		Bow hunters (n=574) (\bar{x} =2.78)	Gun hunters (n=1,727) (\bar{x} =2.71)	Multi-season hunters (n=3,343) (\bar{x} =2.65)
	%	%	%	%
Not at all concerned	9.9	8.4	9.4	10.5
Slightly concerned	35.4	33.1	35.2	35.8
Moderately concerned	34.0	34.0	34.5	33.7
Very concerned	17.6	21.1	16.4	17.6
Unsure	3.1	3.5	4.5	2.3
Total	100.0	100.0	100.0	100.0

¹ Values range from 1 – 5; 1=not at all, 2=slightly, 3=moderately, 4=very concerned, 5=unsure.

Across focus group meetings we saw the full spectrum of concern levels. On one end of the spectrum were comments indicating that the person speaking had very low concern about CWD, or that the speaker believed that the hunters they knew were unconcerned about CWD. These hunters said things about CWD such as: “not an issue is the general consensus” (L1), “not too worried about it” (R2), “not really a concern, very few hunters I know even discuss it” (S3), “I have not experienced anyone in my hunting circles talking about CWD” (M3), “the few hunters I know were not even aware of CWD” (B3), “current issue is EHD” (B2). On the other end of the spectrum were hunters reporting high levels of concern. Hunters on this end of the spectrum described CWD as “under-appreciated; critical to wildlife conservation” (D1) and a “significant threat” (S3).

Concern about the effects CWD might have on the deer herd and future of deer hunting in New York were prominent. Concerns about related declines in the number of deer were revealed in perceptions that CWD is: “very dangerous to [the] herd” (R1), a “contagious disease that decimates deer herds” (B1), “highly communicable among the herd” (D2), leads to “rapid deer population spread” (C2), and “a threat to our herd and our sport in general” (E2). One hunter said “lowering deer populations is the concern” (L1). Another said that hearing the phrase CWD makes them think about “decline in hunter numbers” (N2).

“... if chronic wasting disease has a negative impact on a local deer herd, eventually one of my concerns is that the governing agencies are going to reduce the season durations to accommodate the declining deer herd. And therefore, then directly, all the participants – bow hunters, gun hunters, whatever – will have less recreational time, fewer people are going to buy licenses, the whole thing is going to just spiral. It’s going to have a tremendous economic impact as well.” (J1)

Some participants expressed concern about potential effects on human health. These participants associated CWD with “mad cow” disease (R2), “bad meat” (DE3), or “human death” (P3). Some hunters expressed uncertainty, asking the moderator if they should be concerned about human health effects, or said they were “not sure if it can be passed on to humans” (H1). Multiple participants noted that they would like to avoid eating venison from a deer that tested positive for CWD.

“I wrote down bad news and bad meat. To me, the bad news is that it’s the communication between the deer and, you know, not really sure if it goes between the deer and humans. And that’s why people don’t want to eat the meat.” (DE3)

Discussion revealed that multiple participants were unconcerned about CWD because their personal observations assured them that CWD is not present in New York. While some participants associated the phrase CWD with “sick deer” (R2, R3), “skinny sickly ... zombie deer” (C2), and the like, they believed that CWD was not in New York State because they were not seeing deer that looked weak, sick, or diseased. One participant’s reaction to hearing the phrase CWD was, “Not here yet, no one I know is concerned about it” (P1).

“We don't really talk about [CWD]. I mean it's mentioned, but until, you know, we seen one or, you know, had a report of one within reasonable distance, there's really no concern. As far as, you know, if there's a deer that's out there and it's sickly, me, I'll shoot it, and will not eat it. I'll leave it for the coyotes. Of course that can be spread from the coyotes and the, you know, crows, everything that eats it [the deer]. So I guess that's something we really should consider, be concerned with. But until you see a case in New York State. I guess it's something that I'm not concerned with.” (R2)

“So being located, you know, kind of centrally in New York somewhat, ... I'm not that worried about it because it would hit the border before, the state line, well before it got to me. And there would be more information put out. I guess my question this conversation brought up is how close to home is it? How close to New York State is the closest confirmed case?” (N2)

Awareness of Actions to Reduce CWD-Related Risks

Over 30% of active hunters, including 50% of multi-season hunters, were not aware that DEC prohibits import of whole deer carcasses from outside New York. A majority of active deer hunters were unaware that DEC recommends hunters use no deer urine-based lures when hunting, and recommends that hunters dispose of deer remains in the trash or landfill (Table 7). A substantial proportion of active hunters also were uncertain, or unconvinced, that following these requirements or recommendations would be effective as means to keep CWD outside New York, or keep it from spreading across New York (Table 8).

Most focus group participants were avid, longtime hunters, but even among these avid hunters there was wide variation in understanding about specific aspects of CWD and awareness of CWD-risk prevention recommendations. Some focus group participants had a working understanding of CWD, while others said they didn't know much about the disease. Some knew about the scent lure recommendation, others didn't. There were suggestions that information about CWD and CWD recommendations were not being pushed very hard by DEC, and that casual deer hunters were not going to actively seek out information on CWD.

*“So, I have a question. Do we have evidence that this stuff is spreading or causing or allowing to happen the CWD? I mean- *shrugs* I don't have enough information to make educated conversation with people I know, to be honest with you. And if I don't know about it – I figure I'm fairly read-up on a lot of things – then I think we have ...a lack of knowledge issue.” (S1)*

“I look at it as, ... if I wasn't really aware of it [carcass disposal recommendation] and I consider myself fairly well-read in what's going on, especially anything with DEC that I might hear about, ...I can only assume that a significant portion of hunters are unaware of that.” (S1)

Table 7. Percentage of active deer hunters who were aware of regulations and recommendations related to CWD risk management, by hunter identity type.

Before you received this survey, were you aware that:		All active deer hunters (n=5,670)	Active hunters by type		
			Bow hunters (n=574)	Gun hunters (n=1,727)	Multi-season hunters (n=3,343)
		%	%	%	%
NYSDEC regulation prohibits import of whole deer carcasses	No	30.8	29.3	43.1	50.0
	Yes	69.2	70.7	56.9	75.5
NYSDEC recommends that no hunters use natural scent lures when deer hunting	No	59.4	55.7	69.8	54.5
	Yes	40.6	44.3	30.2	45.5
NYSDEC recommends that all deer hunters dispose of deer in the trash or a landfill	No	55.2	54.0	58.4	50.0
	Yes	44.8	46.0	41.6	50.0

Table 8. Perceived effectiveness of NYSDEC regulations or recommendations as means to limit entry or spread of CWD.

CWD risk-reduction actions required or recommended by NYSDEC	n	Perceived effectiveness of action as a means to limit entry or spread of CWD				
		Not effective	Slightly effective	Moderately effective	Very effective	Unsure
		%	%	%	%	%
No deer hunters in NYS import whole deer carcasses	5,670	10.9	22.2	28.5	19.7	18.7
No hunters in NYS use natural (urine-based) scent lures when hunting deer	5,670	26.5	22.3	14.2	5.4	31.7
Disposing of all deer carcasses in trash or landfill	5,670	14.6	22.0	24.0	15.0	24.4

"...I don't think they're being educated on it. I like to think I'm pretty alert with the media in regards to these things. And I have to admit, I don't remember seeing anything on it [recommendation not to use natural scent lures]. But certainly the stores that are selling a whole 16 foot gondola scent racks aren't doing anything about it. And hunter safety classes are now virtual really, they don't have an instructor to mention such things." (D2)

Perceived Likelihood and Severity of a CWD Outbreak in New York

A majority (68%) of active deer hunters agreed that if CWD enters New York State in the future, then deer populations will decline. Even more hunters (72%) agreed that the quality of deer hunting would decline if CWD enters New York State. About 85% of active deer hunters agreed that keeping CWD outside of New York State should be a high priority for DEC. On the other hand, only 36% of hunters agreed that CWD was likely to enter New York State in the next 5 years (Table 9). Results on these items were similar for bow hunters, gun hunters, and multi-season hunters.

Trust in DEC to Manage CWD-Related Risks

Active deer hunters expressed relatively high levels of trust in DEC. About 72% agreed with the statement, "I trust NYSDEC to make good decisions specifically about CWD prevention." About 70% agreed with the statement, "I trust NYSDEC to make good decisions about deer management overall" (Table 9). Results on these items were similar for bow hunters, gun hunters, and multi-season hunters.

Comments in hunter focus groups suggested that trust is based on: (1) perceived expertise within DEC, (2) actions (doing what you say you will do, not just saying you plan to do something), and (3) demonstrating (communicating) that DEC is taking actions (i.e., do it, and tell people you did it).

"I trust in them [DEC] as far as the CWD goes because they've enlisted Cornell to, as far as I know, be their largest source for advising them in what to do. So, on that aspect, I do. On the other aspect [deer management], um...I've come to not trust the DEC. They are not friends of bow hunters. They are more concerned with selling licenses and I'm not a big fan of their deer management plan that is about to come out again, that was released in 2010, another one. There are a lot of provisions in this management plan that does not take bow hunter interests into account. So, the answer is: on CWD front I'll give them a pass, on everything else I'm highly suspicious." (R1)

"So I guess with that information, my thoughts would be then because it's not here [in New York]..., I guess that they would be doing an adequate job at this time. Just kind of monitoring and making sure. So I feel like they must be doing a good job, because if they're testing meat then that's kind of how they're going to know [if it is present]." (J2)
"I live just north of Oneida Lake, which isn't too far from where the outbreak centered and so that had affected local hunting down here quite a bit. ... I know New York [DEC]

was really on the front edge of hitting back against chronic wasting disease and implementing controls for which the state is recognized as being a leader in that. As opposed to a lot of states which are really getting a hard hit by it. So I guess we should be real happy in that.” (D2)

“Well, I already mentioned my concern about it [CWD]. Being gone from [NY], from what I've been able to tell over the last 10 or 12 years, you know, we have to do whatever we can to keep it from coming back in here, and it seems like the DEC, their rules on bringing meat in from other states, you know the rules that have to be followed. That seems like it's been working so far and hopefully that's, you know, what we can continue to do and it won't be here.” (D3)

Table 9. Hunter beliefs about chronic wasting disease and trust in DEC to manage CWD-related risks.

	n	Disagreement/agreement with statement					Don't know
		Strongly disagree	Some-what disagree	Neither	Some what agree	Strongly agree	
		%	%	%	%	%	%
CWD is likely to spread to NYS in the next 5 years	5,670	4.9	10.4	29.1	28.9	6.6	20.1
If CWD enters NYS in the future, then the deer population in NYS will decline	5,670	3.2	5.9	12.7	37.0	31.0	10.3
If CWD enters NYS the quality of deer hunting in NYS will decline	5,670	3.2	5.4	11.4	34.3	38.1	7.5
People can get sick from eating venison from a deer that has CWD	5,670	8.0	8.6	17.6	13.2	17.7	34.9
Keeping CWD outside NYS should be a high priority for NYSDEC	5,670	2.5	2.7	6.8	21.5	63.5	3.0
I trust NYSDEC to make good decisions specifically about CWD prevention	5,670	5.2	6.9	12.8	28.5	43.2	3.3
I trust NYSDEC to make good decisions about deer management overall	5,670	7.5	10.3	10.8	32.0	37.5	1.9

Use of Social Media, Digital media, and Streaming Audio

Approximately 71% of all active deer hunters used social or digital media platforms. Women were more likely than men to use social and digital media (women 89% vs. men 70%; chi square [1, n=5,670] = 64.45, $p < 0.001$). The proportion of hunters who used social and digital media was similar across hunter identity types and CWD-related action groups (i.e., bow hunters 68%, gun hunters 71%, multi-season hunters 73%, urine-based scent users 73%, resident hunters who had hunted cervids outside New York State 69%, hunters who had left deer carcass on the land 73%). Among those who used social media, more than half visited social media sites daily or every few days (Table 10).

The most common reason for using social media was to connect with friends and family, followed by getting the latest news and sharing videos or photos (Table 11). About 8% of active deer hunters said they had other reasons for using social and digital media; other reasons included entertainment, information and education, commerce, and to get information about fishing or hunting (Appendix B, Table B2).

In all hunter identity and CWD-related action groups Facebook and YouTube were the most commonly used social and digital media platforms (depending on the group, 65% – 78% used Facebook and 52% – 58% used YouTube). About a third of social and digital media users used Instagram and Facebook Messenger (Table 12). Three percent of active deer hunters reported using social or digital media other than those listed in the questionnaire; other types of media were related to social or professional networking, commerce, and communication (Appendix B, Table B3). Facebook and YouTube were also the most commonly used social and digital media platforms among all age cohorts. Use of Instagram and Snapchat varied substantially by gender and age cohort (Table 13).

Approximately 59% of all active deer hunters used social or digital media platforms to get information about deer hunting. The proportion of hunters who used social and digital media to get information about deer hunting was similar across hunter identity types and CWD-related action groups (i.e., bow hunters 58%, gun hunters 53%, multi-season hunters 62%, urine-based scent users 64%, resident hunters who had hunted cervids outside New York State 63%, hunters who had left deer carcass on the land 63%). A majority of active deer hunters used social and digital media at least occasionally to get information about deer hunting (Table 14).

When getting information about deer hunting from social and digital media, active deer hunters in all hunter groups were most likely to use YouTube, Facebook, hunter-related forums, and Facebook groups. The proportions of hunters who used listed social and digital media platforms was similar across hunter identity types and CWD-related action groups (Table 15). Nine percent of active hunters reported using social and digital media other than those listed in the questionnaire to get information about hunting. Other sources included state wildlife agencies (e.g., NYSDEC website, NYSDEC big game email newsletter), hunting/fishing specific resources, and other digital and resources (e.g., Google search, “the web”) (Appendix B, Table B4).

Table 10. Frequency with which active deer hunters use social and digital media platforms, by hunter identity type.

	All active deer hunters (n=5,669)	Active hunters by type		
		Bow hunters (n=574)	Gun hunters (n=1,726)	Multi-season hunters (n=3,343)
	%	%	%	%
Daily	43.3	40.2	43.3	50.0
Every few days	12.8	13.6	12.3	7.7
At least once a week	6.5	6.6	5.9	3.8
Less than once a week	8.6	7.7	9.2	7.7
I don't use social or digital media	28.9	31.9	29.3	30.8
Total	100.0	100.0	100.0	100.0

Table 11. Why deer hunters used social and digital media platforms, by hunter identity type.

	All active deer hunters (n=4,033)	Active hunters by type		
		Bow hunters (n=391)	Gun hunters (n=1,221)	Multi-season hunters (n=2,403)
	%	%	%	%
To connect and keep in touch with friends and family	74.6	71.4	75.3	74.8
To get the latest news	47.7	43.5	49.6	47.4
To share videos and photos	33.2	34.3	33.3	32.9
To make professional and business contacts	17.5	21.0	17.0	17.2
Other reasons	7.6	8.7	6.6	8.0

Table 12. Percentage of active deer hunters who use various social and digital media platforms at least once a week, by hunter identity type and CWD-related action group.

	All active hunters who used social media (n=4,033)	Results for specific groups of active hunters who used social media					
		Bow hunters (n=391)	Gun hunters (n=1,221)	Multi-season hunters (n=2,403)	Had used urine-based scent lures (n=2,424)	Had hunted cervids outside NYS (n=712)	Had left carcass on landscape (n=1,051)
	%	%	%	%	%	%	%
Facebook	76.1	64.5	76.5	77.8	77.5	75.1	78.4
YouTube	55.5	55.2	52.6	57.1	56.7	57.3	58.2
Instagram	33.7	47.1	33.0	31.9	32.8	36.8	35.5
Messenger	31.0	22.0	31.9	32.0	32.3	31.3	34.7
Facebook groups	29.0	24.0	25.8	31.5	29.5	32.0	32.4
Hunter-related forums	24.2	25.1	13.4	29.6	28.2	32.7	2.3
Snapchat	16.9	19.7	16.4	16.6	17.8	14.6	19.3
Twitter	12.5	10.5	15.1	11.7	11.0	10.5	11.0
Pinterest	8.7	9.5	9.6	8.2	8.2	7.3	8.8
Reddit	7.2	9.0	8.8	6.1	6.3	5.2	6.5
Other social media	3.1	2.8	3.7	2.8	2.8	1.8	2.2

Table 13. Percentage of active deer hunters who use various social and digital media platforms at least once a week, by gender and age cohort.

	Results for specific groups of active hunters who used social media					
	Female (n=338)	Male (n=3,695)	Age 18-35 (n=997)	Age 36-53 (n=1,474)	Age 54-71 (n=1,296)	Age 72-92 (n=266)
	%	%	%	%	%	%
Facebook	88.5	75.0	76.9	73.5	78.1	77.4
YouTube	39.6	56.9	66.5	55.2	49.8	43.2
Instagram	49.4	32.3	59.6	35.2	16.9	10.9
Messenger	44.7	29.8	34.8	29.8	29.4	32.0
Facebook groups	38.5	28.2	31.5	30.9	26.7	21.1
Hunter-related forums	10.9	25.4	26.6	28.0	20.4	12.4
Snapchat	30.8	15.6	47.5	10.0	4.4	0.8
Twitter	13.3	12.5	19.4	14.0	6.9	6.0
Pinterest	32.8	6.5	10.2	10.4	6.8	2.6
Reddit	5.0	7.4	16.0	7.4	1.7	0.0
Other social media	2.7	3.1	1.8	3.6	2.9	6.0

Table 14. Frequency with which active deer hunters use social and digital media platforms to get information about deer hunting, by hunter identity type.

	All active deer hunters (n=4,033)	Active hunters by type		
		Bow hunters (n=391)	Gun hunters (n=1,221)	Multi-season hunters (n=2,403)
	%	%	%	%
Never	17.1	14.6	25.1	13.4
Rarely	24.5	18.4	31.4	22.0
Occasionally	37.8	39.4	33.7	39.6
Often	15.6	19.9	7.9	18.8
Very often	5.0	7.7	1.8	6.2
Total	100.0	100.0	100.0	100.0

Table 15. Percentage of active deer hunters who use various social and digital media platforms to get information about deer hunting, by hunter identity type and CWD-related action group.

	All active Hunters who used social media (n=3,344)	Results for specific groups of active hunters who used social media					
		Bow hunters (n=334)	Gun hunters (n=914)	Multi-Season hunters (n=2,082)	Had used urine-based scent lures (n=2,117)	Had hunted cervids outside NYS (n=643)	Had left carcass on landscape (n=906)
	%	%	%	%	%	%	%
YouTube	36.7	39.6	28.7	40.2	45.0	47.4	47.0
Facebook	36.6	31.2	33.5	39.1	45.1	44.0	45.7
Hunter-related forums	27.3	28.1	18.3	31.3	34.6	39.7	36.3
Facebook groups	20.6	21.5	13.9	23.9	27.3	28.8	26.9
Instagram	11.9	22.3	8.6	11.8	14.7	20.8	15.6
Messenger	5.9	4.3	4.3	6.9	7.8	7.0	7.2
Twitter	2.9	2.0	2.3	3.4	3.3	3.6	2.5
Reddit	2.3	3.1	2.7	1.9	2.4	1.4	1.9
Pinterest	1.3	1.0	1.1	1.5	1.7	1.2	2.4
Snapchat	1.2	1.5	0.5	1.6	1.7	1.9	2.0
Other social media	9.3	9.0	9.8	9.2	10.7	8.1	9.3

Women were less likely than men to use YouTube to get information about hunting. As age increased, use of YouTube, hunter-related forums, Facebook groups, and Instagram to get information about hunting decreased (Table 16).

Active deer hunters who were social and digital media users were most likely to use text messaging to share information about hunting with friends. Only about a third of social and digital media users shared information about hunting by posting material on social media (Table 17). About 4% of social and digital media users reported using means other than those listed in the questionnaire to share information about hunting. The most common “other” means of sharing information about hunting was verbal communication (e.g., telephone or face-to-face conversations) (Appendix B, Table B5).

About 54% of active deer hunters listened to streaming audio services. The streaming audio services used most often in all hunter groups were Pandora, Spotify, and XM/Sirius (Table 18). About 4% of social and digital media users reported using streaming audio services other than those listed in the questionnaire. The most common “other” streaming audio services were iHeart Radio and podcasts (Appendix B, Table B6).

Use rates for streaming audio services were similar for male and female hunters. Use of Pandora, Spotify, and XM/Sirius varied substantially by age cohort (Table 19).

Recruiting Participants for Next Phases of Study

Our final study objective was to identify at least 1,250 hunters who were willing to be contacted with invitations to participate in the next phase of research. We identified 4,433 active deer hunters who were willing to be contacted about future research. This included hunters who identified as primarily bow hunters (n=456), gun hunters (n=1,219), and multi-season hunters (n=2,743). It also included 875 active hunters who had hunted cervids outside the state, 2,690 active hunters who had used deer urine-based scent lures, and 1,198 who had disposed of a deer carcass on the landscape.

DISCUSSION AND CONCLUSIONS

CWD-related hunting behaviors About 14% of deer hunters had used deer-urine based scent lures often or very often during the past 5 years. About a third (33%) of hunters who had killed 1 or more deer in the past 5 years had put a deer carcass back on the land. Hunters in focus group discussions identified a range of perceived barriers to proper carcass disposal and avoiding use of deer urine-based lures. Messaging from DEC that addresses these hunter-perceived barriers may encourage hunters to follow DEC recommendations related to use of scent lures and disposal of deer carcasses.

Table 16. Percentage of active deer hunters who use various social and digital media platforms to get information about deer hunting, by gender and age cohort.

	All active hunters who used social media (n=3,344)	Results for specific groups of active hunters who used social media					
		Female (n=338)	Male (n=3,695)	Age 18-35 (n=997)	Age 36-53 (n=1,474)	Age 54-71 (n=1,296)	Age 72-92 (n=266)
		%	%	%	%	%	%
YouTube	36.7	20.1	38.2	40.2	37.4	34.6	28.9
Facebook	36.6	37.0	36.6	43.0	38.2	30.3	35.0
Hunter-related forums	27.3	19.8	28.0	30.3	29.7	24.6	16.5
Facebook groups	20.6	19.8	20.6	26.1	22.5	16.4	9.8
Instagram	11.9	8.9	12.1	23.8	12.8	3.6	1.9
Messenger	5.9	3.0	6.1	3.3	5.5	7.3	10.2
Twitter	2.9	1.2	3.1	4.0	4.1	1.1	1.1
Reddit	2.3	0.9	2.4	5.6	2.2	0.2	0.0
Pinterest	1.3	1.2	1.3	1.4	1.5	1.2	0.4
Snapchat	1.2	0.9	1.3	3.3	0.8	0.3	0.4
Other social media	9.3	10.7	9.2	6.6	8.5	11.2	15.0

Table 17. Methods hunters used to share information about hunting with friends, by hunter identity type.

	All active deer Hunters ¹ (n=4,033)	Active hunters by type		
		Bow hunters (n=391)	Gun hunters (n=1,221)	Multi-season hunters (n=2,403)
	%	%	%	%
Text messages	76.4	79.0	67.4	80.7
Posting material on social media	29.8	28.9	25.7	32.0
Email messages	24.7	21.7	26.0	24.4
None of the above	14.8	12.0	20.8	12.1
Other means	3.5	2.6	2.7	4.1

¹ Includes only active deer hunters who use social media

Table 18. Percentage of active deer hunters who use various streaming audio services, by hunter identity type.

	Active hunters who used streaming audio (n=2,588)	Active hunters who used social media		
		Bow hunters (n=778)	Gun hunters (n=1,507)	Multi-season (n=2,588)
	%	%	%	%
Pandora	59.9	49.7	62.2	60.7
Spotify	38.3	45.3	38.2	36.9
XM/Sirius	31.1	29.9	30.8	31.5
YouTube Music	20.4	17.1	19.2	21.7
Amazon Music	19.0	19.1	20.1	18.6
iTunes	12.6	13.4	12.9	12.3
Apple Music	11.9	10.7	11.8	12.1
Other	3.8	4.7	3.9	3.6

Table 19. Percentage of active deer hunters who use various streaming audio services, by gender and age cohort.

	Active hunters who used streaming audio (n=2,588)	Active hunters who used social media, by gender, age cohort					
		Female (n=338)	Male (n=3,695)	Age 18-35 (n=797)	Age 36-53 (n=1,050)	Age 54-71 (n=674)	Age 72-92 (n=67)
	%	%	%	%	%	%	%
Pandora	59.9	61.8	59.7	48.9	59.0	72.4	77.6
Spotify	38.3	43.8	37.8	52.2	34.9	28.3	26.9
XM/Sirius	31.1	28.6	31.3	22.3	32.0	38.4	46.3
YouTube Music	20.4	22.6	18.7	23.5	20.6	17.1	13.4
Amazon Music	19.0	20.7	20.3	14.3	23.9	17.1	19.4
iTunes	12.6	17.1	12.2	11.2	14.3	12.2	9.0
Apple Music	11.9	15.2	11.6	15.7	12.7	6.8	6.0
Other	3.8	0.9	4.1	3.1	4.5	4.0	0.0

CWD-related beliefs, attitudes, perceptions Over 30% of deer hunters were not aware that DEC prohibits import of whole deer carcasses from outside NYS. A majority of deer hunters were unaware that DEC recommends hunters use no deer urine-based lures when hunting, and recommends that hunters dispose of deer remains in the trash or landfill. These results are consistent with results from a study of NYS deer hunters completed in 2019, and reinforced our sense that awareness building would be a worthwhile goal in a DEC communication plan.

The positive correlation we found between knowledge of, and concern about, CWD has important management implications. If managers can increase awareness of the effects CWD in NYS would have on deer hunters and hunting, that could raise hunter concern. Greater concern about the effects that CWD would have on hunters and hunting could motivate a higher proportion of the deer hunter population to take CWD risk-reduction actions.

Results from the hunter survey suggest that many hunters perceive CWD to be a threat to deer hunting quality, but they may not believe that CWD is likely to enter NYS in the near future. Focus group discussions uncovered a “seeing is believing” belief among some hunters. That is, a belief that CWD isn’t something to be concerned about until one sees it in NYS. Although we saw evidence that some hunters would be concerned about the impacts of CWD if it were to arrive in NYS, those concerns may not be motivating them to take actions that would keep CWD outside NYS. Future messaging could alert such hunters that the time to take action is before it reaches the state.

Results from the hunter survey suggest that many hunters are unsure about or unconvinced of, the response efficacy of actions such as returning to NYS with only processed venison and clean skull caps, avoiding use of deer urine-based lures when deer hunting, and disposing of deer remains in trash pick-up or a landfill. Comments from the focus groups suggest that providing the rationale behind DEC recommendations and regulations will be particularly important in the case of CWD risk management, because hunters receive a mixture of messages from DEC and other entities (e.g., other state agencies, retail businesses). Messaging could focus on providing the rationale for recommendations, or could focus on providing support for effectiveness of taking recommended actions. Communicating the rationale for recommendations also may be helpful to address perceived inconsistencies in DEC recommendations.

Most hunters trusted DEC to manage CWD risks. Focus group discussions suggested that trust is based on: (1) perceived expertise within DEC, (2) actions (doing what you say you will do), and (3) demonstrating (communicating) that DEC is taking actions (i.e., do it, and tell people you did it). These types of comments are consistent with literature on trust building. They increase our confidence that open, transparent, and regular communication with hunters about CWD, and DEC’s action to manage CWD-related risks on behalf of hunters, can build hunter trust in DEC as an information source and as a manager of CWD-related risks.

Use of social and digital media We documented that substantial numbers of deer hunters use social and digital media (although this study was limited to hunters who had provided DEC

with email addresses), suggesting that messaging on social or digital media could raise hunter awareness of actions hunters can take to reduce CWD-related risks.

Although patterns of social and digital media use differed somewhat by gender and age, overall patterns of media use were relatively uniform across hunter identity types and CWD-related activity groups, suggesting that communicating to hunters through the most popular social and digital media platforms (e.g., Facebook, YouTube) will reach a cross-section of the resident deer hunter population.

A portion of the deer hunter population does not use social or digital media, indicating a continuing need to include traditional communication channels in a comprehensive approach to communication about CWD risks and risk reduction actions.

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APPENDIX A: FOCUS GROUP QUESTION GUIDE

Part I: Perceptions of chronic wasting disease (max 20 minutes).

The first topic we want to discuss today is your views about the topic of deer hunting and chronic wasting disease (CWD)

Let's start with a quick exercise. I'm going to go around to everyone in the group and ask you to describe the words that come to your mind when I mention "chronic wasting disease" or (CWD). I'll keep going around the group until we run out of descriptors. I'll start with [participant name], what word or phrase comes to your mind when you hear the phrase "chronic wasting disease?" (move from person to person until participants run out of descriptors).

- **[Follow up with a question that builds from concerns touched upon during the listing exercise] To what extent are the hunters you know concerned about the potential effects of CWD on the quality of future deer hunting? And why are they concerned or unconcerned?**
- **[Follow up with a question that builds from concerns touch upon during the listing exercise] To what extent are the hunters you know concerned about how CWD could affect human health. And why are they concerned or unconcerned?**

CWD is now confirmed in deer in more than 25 states and several Canadian provinces. And the prevalence of CWD in deer is pretty high in regions within some states. How, if at all, has awareness of CWD outbreaks in other places affected the way that each of you think about the risks of CWD?

- **NYSDEC is taking action on multiple fronts to address the threats of CWD. That includes deer monitoring and surveillance, working with other agencies to prevent CWD from entering the state, and providing information to hunters and other groups on CWD prevention actions.**
- **How would the hunters you know rate DEC's response to managing CWD risks?**
- **To what extent do the hunters you know trust DEC to manage CWD risks?**
- **To what extent do the hunters you know trust the information that DEC provides about CWD?**

Part II: Handling deer taken outside New York State (max 20 minutes). Explain that the first segment of the meeting will focus on deer hunting trips outside New York State.

- **I'd like to start by asking each of you to raise a hand if you have taken trips outside NYS to hunt deer (note how many have done so, for later analysis and meeting summary; skip this section if none of the hunters have left NYS to hunt deer).**
- **Follow up by asking for a show of hands for hunters who have taken a deer outside NYS (note how many have done so, for later analysis and meeting summary).**
- **[If some participants have taken out-of-state hunting trips] Can you describe how you got involved in out-of-state hunting trips, and the main motivations you have for going outside New York State to hunt deer?**
- **Over the course of your hunting careers, how has the nature of these out-of-state trips changed? And how, if at all, have those changes affected the way you bring harvested deer back to New York?**

DEC now prohibits hunters from shipping or importing a whole deer carcass or intact trophy head from a deer taken anywhere outside New York State. The prions that cause CWD are carried in parts like the brain and spinal cord, so prohibiting the import of those high-risk parts is intended to reduce the risk of accidentally introducing the disease to NY.

- **How easy or difficult will it be for people who hunt deer outside New York to comply with this regulation?**
- **What kinds of things would make it easier for hunters to comply with this new regulation?**
- **What kinds of considerations or circumstances would keep hunters from following that new regulation?**
- **How is this new regulation consistent with or contrary to traditional ways of bringing a deer back to New York from outside the state?**

Part III: Disposing of deer carcasses (max 20 minutes). Explain that we now want to switch gears and move on to another topic for discussion. That topic is how deer hunters handle their deer carcass parts (i.e., bones, hide, scraps from processing the deer).

I'd like to start this segment by getting a sense of how each of you have dealt with your deer carcasses.

- **Please raise your hand if you have taken your deer to a meat processor who then disposed of the carcass for you;**

- **Now raise your hand if you have put your deer carcass parts back on the land;**
- **and which of you has disposed of a deer carcass in regular trash pick-up?**
- **And who has buried their carcass parts in a pit or landfill?**
- **All of you who have harvested a deer and processed the venison yourself have had to deal with carcass disposal. Thinking back, what kinds of factors figured into your choices the first time you had to decide how to dispose of a deer carcass?**
- **Are your choices about deer carcass disposal different now than they were when you started hunting? And if so, can you give an example of how and why you handle that differently today?**

DEC currently recommends that hunters dispose of deer carcass parts in a municipal landfill. The prions that cause CWD are carried in parts like the brain and spinal cord, so keeping those parts off the landscape is intended to reduce the spread of CWD if it does re-enter New York State.

- How familiar are each of you with this recommendation and the rationale for it?
- How do you think this recommendation will influence hunter choices about carcass disposal? (Follow-up: ask participants to explain their responses, if the rationale behind the response is not evident.)
- How will this recommendation affect your choices about carcass disposal? (Follow-up: ask participants to explain their responses, if the rationale behind the response is not evident.)
- What, if anything, would cause hunters to switch from putting carcasses back on the landscape to disposing of carcasses in a municipal landfill? (*Note: This question may already have been answered by this point.)

Part IV: Use of scent lures (max 20 minutes). Explain that we want to switch gears to a third topic. In this segment of the meeting we want to focus on use of scent lures for deer hunting. And to clarify, by scent lures I mean products that are made from deer or elk urine.

- **Ask for a raise of hands to determine which participants have used scent lures (note how many have done so, for later analysis and meeting summary). Then, begin discussion on this topic.**

- **I want to start this discussion with the same exercise we did earlier. I'm going to go around to everyone in the group and ask you to describe the words that come to your mind when I mention scent lures. I'll keep going around the group until we run out of descriptors. I'll start with [participant name], what word would you use to describe scent lures? (move from person to person until participants run out of descriptors).**
- **[For those who have used lures] What kinds of things did you consider the first time you were deciding to use a scent lure, or choosing which kind or brand of lure to use?**
- **Why did some of you choose not to use scent lures, or decide to stop using them after some period of time?**

DEC currently recommends that hunters use fully synthetic alternatives instead of natural scent or lure products that contain deer or elk urine. Synthetic lures are encouraged because the prions that cause CWD can be present in the urine of an infected deer, and there is currently no means to ensure a urine product is free of prions.

- **How familiar are each of you with this recommendation and the rationale for it?**
- **How do you think this recommendation will influence hunter choices about scent lures?** (Follow-up: ask participants to explain their responses, if the rationale behind the response is not evident.)
- **How will this recommendation affect your choices about using scent lures?** (Follow-up: ask participants to explain their responses, if the rationale behind the response is not evident.)

APPENDIX B: HUNTER SURVEY INSTRUMENT

Deer Hunting and Chronic Wasting Disease Survey

Chronic wasting disease (CWD) is a fatal disease of the cervid (deer, elk, moose) family. It is caused by an abnormal protein called a prion. CWD was discovered in two captive deer facilities in New York in 2005. The New York State Department of Environmental Conservation (NYSDEC) conducted an aggressive deer culling and testing program in that area in 2005, which detected CWD in two wild white-tailed nearby. Ongoing, intensive testing of deer since that time has not identified any new cases of CWD in that area or in the rest of the state.

NYSDEC is conducting this survey to learn more about hunters' opinions and behaviors related to CWD. Information gathered in this study will be used to improve communication with hunters about CWD.

Your participation is voluntary, but we hope you will take a few minutes to complete the survey. Your identity will be kept confidential and the information you provide will never be associated with your name.

Thank you for your help!

PART 1: YOUR DEER HUNTING

1. Have you gone afield to hunt deer in New York State at least once during the past 5 years?
(Choose one response.)

- No → → IF NO, SKIP TO QUESTION 9
- Yes → → CONTINUE TO NEXT QUESTION

2. Do you consider yourself to be primarily a bow hunter, gun hunter, muzzleloader hunter, or multi-season deer hunter? (Choose one.)

I consider myself primarily a:

- Bow hunter
- Gun hunter (regular firearms season)
- Muzzleloader hunter
- Multi-season hunter (2 or more seasons are important to me)

3. Over the past 5 years, how many days per year did you typically hunt during the following seasons? (*Choose one response per line.*)

Deer hunting seasons	Number of days you hunted			
	None	1 – 2	3 – 7	8+
• Archery seasons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Regular firearms seasons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Muzzleloader seasons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Over the past 5 years, how often did you hunt deer, elk, or moose in a state OTHER than New York? (*choose one.*)

- Never
- Hunted deer, elk, or moose outside New York State at least once
- Hunted deer, elk, or moose outside New York State multiple times

5. Over the past 5 years, how often did you use a natural (deer urine-based) scent lure product when hunting deer? (*Choose one.*)

- Never
- Rarely
- Occasionally
- Often
- Very often

6. Over the past 5 years, have you killed one or more deer in New York State? (*Choose one response.*)

- No → → IF NO, SKIP TO QUESTION 9
- Yes → → CONTINUE TO NEXT QUESTION

7. Over the past 5 years, have you processed (butchered) one or more of your deer at home? (*Choose one response.*)

- No → → IF NO, SKIP TO QUESTION 9
- Yes → → CONTINUE TO NEXT QUESTION

8. Over the past 5 years, how have you disposed of the carcass (i.e., bones, head, scraps) from deer you processed at home? (Choose all that apply.)

- I put the carcass parts back on the land
- I put the carcass parts in my regular trash pick up
- I took the carcass parts to a landfill
- Other (please specify: _____)

PART 2: USE OF DIGITAL MEDIA

Questions in this section will help NYSDEC better understand how to use social and digital media to communicate with NYS deer hunters about CWD.

9. How often do you use social and digital media like Facebook, Twitter, YouTube, Instagram, or Reddit? (Choose one response.)

- Daily
- Every few days
- At least once a week
- Less than once a week
- I don't use social or digital media (if never, skip to question 14.)

10. Why do you use social and digital media? (Choose all that apply.)

- To get the latest news
- To connect and keep in touch with friends and family
- To make professional and business contacts
- To share videos and photos
- Other (please specify: _____)

11. Which of the following social and digital media do you use at least once a week? (Choose all that apply.)

- Facebook
- Facebook groups
- Twitter
- YouTube
- Instagram
- Snapchat
- Hunting-related discussion forums or chat rooms
- Pinterest
- Messenger
- Reddit
- Other (please specify: _____)

12. How often do you use social or digital media to get information about deer hunting? (Choose one response.)

- Never
- Rarely
- Occasionally
- Often
- Very often

13. Which of the following social and digital media do you use to get information about deer hunting? (Choose all that apply.)

- Facebook
- Facebook groups
- Twitter
- YouTube
- Instagram
- Snapchat
- Hunting-related discussion forums or chat rooms
- Pinterest
- Messenger
- Reddit
- Other (please specify: _____)

14. Which of the following methods do you use to share information about hunting with friends? (Choose all that apply.)

- Posting material on social media
- Email messages
- Text messages
- Other (please specify: _____)

15. Do you listen to streaming audio services such as Pandora or Spotify? (Choose one response.)

- No → → IF NO, SKIP TO QUESTION 17
- Yes → → CONTINUE TO NEXT QUESTION

16. Which of the following services do you use to listen to streaming audio? (Choose all that apply.)

- Pandora
- Spotify
- XM/Sirius
- iTunes
- Apple Music
- Amazon Music
- YouTube Music
- Other (please specify: _____)

PART 3: YOUR VIEWS RELATED TO CWD

Questions in this section will help NYSDEC understand deer hunters' beliefs and attitudes related to CWD.

17. In general, how much do you know about chronic wasting disease? (Choose one response.)

- Nothing at all
- Very little
- Some
- A moderate amount
- A lot

18. How would you describe your level of concern about CWD? (Choose one response.)

- Not at all concerned
- Slightly concerned
- Moderately concerned
- Very concerned
- Unsure

19. A recent NYSDEC regulation prohibits import of whole deer carcasses from anywhere outside New York State (only clean skull cap, antlers, and deboned meat can be brought into the state). Before you received this survey, were you aware of that new regulation? (Choose one response.)

- No
- Yes

20. If NO deer hunters imported whole deer carcasses from outside New York State, how effective do you believe that would be as a means to keep CWD outside of New York State? (Choose one response.)

- Not at all effective
- Slightly effective
- Moderately effective
- Very effective
- Unsure

21. NYSDEC recommends that NO deer hunters use natural (urine-based) scent lures when deer hunting. Before you received this survey, were you aware of that recommendation? (Choose one response.)

- No
- Yes

22. If NO deer hunters in New York used natural (urine-based) scent lures when deer hunting, how effective do you believe that would be in keeping CWD outside of NY State? (Choose one response.)

- Not at all effective
- Slightly effective
- Moderately effective
- Very effective
- Unsure

23. NYSDEC recommends that all deer hunters dispose of their deer carcasses in the trash or a landfill. Before you received this survey, were you aware of that recommendation? (Choose one response.)

- No
- Yes

24. How effective do you believe that disposing of ALL deer carcasses in the trash or a landfill would be as a means to prevent the spread of CWD within New York State if it is present but undetected? (Choose one response.)

- Not at all effective
- Slightly effective
- Moderately effective
- Very effective
- Unsure

25. How much do you disagree or agree with the following statements? (Choose one per line.)

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Don't know
CWD is likely to spread to New York State in the next 5 years.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If CWD enters New York State in the future, then the deer population in New York will decline.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If CWD enters NYS the quality of deer hunting in New York will decline.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People can get sick from eating venison from a deer that has CWD.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keeping CWD outside New York State should be a high priority for DEC.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I trust NYSDEC to make good decisions specifically about CWD prevention.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I trust NYSDEC to make good decisions about deer management overall.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. Later this year, NYSDEC will sponsor a study to understand hunters' reactions to information about CWD. It will take 15 minutes or less to participate. Can we contact you later this year to see if you want to participate in that study? (Choose one response.)

- No, do not contact me
- Yes, I might be willing to participate in that study

Thank you for your input!

(Please use the space below to offer any comments.)

APPENDIX C: OPEN-ENDED SURVEY QUESTIONS

Table B1. “Other” ways that hunters disposed of deer remains.

	Frequency (n=145)
Put remains of deer back on the land (n=14)	
Put remains on my own land	3
<ul style="list-style-type: none"> • Back in a field at home • Back on my land • My own land 	
Put some remains in trash and some remains on the land	7
<ul style="list-style-type: none"> • Back on land and regular trash • Both back in land and regular trash • Both in the trash and back on the land • I have disposed of the carcasses by returning them to the woods and by putting scraps in the regular trash. • Gut pile stays on land, carcass in regular trash pickup • Torso legs on land ... heads skin in regular trash • I quarter the deer and take back the 4 quarters, backstrap and head (only if it's a buck) back home. The heads and skeleton stay in the woods most of the time. If not I throw it with regular trash pick up. 	
Put remains back in the woods	2
<ul style="list-style-type: none"> • Disposed of in woods • Return them to the woods where they came from for the scavengers to pick through. 	
Dumped on state land	1
Boned it out in the woods and only took home the meat	1
Buried in ground (n=44)	
Buried	21
Buried on my land / my property	12
Buried deep with backhoe	1
Buried guts at kill site	1
Buried in the manure pile	1
Buried on the land I hunt	2
Buried them on the land	1
Buried with tractor	1
I bury the deer so it doesn't attract coyotes	1
Dug a hole and buried them	1
We have a pit we put them in	1
A bone pit at our gun club	1

Table B1. (continued).

	Frequency
Burned deer carcass/remains (n=29)	
Burn	11
Outdoor wood burner / Outside wood boiler	5
Burn in burn barrel; burn in a fire barrel	3
Incinerate / incinerator	3
Burned and buried	2
Burn in wood stove	2
Burn with brush	1
Burned bones and used them in my garden	1
Grind/burn bones and add in to my biochar which gets added to my orchard	1
Brought or gave carcass/remains to butcher for disposal (n=15)	
Butcher	1
Butcher handles it	1
Butcher processed deer	1
Butcher shop	1
Butcher took care of it	1
Butchered at friends house.	1
Gave to butcher	1
Deer processing plant (seasonal)	1
Had it butchered for me, not sure where the remains were disposed of.	1
Had it butchered.	1
Processor disposed	1
I have a butcher that butcher's mine	1
To Butcher shop	1
Took the scraps to a local deer processing shop to dispose of them	1
A friend owns a deer butcher shop. I gave him my carcass scraps.	1
Composted remains (n=7)	
Compost	1
Compost pile	2
Composted	2
Composting	1
Covered with woodchips	1
Brought carcass to local hwy dept. and buried them in wood chips	

Table B1. (continued).

	Frequency
Used remains to bait coyote or feed other animals (n=8)	
coyote bait	1
Dry and use for trapping bait/eye appeal	1
Predator bait pile	1
Used to feed the bald Eagle then buried bones in the Springhem	1
Crab bait	1
Animal farm Wolves	1
Donate to nature center to feed rehabilitation animals	1
Donated carcass to a wolf preserve	1
Placed remains in a dumpster (n=10)	
Demolition dumpster	1
Dumpster	2
Dumpster at work	2
Dumpster for landfill	1
Farm dumpster	1
In my personal dumpster	1
I used the dumpster at my employer, with permission.	1
Put in dumpster at husbands work	1
Taken to a dump or transfer station (n=9)	
Disposed at transfer station	1
Transfer station	1
Taken to a trash transfer station	1
Bring them to transfer station in garbage bags	1
Took in garbage bags to municipal transfer station	1
Took to local dump	2
Brought to local refuge [refuse?] center	1
Recycle Center	1
Used to feed domestic dogs or captive wildlife (n=11)	
Fed to my dogs	3
Feed it to my dogs or use it for coyote bait	1
Vacuumed packed for the dog	1
Gave them to the dogs	1
Gave to friend for sled dogs	1
Most Fed to dogs, some discarded on land	1
Most given to my dogs	1
Winter dog treats, hanging scraps for birds	1
We feed the scraps to our dog and cats and then take the bones to the compost pile and bury them	1

Table B1. (continued).

	Frequency
Miscellaneous (n=12)	
Hide & Tallow	1
Gave it to someone else	1
Let birds pick them clean then garbage	1
make stock from bones	1
Reuse most of the parts, trapping and as a PT taxidermist	1
Traded for ammo	1
All skulls were kept	2
Disposed at camp	1
Donated hide	1
Donate deer hide to Elks club	1
I donate hide to a friend that makes clothing items.	1

Table B2. “Other” reasons they use social and digital media

	Frequency (n=292)
Entertainment (n= 111)	
Entertainment	37
Watch YouTube videos	27
Browse content	9
Bored(om)	6
I watch content but do not post	4
Music	4
Sports	4
Comic relief/laughter	3
Gaming	3
Follow topics of interest	3
Follow games and hobbies	2
Memes	2
Fun	2
Funny videos	1
Follow people of interest	1
HGTV	1
Periodicals	1
Streaming	1
Social and Communication (n= 18)	
Keep in touch with friends/family	3
Professional communication/marketing; for work	3
See/share photos of friends/family	2
Social	2
Email	1
Facebook	1
Inspiration	1
Just to keep up with all the bull s@&t and nonsense	1
Children’s school groups (have to use platform)	1
Media for students	1
Mentoring	1
Snooping	1

Table B2. (continued).

	Frequency
Commercial (n= 34)	
Classifieds/(Facebook) Marketplace	14
Buy(ing)/Sell(ing) items,	9
For the business	1
I'm a YouTube content creator	1
Own newspaper	1
Shopping	8
Education and Information (n= 92)	
Educate myself; Educational purposes/instruction	23
Educational videos; "How To" videos	23
For informational purposes	11
Research	6
News	5
DIY projects	4
Find information on a specific topic	3
Training	3
Weather	3
Get ski conditions/ backcountry Trail conditions, etc.	2
Politics	2
Reviews of items	2
GPS, mapping	1
Recipes	1
Reports	1
Genealogy research	1
Teaching purposes	1
Fishing, Hunting, and Outdoor Recreation (n= 31)	
Hunting education	5
Hunting groups	5
Watch hunting videos	5
Follow hunting sites/share information on hunting sites	3
Fishing & hunting; hunting and fishing and trapping	3
Snowmobile club	2
Follow hunters, anglers, outdoorsmen and women	2
Outdoor pages/groups	2
Follow hunting and fishing sites	1
Fishing lures	1
Fishing reports	1
Report harvest	1

Table B2. (Continued).

	Frequency
Miscellaneous (n= 11)	
All of the above	6
Do not use	5
I go on rarely	3
N/A or no answer	2
Piss people off	2
Does not concern DEC	1
I do not get all my news from social media.	1
I run a "group" for NYS ACO's & DCO's	1
I use it for the bottom 3 options	1
Stuff	1
To counter Leftist propaganda	1
To trigger libs	1
Waste time	1
When I receive something, I usually look at it	1
Find YouTube helpful	1

Table B3. “Other” digital and social media they use

	Frequency (n= 110)
Communication (n= 28)	
Email	10
Text messages	8
Discord	2
Outlook	2
Signal	2
Skype	1
Telegram	1
Logging forums	1
WeChat	1
Social Networking (n= 40)	
Parler	12
MeWe	8
TikTok	7
Gab	4
Rumble	2
Instagram	2
Facebook	1
Imgur	1
Minds	1
8chan	1
Ruqqus	1
Professional Networking (n= 23)	
LinkedIn	23
Informational/Educational (n= 23)	
Podcasts (<i>The Joe Rogan Experience, TheMeatEater</i>)	5
Hunting-related websites (<i>DeerCast, HuntStand, HuntWise</i>)	5
Google	4
DEC	2
Fishing-related websites (<i>FishBrain</i>)	2
News	2
Yahoo	1
Web page	1
Ancestry.com	1

Table B3. (continued).

	Frequency
Commercial (n= 2)	
CoalPail.com	1
Craigslist	1
Miscellaneous (n= 1)	
Direct apps for specific sites	1

Table B4. “Other” social and digital media used to get information about deer hunting

	Frequency (n= 366)
State Agency (n= 114)	
DEC (<i>website</i>)	96
DEC email/newsletter	10
DEC app	1
NY Outdoors	3
DEC Instagram	1
NY Fish and Wildlife app	1
Official website	1
AZGF	1
Hunting/Fishing Specific (n= 43)	
Podcasts (<i>MeatEater, KifaruCast</i>)	15
Hunting website	6
Hunt Stand App	4
OnX	4
Hunt Fishing NY App	2
Hunting/Fishing guide	2
Quality Deer Management Association	2
BaseMap	1
Deer and Deer Hunting	1
DeerCast	1
New York Pocket Ranger	1
New York Sportsmen	1
Product reviews	1
US Prime Time	1
XHunt	1

Table B4. (continued).

	Frequency
Not Hunting/Fishing Specific (n= 141)	
Google	63
Internet/online/web	32
Email	17
Text messages	5
News	4
Parler	3
TikTok	3
Facebook	2
Gab	2
Magazine website	2
MeWe	2
Television	2
YouTube	2
Weather	1
Yahoo	1
Miscellaneous (n=51)	
Do not inquire	1
Do not use/none	50

Table B5. “Other” methods they use to share information about deer hunting

	Frequency (n= 373)
Direct Communication (n= 334)	
Calling/over the phone	167
Conversations in person	69
Speaking/talking/verbal communication	56
Face to face	25
Discussion	8
Personal contact	6
Camp stories/over campfire	3
Indirect Communication (n= 53)	
Word of mouth	18
Apps (<i>GoWild, HuntStand, MeWe, Signal, OnX, Telegram, Telegraph</i>)	6
Facebook (<i>Messenger, DEC posts</i>)	6
Snapchat	5
Videos (<i>YouTube, Vlog</i>)	4
Photographs	3
Instagram	2
Texting/Instant messaging	2
Gun Club website	1
Internet	1
Mail services	1
Newspaper	1
Email	1
Copy articles	1
Discord	1
Miscellaneous (n= 9)	
Do not share hunting information	4
N/A, nothing, none	3
Contact	1
Do not use social media	1

Table B6. “Other” streaming services they use

	Frequency (n= 100)
Entertainment (n= 92)	
iHeart radio	29
Podcasts/podcast app	13
Music (<i>Deezer, Folk Alley, Jango, LivexLive, Napster, Qobuz, Tidal</i>)	8
Apple podcasts	6
Radio	6
Stitcher	6
Audible	4
Podbeam	3
Slacker	3
YouTube	3
TuneIn	2
Radio.com	2
Pocket Casts	1
Sirius XM	1
Overcast	1
Sling	1
Spotify	1
CastBox podcasts	1
TV	1
Other (n= 7)	
Google (podcasts)	3
Alexa	1
Amazon	1
Facebook	1
Yee	1
Miscellaneous (n=1)	
None	1