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# New York Hunters' Perceptions of Chronic Wasting Disease

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# EXECUTIVE SUMMARY

In 2019, DEC sponsored research to understand New York deer hunters' behaviors, perceptions of CWD-related risks, and attitudes about a regulation prohibiting import of whole deer carcasses. The purpose of our study was to:

- Assess the degree to which hunters practice preventive actions DEC recommends to keep CWD from re-entering to New York State, and identify factors that influence whether hunters take those actions.
- Characterize hunters' beliefs and perceptions related to CWD.

## METHODS

We developed a self-administered questionnaire to address our research objectives. In fall 2019 we used that questionnaire to collect data through a mail survey with a statewide random sample of 2,000 hunting license holders. Our response rate was 29.5%.

We used protection motivation theory (PMT) to help understand why hunters do or do not take two actions DEC recommends to prevent CWD from entering New York. PMT proposes that two paths of perception—threat appraisal and coping appraisal—are linked to protective behavior. Threat appraisal includes perceived vulnerability (e.g., how likely is it that CWD will re-enter New York?) and perceived severity (e.g., if CWD does enter New York, how badly would I be affected?). Coping appraisal includes perceived response efficacy (e.g., are the actions DEC is recommending an effective means of keeping CWD outside New York?), self-efficacy (e.g., can I actually carry out the protective actions that DEC recommends?), and response cost (e.g., what will it cost me in time or money to take the actions that DEC recommends?).

## RESULTS HIGHLIGHTS

Preventive Actions and Intentions. DEC recommends that deer carcasses (parts and scraps from butchering) be disposed of in municipal landfills. Hunters can dispose of their deer carcasses properly by leaving them with meat processors (who are required to dispose of deer carcasses in a landfill). About 61% of successful hunters had taken a deer to a meat processor at least once in the last 5 years. DEC recommends that hunters who process their own deer dispose of the carcass parts in municipal trash pickup or directly in a municipal landfill. About 29% of successful hunters had disposed of a deer carcass in the trash/landfill at least once in the last 5 years. About 1 in 4 said they probably or definitely would dispose of a carcass in the trash/landfill in the future.

Findings indicate that a sizable subset of hunters leave their deer carcass on the landscape. About 24% of hunters who had killed a deer in the last 5 years had never taken a deer to a processor or put the carcass of a deer they processed themselves into the trash or a landfill. About 41% of hunters who had taken a deer in the last 5 years reported that they had left a deer carcass on the land (either land they owned or land they hunted but did not own).

About 35% of active hunters had used natural deer scent lures sometime during the last 5 years, and about 1 in 4 said they probably or definitely would use natural scent lures when hunting deer in the future. This behavior is contrary to a DEC recommendation that hunters avoid use of natural (deer urine-based) scent lures when hunting deer.

Threat Appraisal (Perceived vulnerability and susceptibility). A majority of active hunters (84%) would be concerned about eating venison from a deer that tested positive for CWD. On the other hand, the majority (67%) of active deer hunters described themselves as "not at all" or "not too" concerned about eating venison from free-ranging deer in New York that had not been tested for CWD.

A majority of active deer hunters (71%) agreed that spread of CWD in New York would lead to deer population decline and would negatively impact hunting traditions in New York. On the other hand, only 32% thought it was moderately/very likely that CWD would be found in free-ranging deer in New York within the next 5 years, and only 16% thought it was moderately/very likely to be found within the next 5 years in free-ranging deer where they hunted.

Coping Appraisal (Response efficacy, self efficacy, cost). Over half of active hunters thought bringing in only deboned meat if they took a deer outside New York would be moderately/very effective in keeping CWD outside New York. About 1 in 4 (25%) were unsure about the effectiveness of this action.

About 40% of active hunters thought disposing of their deer carcass parts in the trash or a landfill would be moderately/very effective in keeping CWD outside New York. Nearly 1 in 3 (29%) were unsure about the effectiveness of this action.

Hunters who had successfully taken a deer and had disposed of a deer carcass in the trash were more likely than successful hunters who had not disposed of a deer carcass in the trash to agree that disposing of a carcass in the trash was easy (78% vs. 27%), inexpensive (76% vs. 37%), and convenient (77% vs. 25%).

Less than 1 in 3 active hunters (29%) thought strictly avoiding use of natural scent lures when they hunt deer would be moderately/very effective in keeping CWD outside New York. About 1 in 3 (34%) were unsure about the effectiveness of this action.

## CONCLUSIONS

Persuading more hunters to dispose of deer carcasses in the trash or a landfill, and to avoid use of natural scent lures when hunting, will be challenging in the context of current hunter beliefs and behavioral patterns. Substantial numbers of active deer hunters in New York perceive low vulnerability to the negative outcomes associated with CWD and are not convinced that taking those actions will be effective in preventing entry of CWD into New York.

This research provided baseline information on hunters' behavior and beliefs related to CWD. More research will be needed to inform effective communication about CWD risk reduction in New York. Given these results, it would be useful for future investigations to explore whether communication which elevates a sense of vulnerability to negative outcomes from CWD, or increases perceived response or self efficacy for CWD preventive actions, would influence intentions to take protective behaviors recommended by DEC.

## ACKNOWLEDGMENTS

We extend our appreciation to the hunters of New York State who participated in this study. For their assistance during all phases of this research, we express our thanks to Jeremy Hurst, Kevin Hynes, Courtney LaMere, Mike Schiavone (New York State Department of Environmental Conservation [DEC] Bureau of Wildlife), and Krysten Schuler (Animal Health Diagnostic Center, Cornell University College of Veterinary Medicine).

The Survey Research Institute (SRI) at Cornell University conducted nonrespondent follow-up interviews. Nancy Connelly assisted with sampling design and analysis. Karlene Smith and other CCSS staff assisted with survey implementation and data coding. Our survey instrument and request to conduct survey research was reviewed and granted approval by the Cornell University Office of Research Integrity and Assurance (Institutional Review Board for Human Participants Protocol ID#: 1004001374). This work was supported by New York Federal Aid in Wildlife Restoration Grant WE–173–G.

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# INTRODUCTION

Chronic wasting disease (CWD) is a fatal prion disease affecting species in the deer family (e.g., deer, moose, elk). It has been reported in free-ranging deer, elk and/or moose in at least 26 states in the continental United States, as well as four provinces in Canada. CWD was found in captive and wild white-tailed deer in Oneida County in 2005, but following an intensive disease response effort by DEC, no subsequent cases have been detected. CWD is not currently known to be in New York State.

In 2018, the New York State Department of Environmental Conservation (DEC), the New York State Department of Agriculture and Markets (DAM), and the Cornell University College of Veterinary Medicine finalized an interagency CWD risk minimization plan (DEC 2018) that emphasizes three goals: (1) keep infectious material and animals out of the state to prevent new introductions; (2) prevent exposure of wild white-tailed deer and moose to infectious material in New York; and (3) provide education to increase the public understanding of potential CWD risks and impact on wild deer health. The plan advises hunters to consider alternatives to natural deer urine-based lures and to dispose of deer carcasses (parts and scraps from butchering) in the trash or a landfill to reduce the risk that CWD will re-enter New York State. To minimize risk, hunters are prohibited from importing whole deer carcass or intact trophy heads into New York; hunters may only enter the state with deboned meat, cleaned skull cap, raw or processed cape or hide, cleaned teeth or lower jaw, and finished taxidermy products.

Previous reviews of agency response to CWD discovery in Wisconsin demonstrated the key role that hunter acceptance can play in the implementation (and subsequent success or failure) of CWD risk minimization actions (Heberlein and Stedman 2009, Holsman et al. 2010). DEC managers believe that hunter adoption of recommended and regulated behaviors as described above will facilitate the success of the CWD risk minimization plan.

Strategy 3 in the plan calls for DEC to "develop a communication plan defining messages and audience, outreach, and advertising strategy to re-engage various stakeholder groups in CWD education" (DEC 2018: 29). New York deer hunters are a key audience with regard to CWD communications, but DEC has collected no data on hunters' perceptions of CWD risk in the 15 years since research associated with DEC's rapid response to discovery of CWD-positive deer in 2005 (Brown et al. 2005, 2006). Current information on New York deer hunters' CWD-related behaviors and perceptions would be useful input to a CWD communication plan.

To address these information needs, DEC sponsored research to understand New York deer hunters' behaviors and perceptions of CWD risk, as we report the findings of that study here.

## Research Objectives

1. Assess the degree to which hunters practice behaviors that minimize or increase the risk of CWD re-entry to New York State.
2. Characterize hunters' beliefs about CWD.
3. Characterize hunters' perceptions of the risk that CWD poses to the deer population, deer hunting, and human health.
4. Identify factors that influence whether hunters practice risk minimization behaviors.

# CONCEPTUAL FOUNDATION

## Protection Motivation Theory

We used protection motivation theory (PMT) (Maddux and Rogers 1983; Prentice-Dunn and Rogers 1986; Rogers 1983) as the conceptual foundation for this study. PMT was originally developed to investigate why people do or do not modify their behavior in ways recommended by health professionals (e.g., increase exercise, modify their diet, stop smoking, take HIV prevention actions). The theory has since been applied to help predict why people do or do not practice recommend responses to environmental threats such as floods and tsunamis (Cismaru et al. 2011, McCaughey et al. 2017). PMT was an attractive theoretical framework for this study because we were interested in understanding why hunters do or do not take actions that DEC suggests to protect against re-entry of CWD into New York State.

Figure 1 provides a graphical representation of PMT. The theory proposes that two paths of perception—threat appraisal and coping appraisal—are linked to protective behavior. Threat appraisal includes perceived vulnerability (e.g., how likely is it that CWD will re-enter New York?) and perceived severity (e.g., if CWD does re-enter New York, how badly would I be affected?). Threat appraisal also involves perceptions of the intrinsic and extrinsic rewards associated with recommended (adaptive) or discouraged (maladaptive) behaviors (e.g., I'm more successful as a deer hunter because I use natural scent lures). Coping appraisal includes perceived response efficacy (e.g., are the actions DEC is recommending an effective means of keeping CWD outside New York?), self-efficacy (e.g., can I actually carry out the protective actions that DEC recommends?), and response cost (e.g., what will it cost me in time or money to take the actions that DEC recommends?).

As summarized by McCaughey et al. (2017: 463), "PMT proposes that the greater the perceived threat and the greater the perceived efficacy of protective actions, the greater the motivation to carry out those protective actions." Protective motivation is typically measured as intention to take recommended protective actions (e.g., intention to use synthetic deer scent lures). Protective motivation (intention) is expected to predict protective behavior, but empirical

research shows that expression of behavior is subject to a wide range of constraining and enabling factors (e.g., availability and cost of synthetic scent lures).

Cismaru et al. (2011, p. 65-66) state that, "PMT assumes that if individuals are presented with a clear and real threat and provided recommendations that must be followed to avoid or mitigate the threat, then they will adopt the recommended behavior if the recommendations are perceived as doable and easy to follow." Research on PMT across a range of applications (Floyd et al. 2000; Milne et al. 2000) supports the hypotheses that elevating levels of perceived threat and efficacy, and decreasing perceived costs of action, increase the likelihood that a person will adopt the recommended behavior.

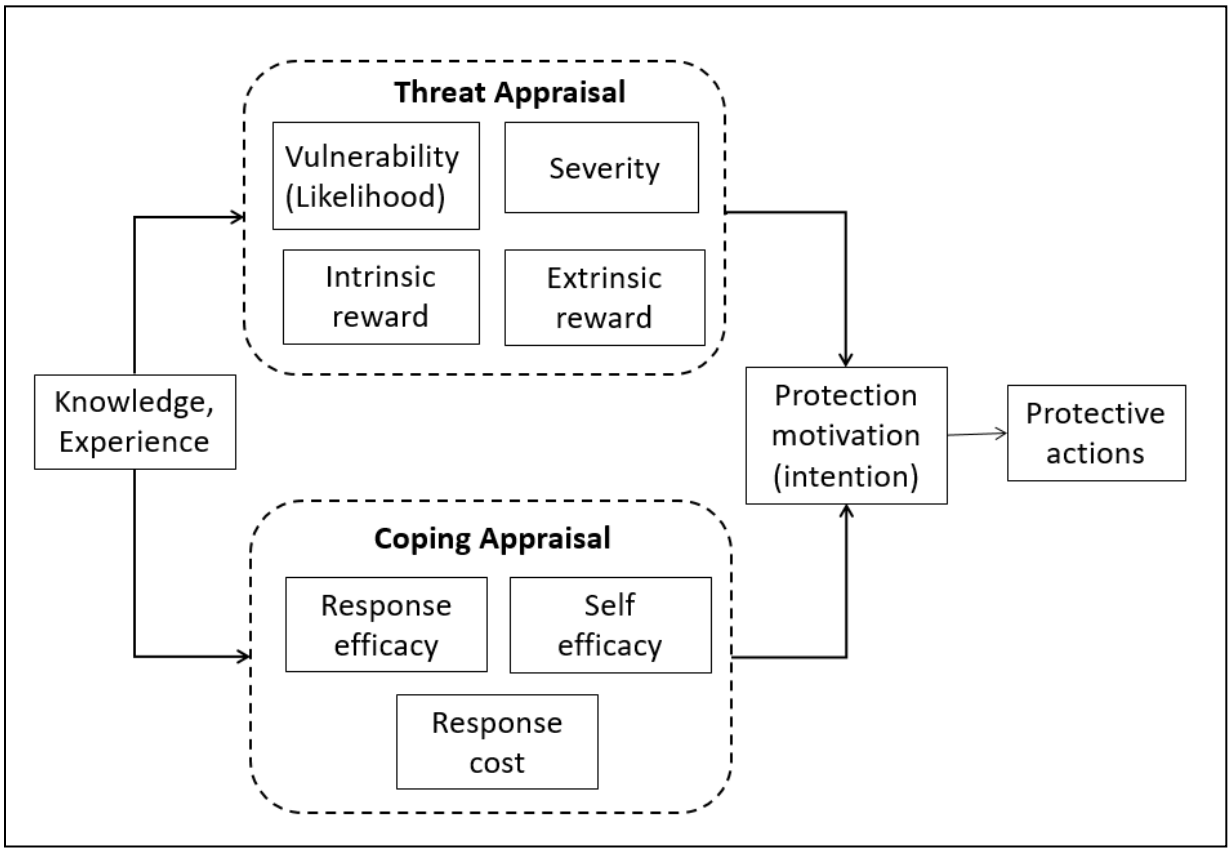


**Figure 1.** Representation of concepts within Protection Motivation Theory (PMT) and their hypothesized links to protective behavior (adapted from Xiao et al. 2014).

Some components of PMT (e.g., perceived response efficacy and perceived severity of negative outcomes) have been explored in studies focused on hunters and CWD. Cooney and Holsman (2010), for example, found that many Wisconsin deer hunters believed that deer eradication would not eliminate CWD from their state; the authors suggested that deer management agencies will need to convince hunters that deer-reduction strategies are effective in containing CWD (i.e., have response efficacy) if they want hunters to assist with or support such efforts. Vaske and Miller (2018) found evidence that CWD-related risk perceptions (perceived severity of outcomes associated with CWD) declined among Illinois hunters between 2004 and 2012. They suggested that, "With less perceived risk, management strategies such as sharpshooting may be even more contentious" (Vaske and Miller 2018: 1385). If perceived severity of outcomes associated with CWD decrease over time, it also may become more difficult for wildlife managers to convince hunters to take CWD risk minimization actions.

Review of PMT literature led us to formulate two research questions:

- Are intentions to take CWD preventive actions associated with CWD threat appraisal and coping appraisal?
- Are attitudes toward a ban on import of whole deer carcasses associated with CWD threat appraisal and coping appraisal?

## Social Trust

At an interpersonal level, the concept of trust "refers to a willingness to rely on others to act on our behalf based on the belief that they possess the capacity to make effective decisions and take our interests into account" (Houston and Howard Harding 2014:55). At an institutional or social level, the term social trust refers to trust in the entities that manage a hazard facing society. Social trust is often linked to a layperson's perception of risk related to that hazard (Siegrist and Cvetkovich 2000). Risk management studies have, for example, demonstrated a link between social trust and perceived risks and benefits of technology (Siegrist et al. 2000). Research in a range of contexts has shown that threat appraisal is often lower for laypeople if they trust the entity managing the risk from a hazard (Siegrist and Cvetkovich 2000). As described below, trust in authorities may play a role in risk perceptions when uncertainty about that risk is high.

> *In the absence of sufficient knowledge, decisions and judgments are guided by social trust (Earle & Cvetkovich, 1995; Luhmann, 1989). The function of trust is to reduce the complexity people are faced with. In other words, instead of making rational judgments based on knowledge, social trust is employed to select experts who are trustworthy and whose opinions can be believed as being accurate.* (Siegrist and Cvetkovich 2000:714).

Studies in Wisconsin and Illinois have linked hunter's CWD-related risk perceptions to their trust in the state agency responsible for deer management generally, and emergency response to CWD detection specifically (Vaske 2010). Vaske et al. (2004) found that Wisconsin hunters who dropped out of hunting were less trusting of Wisconsin DNR (WDNR) than were hunters who continued hunting after CWD-positive deer were detected. Holsman et al. (2010) found that low trust in WDNR on the topic of deer management contributed to low support for WDNR's response to discovery of CWD-positive deer in 2002. Needham and Vaske (2008) found an inverse relationship between trust and CWD-related risk perception; hunters who trusted agencies perceived less risk associated with CWD.

Shared values have been suggested as a distinct dimension of social trust (Smith 2013a, 2013b). Social trust in a management agency is often higher among stakeholders who believe their values align with those of the management agency. This relationship is captured in a theory called salient value similarity (SVS) (Earle and Cvetkovich 1995). The SVS model has been used to help understand acceptance of natural resource management actions. For example, Gigliotti et al. (2020) used the SVS model to help understand private landowners who manage wetlands in the prairie pothole region of Minnesota. They found that landowners who had held wildlife conservation values most congruent with those of the Minnesota Department of Natural Resources (MDNR) also had the highest level of social trust in MDNR.

Studies have demonstrated that SVS between stakeholders and management agencies helps explain how social trust contributes to both risk perceptions and acceptability of management interventions. For example, Vaske et al. (2007) found that social trust was a mediator between value similarity and public approval of two wildfire management practices (i.e., prescribed burning and forest thinning).

Technical competency has been identified as another distinct dimension of social trust (Houston and Howard Harding 2014). Stakeholders who believe that an organization is competent in achieving its goals and objectives may be more willing to trust that organizations' hazard management decisions. Harper et al. (2015) developed a scale to assess trust in the technical competence of the Illinois Department of Natural Resources (IDNR) to manage CWD risks. They found that hunters who perceived higher risk to deer and have more trust in the information provided and management decisions made by the Illinois Department of Natural Resources (IDNR) were more likely than other hunters to support an IDNR sharp shooting program in a CWD response area.

Review of PMT and social trust literature led us to formulate two research questions:

- Are hunters who trust in DEC's ability to manage CWD risks more likely to believe that preventive actions DEC recommends will help keep CWD outside New York?
- Are hunters who trust in DEC's ability to manage CWD risks more likely to have favorable attitudes toward DECs prohibition on import of whole deer carcasses?

# METHODS

## Survey Instrument

In cooperation with a team of DEC wildlife professionals (hereafter referred to as the contact team), we developed a self-administered questionnaire (Appendix A) to address the research objectives described above. The questionnaire included measures of five concepts within PMT (i.e., vulnerability, severity, response efficacy, self efficacy, costs), past hunting behavior, trust in DEC, trust in sources of CWD information, attitude toward deer carcass import ban, age and education.

## Survey Implementation

We collected data through a mail survey. The population of interest was New York State deer hunters. For the mail survey, DEC drew a statewide random sample of 2,000 names and addresses from the full database of 2019 New York State hunting license holders. We implemented survey mailings between October 6, 2019 and November 13, 2019. We contacted each member of the sample up to four times (i.e., an initial letter and questionnaire, a reminder postcard, a third reminder letter and replacement questionnaire, and a final reminder about one week after the third mailing).

We contracted the Survey Research Institute at Cornell University (SRI) to complete follow-up telephone interviews with a sample of 75 nonrespondents. SRI completed the interviews between December 6, 2019 and December 29, 2019. Interviews contained 19 questions from the mail survey and took about 5 minutes to complete.

## Measurement

### Threat Appraisal

We used two approaches to assess perceived vulnerability to CWD effects, which focused on perceived likelihood that this event would occur and would effect one personally. Our primary measure of vulnerability was a 3-item scale. Our secondary measure of vulnerability was a scale on psychological distance. We also used two approaches to assess perceived severity of consequences if CWD did re-enter and spread across New York. Our primary measure of

severity was a 3-item scale. Our secondary measure of severity was a scale on psychological distance. We did not include any measures of intrinsic or extrinsic rewards.

Perceived Vulnerability to Effects of CWD We used questionnaire items 7a – 7c to measure perceived vulnerability to negative outcomes of CWD. All items included 7 response options that ranged from -3 (very unlikely) to +3 (very likely), with "0" for the response "Neither." We created a vulnerability scale (Cronbach's $\alpha = 0.745$) by calculating the grand mean of all 3 items (Table 1).

Psychological Distance from CWD Impacts We developed questionnaire items 12a – 12f to examine psychological distance from impacts of CWD (2 items on geographic distance, 2 items on social distance, and 2 items on temporal distance). We recoded or reverse coded variables V12A to V12F. The 6 items created a scale with alpha=0.608. This is lower than desired, and the items loaded onto 2 factors. Both outcomes are indications that the 6 items do not yield a strong unidimensional scale.

The 2 items on temporal distance (questionnaire items 12E and 12F) did yield a scale with a high alpha (0.797). The two items are highly correlated (Pearson correlation 0.664; $p < 0.01$). We made a decision to create a 2-item index of psychological distance. Other items were analyzed separately.

Perceived Severity of CWD Effects We used questionnaire items 10a – 10d to measure perceived severity of consequences if CWD enters New York State. We provided 7 response options that ranged from -3 (strongly disagree) to +3 (strongly agree), with "0" for the response "Neither." We created a variable called Severity (Cronbach's $\alpha = 0.834$) by taking the grand mean of all four items in the scale (Table 1).

Perceived Risks to Human Health We used questionnaire items 8a – 8c to measure concerns about potential risks CWD poses to human health. We adapted these items from Vaske et al. (2004). All items had 4 response options (1=not at all concerned, 2=not too concerned, 3=somewhat concerned, 4=very concerned). We created a health risk scale (Cronbach's $\alpha = 0.733$) by calculating the grand mean of all 3 items (Table 1).

Characteristics of CWD risks We measured threat characteristic perceptions using items that Song et al. (2019) used to predict intentions to use natural scent lures when deer hunting. In questionnaire items 9a – 9f, we asked participants how they would describe the risks of CWD using a 6-point semantic differential scale for 3 word pairs that characterized perceived dread (Slovic 1987) and 3 that characterized perceived uncertainty. Neither the perceived dread nor the perceived uncertainty items yielded a reliable scale (alpha was 0.433 for dread scale; alpha

**Table 1.** Scale reliability and factor loadings of items in multi-item scales.

| Latent variable and items measuring variable | Factor loading[b] |
|---|---|
| *Vulnerable* (Cronbach's α = 0.745)[a] | |
| Likelihood CWD will be found in wild deer somewhere in NY | 0.881 |
| Likelihood CWD will be found in wild deer where I hunt | 0.861 |
| Likelihood CWD will be found in captive deer facility in NY | 0.633 |
| *Severity* (Cronbach's α = 0.834) | |
| CWD in NY would lead to signicant decline in deer population | 0.737 |
| CWD in NY would negatively impact hunting traditions | 0.808 |
| CWD in NY would lead to less dollars spent by hunters | 0.823 |
| CWD in NY would divert DEC resources from other work | 0.716 |
| *HealthRisk* (Cronbach's α = 0.733) | |
| Level of concern about eating NY deer not tested for CWD | 0.655 |
| Level of concern about eating deer that tested positive | 0.837 |
| Level of concern about becoming ill from CWD | 0.884 |
| *Trust in DEC* (Cronbach's α = 0.957) | |
| Trust DEC to make good management decisions regarding CWD | 0.947 |
| Trust DEC to follow best available science for CWD management | 0.962 |
| Trust DEC to properly address CWD in NY | 0.962 |
| *Carcass ban bad/good* (Cronbach's α = 0.860) | |
| View on proposed expansion of carcass import ban: | |
| Bad-good | 0.807 |
| Unfavorable-favorable | 0.899 |
| Undesirable-desirable | 0.866 |
| *Carcass ban necessary/unnecessary* (Cronbach's α = 0.885) | |
| View on proposed expansion of carcass import ban: | |
| Wise-foolish | 0.779 |
| Positive-negative | 0.832 |
| Safe-dangerous | 0.862 |
| Necessary-unnecessary | 0.852 |

[a]Cronbach's alpha is an indicator of internal consistency among items in a scale. An alpha < .70 indicates unacceptably low internal consistency; an alpha > .90 indicates that items in a scale are redundant. An alpha between .70 and .90 is preferred.

[b]Factor loadings indicate how much influence an item has on the latent variable. Loadings close to 0 indicate a weak influence; loadings close to -1 or 1 indicate a strong influence. Factor loadings with an absolute value > .60 are acceptable.

was 0.186 for the unknown scale), so we treated each of the 6 items as unique indicators of threat characteristic perceptions.

**Coping Appraisal**

We developed single-item indicators of all three concepts within the coping appraisal category (i.e., response efficacy, self efficacy, and costs).

Response Efficacy We used questionnaire items 11a – 11c to assess how effective hunters thought taking the three protective actions recommended by DEC would be in keeping CWD outside New York. The actions were disposing of their deer carcass in trash/landfill, avoiding use of natural scent lures, and bringing back only deboned meat, clean capes or skull caps if they take a deer outside New York.

Self Efficacy We operationalized the self efficacy concept as defined by Bandura (1977, 1982) and Locke and Latham (2002). We used questionnaire item 6a to assess whether hunters agreed that disposing of a deer carcass in the trash landfill was easy (7 response options ranged from strongly disagree to strongly agree).

Costs of Disposing of Carcass in Trash We used questionnaire items 6b – 6d to assess perceived costs associated with disposing of a deer carcass in the trash or a landfill (i.e., is it perceived as inexpensive, convenient, time consuming?). Each item had 7 response options that ranged from strongly disagree to strongly agree. Two items (i.e., is it perceived as inexpensive, convenient?) yielded a reliable scale (Cronbach's $\alpha = 0.872$). The two items were highly correlated among active hunters (n=327) (Pearson correlation 0.794; $p < 0.001$).

**Protective Behavior Intentions**

We asked hunters to report how likely they were to take each of the three recommended preventive actions within the next three years. All three questions had five response options (i.e., definitely will not, probably will not, might or might not, probably will, or definitely will take the action described).

**Other Concepts**

We included indicators to explore three other topics that we believed would help managers' understand future hunter behavior and hunter acceptance of a new deer management policy related to CWD risk management. Those topics were past hunting behavior, trust in DEC, and attitudes toward a ban on import of whole deer carcasses.

Past Hunting Behavior We ask hunters about their previous experience hunting within and outside New York (Questionnaire items 2a – 2h and 4a – 4e). We asked about past experience hunting in areas where CWD-positive deer have been detected, because hunters' perceptions of CWD-related risks are assumed to change with hunting experience (Vaske and Miller 2019).

Trust in DEC We used questionnaire items 14a – 14c to create an index of public trust in DEC's ability to address CWD (Cronbach's $\alpha = 0.957$). We adapted these items from Harper et al. (2015). All 3 items had 7 response options that ranged from -3 (strongly disagree) to +3 (strongly agree), with "0" for the response "Neither." We created a variable called Trust in DEC by taking the grand mean of all 3 items in the scale (Table 1).

Attitudes Toward Deer Carcass Import Ban We used questionnaire item 13a – 13g to measure attitude toward the whole deer carcass import ban. These questions used a 5-point semantic differential scale, which appeared after a prompt asking participants what they thought about the regulation. Respondents were informed that DEC already had a partial carcass import ban, and that the agency had proposed expanding the regional ban into a global ban. This regulation change (from regional to global) was publically announced while the survey was underway. The 7 pairs of words were bad-good, wise-foolish, unfavorable-favorable, positive-negative, undesirable-desirable, safe-dangerous, and necessary-unnecessary. All items had a midpoint of neither (e.g., neither good nor bad). We reverse coded bad-good, wise-foolish, unfavorable-favorable, positive-negative, safe-dangerous, and necessary-unnecessary. We found that these attitude items loaded onto 2 factors, so we created 2 attitude scales using different items. We created a 3-item good/bad scale (Cronbach's $\alpha = 0.860$). We created a 4-item necessary/unnecessary scale (Cronbach's $\alpha = 0.885$) (Table 1).

## Analysis

We conducted all analyses using IBM SPSS Statistics for Windows, Version 24.0 (IBM Corp. 2016). We calculated descriptive statistics (frequencies, means) to summarize results for each variable. We used Pearson's chi square test, t-tests, and analysis of variance (ANOVA) to test for differences between groups (e.g., respondents and nonrespondents) at the $P < 0.05$ level.

We created multi-item scales to measure the following concepts: attitude toward carcass ban (bad/good, necessary/unnecessary), vulnerability to negative CWD outcomes, concern about CWD health risks, perceived severity of effects if CWD enters New York, psychological distance from CWD effects, trust in DEC to address CWD, costs of disposing of deer carcass in trash/landfill, and temporal distance from CWD impacts (Table 1). We used ordinary least squares regression to test a model of factors hypothesized to predict attitude toward the prohibition against importing whole deer carcasses. We also used ordinary least squares

regression to identify predictors of intentions to take use natural scent lures when deer hunting or to dispose of a deer carcass in the trash/landfill.

# RESULTS

## Survey Response

Our response rate was 29.5% (562 completed questionnaires from a pool of 1,908 deliverable questionnaires) (Table 2).

Survey questions were only relevant to members of the sample who hunt deer. Thus, we included only respondents who indicated that they typically hunted deer 1 or more days per year during the last 5 years. There were 478 (out of a total of 562 responses) in this category (i.e., about 85% of respondents were considered active deer hunters). Mean age of active deer hunters was 57 years old.

**Table 2.** Response rate and cooperation rate for 2019 hunters and chronic wasting disease mail survey.

| | |
|---|---|
| Response rate[1] | 29.5% |
| Completed questionnaires | 562 |
| Partially completed questionnaires | 1 |
| Refusals (returned a blank questionnaire) | 7 |
| Noncontact (undeliverable questionnaires) | 92 |
| Other nonrespondents | 1,338 |
| Total | 2,000 |

[1]Completed questionnaires / total number of units in the sample – undeliverable units.

## Respondent-Nonrespondent Comparisons

Nonrespondents and respondents did not statistically differ in the rate at which they had: participated in deer hunting in last 5 years (respondents [R] 90%, nonrespondents [NR] 88%); used natural scent lures (R 38%, NR 32%); disposed of deer carcasses in trash or landfill (R 29%, NR 31%); hunted cervids outside NYS (R 20%, NR 12%); and hunted cervids outside NYS in a CWD-positive area (R 5%, NR 1.4%) (Appendix B, Tables B1-B3).

Nonrespondents differed from respondents on several other measures. Respondents were older than nonrespondents (R mean year of birth 1961, NR mean year of birth 1971). Respondents were more likely than nonrespondents to have shot a deer (R 87% vs. NR 75%) and to have taken their deer to a meat processor (R 61% vs. NR 35%) in the last 5 years (Appendix B, Tables B4-B5).

Respondents were more likely to believe that disposing of their deer carcass in trash or landfill would be moderately or very effective in keeping CWD outside NYS (R 40% vs. NR 24%). Nonrespondents were more likely than respondents to be unsure about the efficacy of this action (R 34% vs. NR 49%) (Appendix B, Table B6).

Respondents were more likely to believe that avoiding use of natural deer scent lures when they hunt deer would be moderately or very effective in keeping CWD outside New York (R 29% vs NR 16%). Respondents expressed slightly more concern than nonrespondents about eating venison from a deer in NYS not tested for CWD and were slightly more likely than nonrespondents to describe their attitude toward the deer carcass import ban as positive (Appendix B, Tables B7, B10).

Weighting data involves tradeoffs. Weighting data based on a small number of nonrespondent interviews increases the standard errors of statistics and leads to a loss of precision and an increase in variability of results. In this study, we made a decision not to weight the data based on observed differences between respondents and nonrespondents.

## Hunter Behaviors

Nearly all active deer hunters typically hunted one or more days per year during regular firearms deer hunting season; about 60% typically hunted one or more days per year during an archery deer season (Table 3).

### Preventive Actions

Carcass Disposal DEC recommends that deer carcasses (parts and scraps from butchering) be disposed of in municipal landfills (DEC 2019). Hunters can dispose of their deer carcasses properly by leaving them with meat processors (who are required to dispose of deer carcasses in a landfill). About 61% of successful hunters had taken a deer to a meat processor at least once in the last 5 years (Table 4). DEC recommends that hunters who process their own deer dispose of the carcass parts in municipal trash pickup or directly in a municipal landfill. About 29% of successful hunters had disposed of a deer carcass in the trash/landfill at least once in the last 5 years (Table 4).

Findings indicate that a sizable subset of hunters leave their deer carcass on the landscape. About 24% of hunters who had killed a deer in the last 5 years had never taken a deer to a processor or put the carcass of a deer they processed themselves into the trash or a landfill. About 41% of hunters who had taken a deer in the last 5 years reported that they had left a deer carcass on the land (either land they owned or land they hunted but did not own).

Scent Lure Use About 35% of active hunters (48% of bowhunters and 20% of gun hunters) had used natural (deer urine-based) scent lures in one or more of the last 5 years (Table 5). This behavior is contrary to a DEC recommendation that hunters avoid use of natural (deer urine-based) scent lures when hunting deer.

**Table 3.** Average number of days that active deer hunters hunted during archery, firearms, or muzzleloader seasons.

| Average number of Days hunted per year in last 5 years | Deer hunting seasons | | |
|---|---|---|---|
| | Archery (n=424) | Regular firearms (n=474) | Muzzleloader (n=420) |
| | % | % | % |
| 0 days | 40.1 | 0.6 | 46.2 |
| 1-2 days | 10.4 | 8.2 | 21.2 |
| 3-7 days | 20.8 | 36.7 | 22.4 |
| 8+ days | 28.8 | 54.4 | 10.2 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

**Table 4.** How active hunters disposed of carcass from deer they took in New York in the last 5 years.

| Actions taken 1 or more times in last 5 years | N[1] | n | Valid % |
|---|---|---|---|
| Took a deer to a meat processor | 410 | 248 | 60.5 |
| Disposed of a deer carcass on their own land | 408 | 142 | 34.8 |
| Disposed of a deer carcass in the trash or a landfill | 403 | 116 | 28.8 |
| Took a deer to a taxidermist | 399 | 91 | 22.8 |
| Disposed of a deer carcass on land they hunt, but do not own | 404 | 47 | 11.6 |

[1]Includes only active hunters who had taken a deer in New York State in the last 5 years [n=413]).

**Table 5.** Rate of participation in key deer hunting behaviors within and outside New York State.

| Actions taken 1 or more times in last 5 years | N | n | % |
|---|---|---|---|
| Used a deer urine-based lure when deer hunting in New York | 406[1] | 154 | 37.9 |
| Hunted white-tailed or mule deer or elk outside New York | 475 | 99 | 20.8 |
| Killed white-tailed or mule deer or elk outside New York | 473 | 72 | 15.2 |
| Hunted deer or elk outside New York where CWD had been detected | 467 | 23 | 4.9 |
| Shot deer or elk in a high-fence preserve in New York | 407[1] | 6 | 1.5 |
| Shot deer or elk in a high-fence preserve outside New York | 472 | 5 | 1.1 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

**Other Behaviors Relevant to CWD Risk**

Residents who hunt deer or elk outside New York are a key audience for communication about keeping CWD out of New York. About 1 in 5 active hunters (21%) had hunted deer or elk outside New York in the last 5 years. Very few active hunters had hunted deer or elk in a CWD-positive location (5%) or had shot a deer or elk in a high-fence preserve in the last 5 years (Table 5).

**Intentions to take Preventive Actions**

About 24% of active hunters said they probably or definitely would dispose of their deer carcass parts in the trash or a landfill in the future. About 52% of active hunters said they probably or definitely would not use natural scent lures when hunting deer in the future; about 27% said they probably or definitely would use natural scent lures in the future (Table 6). The percentage of hunters who intended to use natural scent lures in the future was lower (15%) for those who participated in only regular firearms or muzzleloader seasons; it was higher (36%) for those who participated only in bow hunting seasons.

Behavioral intentions were strongly associated with past behavior. About 72% of successful hunters who had disposed of a deer carcass in the trash within the last 5 years (n=114) reported that they probably or definitely would dispose of a deer carcass in the trash in the future; only 15% said they would not or probably would not do so. Conversely, about 85% of successful hunters who had <u>not</u> disposed of a deer carcass in the trash within the last 5 years (n=284)

reported that they will not or probably will not dispose of a deer carcass in the trash in the future; only 5% said they probably or definitely will dispose of a deer carcass in the trash in the future.

The same association between past behavior and future behavioral intention appeared with regard to intended use of natural scent lures. About 69% of active hunters who had used a natural scent lure in the past (n=164) said they probably or definitely would use a natural scent lure again in the future; only 9% of those who had used a natural scent lure in the past said they probably or definitely will not use such a scent lure in the future. Conversely, about 75% of active hunters who had not used a natural scent lure in the past (n=300) said they will not or probably will not use a natural scent lure in the future; only 3% of those who had not used a natural scent lure in the past said they probably or definitely will use such a scent lure in the future.

**Table 6.** Intentions of active deer hunters to take CWD risk-minimization actions.

| How likely are you to do the following in the next 3 years? | n[1] | $\bar{X}$ | Response categories[2] | | | | |
|---|---|---|---|---|---|---|---|
| | | | Definitely will not | Probably will not | Might, might not | Probably will | Definitely will |
| | | | % | % | % | % | % |
| Use natural deer urine-based scent lures when deer hunting | 475 | 2.56 | 34.5 | 17.1 | 21.9 | 11.2 | 15.4 |
| Bag all leftover parts of my deer carcass and dispose of them in the trash or a landfill | 472 | 2.56 | 45.6 | 17.8 | 12.3 | 7.0 | 17.4 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]1=definitely will not, 2=probably will not, 3=might/might not, 4=probably will, 5=definitely will.

## Threat Appraisal

### Perceived Vulnerability to CWD Effects

Only 32% of active hunters thought it was moderately or very likely that CWD would be found in free-ranging deer in New York within the next 5 years and only 16% thought it was moderately or very likely to be found in free-ranging deer in the area where they hunted deer within the next 5 years (Table 7). Few active hunters moderately or strongly agreed that they are currently affected by CWD (1%) or that CWD affects people they know (5%) (Table 8).

### Perceived Severity of CWD Effects

Perceived risks to Hunters and hunting. Seventy-one percent of active deer hunters agreed (slightly, moderately, or strongly) that spread of CWD in New York would lead to deer population decline and 75% agreed spread of CWD would negatively impact hunting traditions in New York (more than 1 in 3 [39%] agreed that spread of CWD in NYS would cause them to stop hunting deer in New York) (Table 9).

Perceived risks to human health. A majority of active hunters (84%) would be concerned about eating venison from a deer that tested positive for CWD (60% would be very concerned). A majority of active hunters (73%) were moderately or very concerned about becoming ill from CWD. On the other hand, the majority (67%) of active deer hunters described themselves as "not at all" or "not too" concerned about eating venison from free-ranging deer in New York that had not been tested for CWD (Table 10).

Perceived characteristics of CWD risks. We used a set of semantic differential questions (word pairs) to assess how deer hunters characterized CWD risks (Table 11). Some of these questions tap into perceived vulnerability (e.g., is the threat increasing or decreasing?) or perceived severity (e.g., is the threat dreadful or not dreadful?).

The midpoint of the scale for these items was "neither" (e.g., neither controllable nor uncontrollable. Depending on the item, 31%-50% of respondents selected the midpoint labeled "neither." These responses suggested that many active deer hunters were unsure about how to characterize the risks posed by CWD.

Although 39% of active hunters perceived the risks of CWD as increasing and dreadful, a substantial minority of respondents also characterized the risks associated with CWD as controllable (44%), observable (41%), and known to science (43%) (Table 11).

**Table 7.** Active deer hunters' perception of likelihood that CWD-related events will occur within the next 5 years.

| How likely is it that CWD will Be discovered… | n[1] | $\bar{X}$ | Response categories[2] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Very unlikely | Moderately unlikely | Slightly unlikely | Neither | Slightly likely | Moderately Likely | Very likely |
| | | | % | % | % | % | % | % | % |
| In a free-ranging deer somewhere in NY | 464 | 0.44 | 8.2 | 11.2 | 9.7 | 14.4 | 23.9 | 21.1 | 11.4 |
| In a free-ranging deer in an area of NY where I hunt | 465 | -0.43 | 19.1 | 15.1 | 12.9 | 14.9 | 22.6 | 12.0 | 3.7 |
| In a captive deer facility (e.g., deer farm) in NY | 465 | 0.62 | 8.8 | 6.9 | 8.8 | 18.9 | 21.5 | 15.3 | 19.8 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]-3=very unlikely, -2=moderately unlikely, -1=slightly unlikely, 0=neither, 1=slightly likely, 2=moderately likely, 3=very likely.

**Table 8.** Active deer hunters' sense of psychological distance from potential consequences if CWD re-enters New York State.

| | n[1] | $\bar{X}$ | Response categories[2] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Strongly Disagree | Moderately disagree | Slightly disagree | Neither | Slightly agree | Moderately agree | Strongly agree |
| | | | % | % | % | % | % | % | % |
| My local area is affected by CWD | 448 | 2.49 | 43.1 | 13.8 | 6.9 | 26.1 | 8.0 | 0.9 | 1.1 |
| CWD mostly affects areas far away from where I live | 449 | 2.49 | 10.9 | 10.7 | 12.0 | 28.7 | 16.0 | 10.5 | 11.1 |
| CWD has effects on people I know | 446 | 2.48 | 51.3 | 5.8 | 2.0 | 33.4 | 2.5 | 1.8 | 3.1 |
| CWD mostly affects people I don't know | 444 | 4.31 | 14.0 | 4.1 | 3.6 | 41.7 | 7.9 | 9.7 | 19.1 |
| I'm unlikely to be affected by CWD in the near future | 448 | 4.23 | 12.3 | 6.7 | 8.3 | 33.7 | 10.9 | 13.4 | 14.7 |
| I'm unlikely ever to be affected by CWD | 448 | 4.14 | 10.0 | 8.5 | 10.7 | 34.8 | 11.4 | 13.4 | 11.2 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]-3=strongly disagree, -2=moderately disagree, -1=slightly disagree, 0=neither, 1=slightly agree, 2=moderately agree, 3=strongly agree.

**Table 9.** Active deer hunters' beliefs about potential consequences if CWD re-enters New York State.

| Spread of CWD to New York would… | n[1] | $\bar{X}$ | Response categories[2] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Strongly Disagree | Moderately disagree | Slightly disagree | Neither | Slightly agree | Moderately agree | Strongly agree |
| | | | % | % | % | % | % | % | % |
| Eventually lead to a significant decline in deer population | 466 | 1.14 | 3.2 | 5.6 | 8.6 | 11.4 | 22.1 | 25.5 | 23.6 |
| Negatively impact hunting traditions | 465 | 1.24 | 4.9 | 5.6 | 4.9 | 9.2 | 22.8 | 24.5 | 28.0 |
| Lead to a reduction in dollars spent by hunters | 465 | 1.38 | 4.7 | 3.2 | 4.9 | 10.9 | 21.3 | 21.9 | 33.1 |
| Divert DEC resources from other important wildlife conservation work | 464 | 1.07 | 3.9 | 3.7 | 6.3 | 20.0 | 20.7 | 24.1 | 21.3 |
| Cause me to stop hunting | 466 | -0.33 | 24.7 | 10.7 | 11.4 | 14.6 | 16.7 | 9.0 | 12.9 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]-3=strongly disagree, -2=moderately disagree, -1=slightly disagree, 0=neither, 1=slightly agree, 2=moderately agree, 3=strongly agree.

**Table 10.** Active deer hunters' concerns about effects of CWD on human health.

| | n[1] | $\bar{X}$ | Level of concern[2] | | | |
|---|---|---|---|---|---|---|
| | | | Not at all concerned | Not too concerned | Somewhat concerned | Very concerned |
| | | | % | % | % | % |
| Eating venison from a free-ranging deer in New York that was not tested for CWD | 468 | 2.09 | 32.3 | 35.0 | 23.9 | 8.8 |
| Eating venison from a free-ranging deer that tested positive for CWD | 468 | 3.39 | 5.3 | 10.5 | 24.4 | 59.8 |
| Becoming ill from CWD | 466 | 3.15 | 6.4 | 20.6 | 24.2 | 48.7 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]1=not at all concerned, 2=not too concerned, 3=somewhat concerned, 4=very concerned.

**Table 11.** Active deer hunters' perceptions of CWD-related risks.

| | n | $\bar{X}$ | Response categories 1 | 2 | Neither | 4 | 5 | |
|---|---|---|---|---|---|---|---|---|
| | | | % | % | % | % | % | |
| Controllable | 458 | 2.68 | 13.3 | 33.4 | 31.4 | 15.7 | 6.1 | Uncontrollable |
| Increasing | 454 | 2.68 | 9.3 | 29.4 | 49.1 | 8.8 | 3.5 | Decreasing |
| Dreadful | 442 | 2.70 | 14.7 | 23.8 | 45.7 | 8.4 | 7.5 | Not dreadful |
| Immediate effects | 454 | 3.05 | 6.2 | 17.0 | 50.0 | 19.4 | 7.5 | Delayed effects |
| Unknown to science | 455 | 3.38 | 5.7 | 13.6 | 36.0 | 25.9 | 18.7 | Known to science |
| Observable | 454 | 2.69 | 14.3 | 26.2 | 39.6 | 15.4 | 4.4 | Unobservable |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

## Coping Appraisal

### Response Efficacy

Disposing of deer carcass in trash, landfill. About 40% of active hunters thought disposing of their deer carcass parts in the trash or a landfill would be moderately or very effective in keeping CWD outside New York. Nearly 1 in 3 (29%) were unsure about the effectiveness of this action (Table 12). Nonrespondents were more likely than respondents to be unsure about the efficacy of this action; only 24% of nonrespondents thought it would be moderately or very effective (Appendix B, Table B5). Respondents who hunted exclusively during bow seasons or exclusively during firearms seasons did not differ on this measure.

**Table 12.** Active deer hunters' perceptions about effectiveness of CWD risk-minimization actions.

| | n[1] | $\bar{X}$ | Response categories[2] | | | | |
|---|---|---|---|---|---|---|---|
| | | | Not at all effective | Slightly effective | Moderately effective | Very effective | Unsure |
| | | | % | % | % | % | % |
| Disposing of my deer carcass in the trash or a landfill | 449 | 3.29 | 15.8 | 15.8 | 21.4 | 18.3 | 29.0 |
| Strictly avoiding use of natural urine-based scent lures when hunt deer | 451 | 3.22 | 21.7 | 15.7 | 15.5 | 13.1 | 33.9 |
| Bringing home only deboned meat, clean capes, or skull caps if I take a deer outside New York | 448 | 3.57 | 10.5 | 8.0 | 20.5 | 35.5 | 25.4 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]1=not at all effective, 2=slightly effective, 3=moderately effective, 4=very effective, 5=unsure.

Avoiding natural scent lures. Fewer than 1 in 3 active hunters (29%) thought strictly avoiding use of natural scent lures when they hunt deer would be moderately or very effective in keeping CWD outside New York. About 1 in 3 (34%) were unsure about the effectiveness of this action (Table 12). Active hunters who had used a natural scent lure were more likely than other active hunters to believe that avoiding use of natural scent lures would not be at all effective in keeping CWD outside New York (31% vs. 16%, $\chi^2$ =19.60, df=4, p=0.001). Respondents who only hunted bow seasons were no different than those who only hunted firearms seasons on perceived effectiveness of avoiding use of natural scent lures.

Processing my deer before returning to New York. Over half of active hunters thought bringing in only deboned meat if they took a deer outside New York would be moderately or very effective in keeping CWD outside New York. About 1 in 4 (25%) were unsure about the effectiveness of this action (Table 12). Respondents who only hunted bow seasons were more likely than those who only hunted firearms seasons to believe that bringing only deboned deer meat into New York would be very effective in keeping CWD outside the state (41% vs. 30%; $\chi^2$=12.33, df=4, p=0.015).

### Self Efficacy and Costs Related to Deer Carcass Disposal

Active hunters who had successfully taken a deer and had disposed of their deer carcass in the trash or landfills perceived that activity differently than did hunters who did not dispose of deer carcasses in the trash or landfill. The former were more likely to agree that doing so was easy (78% vs. 27%), inexpensive (76% vs. 37%), and convenient (77% vs. 25%) (Table 13).

## Other Concepts of Interest

### Trust in DEC and Other Information Sources

Trust in DEC was relatively strong: majorities of active hunters slightly to strongly agreed that they trust DEC to: make good deer management decisions regarding CWD issues, follow best available science in managing CWD, and properly address CWD in New York (Table 14). Active hunters placed relatively high trust in information about CWD from DEC, Centers for Disease Control (CDC), New York State Department of Agriculture and Markets and New York State Department of Health (Table 15).

**Table 13.** Beliefs about disposing of deer carcasses in trash or landfill among active hunters who had taken a deer, and had or had not disposed of a deer carcass in trash or landfill.

| Bagging leftover parts of my deer carcass and disposing of them in trash, landfill is… | Active hunters who had taken a deer and had disposed of carcass in trash | | | | Active hunters who had taken a deer but had not disposed of carcass in trash | | | | $\chi^2$ | P value |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | Disagree | Neither | Agree | n | Disagree | Neither | Agree | | |
| | | % | % | % | | % | % | % | 85.09 | <0.001 |
| Easy to do | 115 | 13.0 | 8.7 | 78.3 | 244 | 48.8 | 24.6 | 26.6 | | |
| Inexpensive | 115 | 11.3 | 13.0 | 75.7 | 243 | 33.3 | 29.6 | 37.0 | | |
| Convenient | 113 | 15.0 | 8.0 | 77.0 | 242 | 48.3 | 26.9 | 24.8 | | |
| Time consuming | 113 | 50.4 | 20.4 | 29.2 | 243 | 32.9 | 34.2 | 32.9 | | |

**Table 14.** Active deer hunters' level of trust in DEC to make good decisions about response to CWD risks.

| I trust the DEC to… | n[1] | $\bar{X}$ | Response categories[2] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Strongly Disagree | Moderately disagree | Slightly disagree | Neither | Slightly agree | Moderately agree | Strongly agree |
| | | | % | % | % | % | % | % | % |
| Make a good deer management decisions regarding CWD issues | 452 | 1.53 | 3.8 | 3.5 | 5.3 | 8.6 | 15.3 | 28.5 | 35.0 |
| Follow the best available science in managing CWD | 451 | 1.71 | 2.9 | 2.9 | 3.8 | 7.1 | 16.0 | 28.2 | 39.0 |
| Properly address CWD in New York | 451 | 1.66 | 3.3 | 2.0 | 4.7 | 8.0 | 17.3 | 26.4 | 38.4 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]-3=strongly disagree, -2=moderately disagree, -1=slightly disagree, 0=neither, 1=slightly agree, 2=moderately agree, 3=strongly agree.

**Table 15.** Trust in DEC's ability to manage CWD risks among active hunters who do or do not believe preventive actions will be moderately/very effective in keeping CWD outside New York.

| Perceived effectiveness of preventive actions in keeping CWD outside New York | | Social Trust[2] | | | |
|---|---|---|---|---|---|
| | n[1] | $\bar{X}$ | SD | t | P value |
| Disposing of my deer carcass in the trash or landfill[3] | | | | | |
| Not/slightly effective, or unsure | 236 | 1.53 | 1.59 | 1.746 | 0.08 |
| Moderately/very effective | 212 | 1.77 | 1.36 | | |
| Avoiding use of natural urine-based scent lures when I hunt deer[3] | | | | | |
| Not/slightly effective, or unsure | 238 | 1.44 | 1.62 | 2.96 | 0.003 |
| Moderately/very effective | 212 | 1.85 | 1.30 | | |
| Bringing home only deboned meat, clean capes, or skull caps if I take a deer outside NY[3] | | | | | |
| Not/slightly effective, or unsure | 174 | 1.42 | 1.52 | 2.39 | 0.017 |
| Moderately/very effective | 273 | 1.76 | 1.46 | | |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]Social trust scale was scored from -3 (low trust) to +3 (high trust).

[3]Response efficacy questions had 5 response options: not at all effective, slightly effective, moderately effective, very effective, or unsure.

One of our research questions was, "Are hunters who trust in DEC's ability to manage CWD risks more likely to believe that preventive actions DEC recommends will help keep CWD outside New York?" We found that there was a strong positive relationship between trust in DEC's ability to manage CWD risks and the perception that preventative actions recommended by DEC would be moderately or very effective in keeping CWD outside New York. Trust in DEC was significantly higher among respondents who: (1) believed that avoiding use of natural scent lures would be moderately or very effective, (2) believed that bringing home only deboned meat, clean capes, or skull caps from out-of-state hunts would be moderately or very effective (Table 16). The relationship between trust in DEC and perceived response efficacy of disposing of deer carcasses in the trash/landfill was similar, though the difference between the low and high perceived effectiveness hunter subgroups was not significant at the p=0.05 level (Table 16).

**Table 16.** Level of trust active deer hunters placed in various sources to provide accurate information about the risks of CWD.

| | n[1] | $\bar{X}$ | Response categories[2] | | | | |
|---|---|---|---|---|---|---|---|
| | | | Do not trust at all | Trust a little | Trust somewhat | Trust a lot | Trust completely |
| | | | % | % | % | % | % |
| NYSDEC | 468 | 3.72 | 2.6 | 8.5 | 27.1 | 38.2 | 23.5 |
| Centers for Disease Control (CDC) | 465 | 3.68 | 3.9 | 10.5 | 24.9 | 35.1 | 25.6 |
| NYSDAM | 464 | 3.54 | 2.2 | 11.6 | 33.4 | 35.3 | 17.5 |
| NYSDOH | 461 | 3.54 | 3.3 | 12.8 | 30.8 | 33.0 | 20.2 |
| National deer hunting organizations | 463 | 3.53 | 2.8 | 10.4 | 35.0 | 34.8 | 17.1 |
| North American Deer Farmers Association | 463 | 3.13 | 10.6 | 17.7 | 33.0 | 25.5 | 13.2 |
| Celebrity hunters | 465 | 2.15 | 37.0 | 25.4 | 26.7 | 7.7 | 3.2 |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]1=do not trust at all, 2=trust a little, 3=trust somewhat, 4=trust a lot, 5=trust completely.

**Factors that Influence Attitudes Toward Deer Carcass Import Ban**

Majorities of active hunters viewed the ban on importation of whole deer carcasses as somewhat or very: good (69%), wise (58%), desirable (57%), safe (58%), and necessary (58%) (Table 17).

Results of multivariate analysis. One of our research questions was, "Are attitudes toward a ban on import of whole deer carcasses associated with CWD threat appraisal and coping appraisal? We used multivariate analysis to address this question. We found a significant (but weak) model of factors predicting perception that the carcass ban was "bad" or "good". Significant predictors included: risk perception, trust in DEC, and whether the respondent had hunted cervids outside NYS in the last 5 years (Table 18). To explore this further, we created a dummy variable to compare active hunters who viewed the whole carcass ban as "good" to those who viewed the ban as "neutral" or "bad". Active deer hunters who viewed the ban as good had a higher level of concern about human health effects of CWD, viewed the potential impacts of CWD in New York as more severe, had a higher level of trust in DEC's ability to manage CWD risks, and were more likely to view bringing home only venison or clean skull caps from a deer they took out-of-state as a very effective way to keep CWD outside New York (Table 19).

We found a significant (but weak) model of factors predicting the perception that the carcass ban was "necessary" or "unnecessary". Significant predictors included: perception of CWD as "controllable / uncontrollable", perception of whether CWD risk was "increasing / decreasing", perceived severity of CWD consequences, and trust in DEC (Table 20).

## Factors that Influence Preventive Action Intentions

One of our research questions was, "Are intentions to take CWD preventive actions associated with CWD threat appraisal and coping appraisal?" To address this question, we used linear regression to test two a priori models of factors that would predict intentions to take preventive actions recommended by DEC to keep CWD outside New York. In each case, the first model included PMT variables and the second model included PMT and behavioral variables. We expected past behavior to be a significant predictor variable after we observed the strong correlation between past behavior and behavioral intention (described on page 10).

**Table 17.** How active deer hunters' described their perceptions of prohibition on import of whole deer carcasses.

| | | | Response categories | | | | | |
|---|---|---|---|---|---|---|---|---|
| | n[1] | $\bar{X}$ | Very | Somewhat | Neither | Somewhat | Very | |
| | | | % | % | % | % | % | |
| Bad | 442 | 3.91 | 5.7 | 10.2 | 15.2 | 25.8 | 43.2 | Good |
| Wise | 438 | 2.41 | 37.0 | 21.0 | 16.2 | 15.3 | 10.5 | Foolish |
| Unfavorable | 436 | 3.70 | 6.4 | 11.9 | 23.2 | 22.5 | 36.0 | Favorable |
| Positive | 433 | 2.29 | 38.6 | 21.0 | 21.5 | 11.1 | 7.9 | Negative |
| Undesirable | 435 | 3.67 | 6.7 | 11.7 | 24.6 | 21.8 | 35.2 | Desirable |
| Safe | 440 | 2.33 | 36.6 | 21.1 | 23.0 | 11.8 | 7.5 | Dangerous |
| Necessary | 441 | 2.36 | 36.1 | 21.3 | 22.2 | 11.1 | 9.3 | Unnecessary |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).



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**Table 18.** Summary of linear regression analysis for variables predicting attitude that whole deer carcass import ban is a bad/good idea.

| | *B* | *SE* | Standardized Beta *β* |
|---|---|---|---|
| CWD risks controllable/uncontrollable (V9a) | -0.056 | 0.052 | -0.053 |
| CWD risks increasing/decreasing (V9b) | -0.030 | 0.064 | -0.024 |
| CWD risks dreadful/not dreadful (V9c) | -0.055 | 0.057 | -0.052 |
| CWD risks immediate/delayed (V9d) | 0.034 | 0.060 | 0.029 |
| CWD risks unknown/known (V9e) | 0.060 | 0.050 | 0.059 |
| CWD risks observable/unobservable (V9f) | 0.043 | 0.053 | 0.805 |
| **Risk scale** | 0.153* | 0.076 | 0.105 |
| Temporal distance scale | -0.002 | 0.033 | -0.002 |
| Vulnerable to CWD outcomes scale | -0.002 | 0.039 | -0.003 |
| Perceived severity of CWD scale | 0.048 | 0.043 | 0.058 |
| **Trust in DEC scale** | 0.213*** | 0.038 | 0.281 |
| **Hunted deer, elk outside NYS in last 5 years** | -0.066* | 0.033 | -0.098 |
| Perceived effectiveness of ban in keeping CWD out | 0.080 | 0.042 | 0.090 |
| Constant | -0.366 | 0.407 | |
| F(13,380) = 6.23 | | | |
| $r^2$ = 0.176 | | | |
| adj. $r^2$ = 0.148 | | | |
| P <0.001 | | | |

*p< .05; **p< .01; ***p< .001

**Table 19.** Comparison of active deer hunters who view whole carcass import ban as neutral/bad vs. those who view the ban as good.

| Multi-item scale name | n[1] | $\bar{X}$ | SD | t | P value |
|---|---|---|---|---|---|
| *Concern about health risk* | | | | | |
| View: neutral/bad | 134 | 2.74[2] | 0.79 | -2.36 | 0.019 |
| View: good | 298 | 2.93[2] | 0.74 | | |
| *Perceived severity of CWD impacts* | | | | | |
| View: neutral/bad | 136 | 0.89[3] | 1.28 | -3.38 | 0.001 |
| View: good | 297 | 1.35[3] | 1.30 | | |
| *Trust in DEC* | | | | | |
| View: neutral/bad | 141 | 0.96[3] | 1.72 | -6.77 | <0.001 |
| View: good | 301 | 1.94[3] | 1.26 | | |
| *Perceived efficacy of bringing only venison, clean skull caps from my deer into New York* | | | | | |
| View: neutral/bad | 140 | 3.34[4] | 1.45 | -2.61 | 0.009 |
| View: good | 299 | 3.67[4] | 1.12 | | |

[1]Includes only active deer hunters (i.e., those who had hunted deer in NYS in the last 5 years).

[2]1=not at all concerned, 2=not too concerned, 3=somewhat concerned, 4=very concerned.

[3]1=strongly disagree, 4=neither, 7=strongly agree

[4]1=not at all effective, 2=slightly effective, 3=moderately effective, 4=very effective, 5=unsure.

**Table 20.** Summary of linear regression analysis for variables predicting attitude that whole deer carcass import ban is a necessary.

| | *B* | *SE* | Standardized Beta *β* |
|---|---|---|---|
| **CWD risks controllable/uncontrollable (V9a)** | -0.112* | 0.056 | -0.103 |
| **CWD risks increasing/decreasing (V9b)** | -0.136* | 0.070 | -0.103 |
| CWD risks dreadful/not dreadful (V9c) | -0.043 | 0.061 | -0.039 |
| CWD risks immediate/delayed (V9d) | 0.093 | 0.064 | 0.076 |
| CWD risks unknown/known (V9e) | 0.070 | 0.054 | 0.066 |
| CWD risks observable/unobservable (V9f) | -0.050 | 0.058 | -0.045 |
| Risk scale | 0.043 | 0.082 | 0.028 |
| Temporal distance scale | 0.023 | 0.036 | 0.032 |
| Vulnerable to CWD outcomes scale | 0.019 | 0.042 | 0.025 |
| **Perceived severity of CWD scale** | 0.098* | 0.046 | 0.112 |
| **Trust in DEC scale** | 0.123** | 0.041 | 0.156 |
| Hunted deer, elk outside NYS in last 5 years | -0.021 | 0.035 | -0.030 |
| Perceived effectiveness of ban in keeping CWD out | 0.040 | 0.046 | 0.043 |
| Constant | 0.479 | 0.440 | |
| F(13,381) = 3.76 | | | |
| $r^2$ = 0.114 | | | |
| adj. $r^2$ = 0.084 | | | |
| P <0.001 | | | |

*p< .05; **p< .01; ***p< .001

**Intention to Use Natural Scent Lures**

Independent variables in the PMT model explained about 16% of the variance in intention to use natural scent lures. Perceived severity of CWD effects and perceived response efficacy were significant predictor variables; perceived response efficacy was the strongest predictor in the PMT model (Table 21). Adding behavioral variables allowed us to explain about 62% of the variance in intention to use natural scent lures. Perceived response efficacy, bowhunting, and past use of natural scent lures were significant predictor variables in the combined model; past use of natural scent lures was the strongest predictor in the combined model (Table 21).

**Table 21.** Summary of linear regression of intention to use natural scent lures when hunting among active deer hunters, with Protection Motivation Theory (PMT) and past behavior as predictor variables.

| Independent variables | PMT model | | | PMT & Behaviors model | | |
|---|---|---|---|---|---|---|
| | *β* | *SE* | Std *β* | *B* | *SE* | Std *β* |
| Vulnerability to CWD | -0.017 | 0.053 | -0.018 | -0.009 | 0.037 | |
| Severity of CWD | **0.130*** | 0.063 | 0.118 | 0.065 | 0.043 | |
| Response efficacy[1] | **-0.550***** | 0.073 | -0.423 | **-0.283***** | 0.053 | |
| Bowhunter (1=yes) | --- | --- | --- | **0.232*** | 0.113 | |
| Used natural scent lures In past 5 years | --- | --- | --- | **0.523***** | 0.030 | |
| Constant | 3.69 | 0.185 | | 2.368 | 0.155 | |
| | F(3, 286)=19.68 | | | F(5, 276)=90.48 | | |
| | $R^2$=0.171 | | | $R^2$=0.621 | | |
| | Adjusted $R^2$=0.162 | | | Adjusted $R^2$=0.614 | | |
| | P<0.001 | | | P<0.001 | | |

*P<0.05, **P<0.01, ***P≤0.001

[1]Perceived effectiveness of avoiding use of natural scent lures in keeping CWD outside New York. Response options 1=not at all effective, 2=slightly effective, 3=moderately effective, 4=very effective, 5=unsure; hunters who responded “unsure” were not included in this analysis.

**Intention to Dispose of Deer Carcass in Trash/Landfill**

Independent variables in the PMT model explained about 37% of the variance in intention to dispose of a deer carcass in the trash or a landfill. Response and self efficacy were the only significant predictor variables in the PMT model; perceived self efficacy was the strongest predictor in the PMT model (Table 22). Adding behavioral variables allowed us to explain about 55% of the variance in intention to dispose of a deer carcass in the trash. Response and self efficacy, and past disposal of a deer carcass in the trash were significant predictor variables in the combined model; having disposed of a deer carcass in the trash/landfill was the strongest predictor of intention to dispose of a deer carcass in the trash/landfill in the future (Table 22).

## DISCUSSION

This publication documents findings from a survey of deer hunters in New York. The survey provides a snapshot of hunters' CWD-related beliefs, attitudes, and practices in 2019. Data from this survey address information needs identified in an interagency CWD risk minimization plan (DEC 2018). Insights from this study can be used by DEC in ongoing efforts to inform and educate a key audience—deer hunters—about CWD risks and risk minimization actions.

Our first research objective was to assess the degree to which hunters practice behaviors that DEC recommends to keep CWD out of New York. Although DEC recommends that hunters dispose of their deer carcass in municipal trash pickup or directly in a landfill (to minimize potential for spread of potentially infectious material on the landscape), survey results suggest that only a minority of hunters do so in New York. Many successful deer hunters leave their deer carcass with meat processors, who are required to dispose of deer carcasses properly, but a sizable subset of hunters leave their deer carcass on the landscape.

Survey results also suggest that a substantial minority of New York deer hunters, especially bowhunters, have used natural (deer urine-based) scent lures when hunting and intend to use them in the future. Some states and Canadian provinces have proposed restrictions on use of deer-urine based scent products as a precaution to mitigate the spread of CWD, but those efforts have met resistance from hunter organizations, scent manufacturers, and captive cervid owners (Song et al. 2019).

Our second and third study objectives were to characterize hunters' CWD-related beliefs and risk perceptions. We documented uncertainty among a substantial minority of New York deer hunters about the efficacy of actions recommended by DEC to reduce the risk that CWD will enter New York. Moreover, we found that many hunters are psychologically distant from the issue of CWD; they do not perceive themselves as currently affected by CWD and few believe they are highly likely to be affected by CWD in the near future. In other words, substantial numbers of active deer hunters in New York do not believe they will be negatively impacted by

**Table 22.** Summary of linear regression of intention to dispose of deer carcass in trash/landfill, with Protection Motivation Theory (PMT) and past behavior as predictor variables.

| Independent variables | PMT model | | | PMT & Behaviors model | | |
|---|---|---|---|---|---|---|
| | *β* | *SE* | Std *β* | *B* | *SE* | Std *β* |
| Vulnerability to CWD | 0.055 | 0.052 | 0.051 | 0.018 | 0.046 | 0.017 |
| Severity of CWD | 0.008 | 0.058 | 0.007 | 0.045 | 0.051 | 0.037 |
| Response efficacy[1] | **0.250*** ** | 0.074 | 0.173 | **0.171** ** | 0.065 | 0.118 |
| Self efficacy[2] | **0.310*** ** | 0.059 | 0.446 | **0.198*** ** | 0.052 | 0.285 |
| Response Cost[3] | 0.064 | 0.063 | 0.084 | 0.052 | 0.055 | 0.069 |
| Disposed of carcass In trash in past 5 years | --- | --- | --- | **0.446*** ** | 0.045 | 0.453 |
| Constant | 0.395 | 0.273 | | 0.691 | 0.238 | |
| | F(5,294)=36.46 | | | F(6,281)=58.51 | | |
| | $R^2$=0.383 | | | $R^2$=0.555 | | |
| | Adjusted $R^2$=0.372 | | | Adjusted $R^2$=0.546 | | |
| | P<0.001 | | | P<0.001 | | |

*P<0.05, **P<0.01, ***P≤0.001

[1]Perceived effectiveness of avoiding use of natural scent lures in keeping CWD outside New York. Response options 1=not at all effective, 2=slightly effective, 3=moderately effective, 4=very effective, 5=unsure; hunters who responded "unsure" were not included in this analysis.

[2]Response to statement, "Bagging leftover parts of my deer carcass and disposing of them in the trash or landfill is easy." Response options 1=strongly disagree, 4=neither, 7=strongly agree.

[3]Mean of response to two statements, "Bagging leftover parts of my deer carcass and disposing of them in the trash or landfill is (1) inexpensive, (2) convenient. Response options 1=strongly disagree, 4=neither, 7=strongly agree.

CWD (low threat appraisal) and don't believe recommended behaviors to prevent re-entry of CWD into New York will work (low coping appraisal). Many of those who did not dispose of their deer carcass in the trash or a landfill perceived that action as being personally costly (low coping appraisal). PMT predicts hunters with these beliefs are unlikely to adopt recommended CWD risk-minimization behaviors.

Many respondents expressed uncertainty in their beliefs and perceptions about CWD. Hunter uncertainty about CWD has also been documented in recent study of Minnesota deer hunters. Schroeder et al. (2019) found that deer hunters who hunted in or near a CWD management zone in southeastern Minnesota rated their feelings of uncertainty about CWD higher than they rated their feelings of worry or anger about CWD.

We designed this study to explore whether intentions to use natural deer scent lures, or dispose of deer carcasses in trash pickup or landfills could be explained by CWD threat appraisal and coping appraisal. Perceived severity of CWD effects explained part of the variance in intentions to use natural scent lures, providing some evidence of a link between threat appraisal and behavioral intention. Response efficacy explained part of the variance in intentions to use natural scent lures, and response and self efficacy explained part of the variance in carcass disposal intentions. These findings providing some evidence of a link between coping appraisal and behavioral intention. It was not surprising that the strongest predictor of behavioral intention was past behavior. A strong linkage between past behavior and future behavior is observed frequently by social scientists and is typically regarded as a confirmation of behavioral stability rather than an explanation of why a behavior occurs (Ajzen 1991, Quellette and Wood 1998).

We also designed this study to explore whether attitudes toward a ban on import of whole deer carcasses could be explained by CWD threat appraisal and coping appraisal. Although we found that CWD-related risk perceptions and perceived severity of CWD-related effects were significant predictors of attitude toward the ban, our predictive models were weak. The low predictive power of our models of attitude toward the carcass import ban may have resulted from any one of several factors: the high proportion of respondents who expressed uncertainty in their beliefs and perceptions about CWD, measurement error, or the absence of important explanatory variables in the model.

Finally, we designed the study to explore two research questions on social trust. Our findings provide evidence that hunters with high levels of trust in DEC's ability to manage CWD also had high sense of response efficacy for the preventive actions recommended by DEC. We also found that hunters who trust in DEC's ability to manage CWD risks were more likely to have favorable attitudes toward DECs prohibition on import of whole deer carcasses. These findings are

consistent with previous research on social trust and public acceptance of natural resource management actions (Harper et al. (2015).

## Conclusions

Persuading more hunters to dispose of deer carcasses in the trash or a landfill, and to avoid use of natural scent lures when hunting, will be challenging in the context of current hunter beliefs and behavioral patterns. Given these results, communication which elevates a sense of vulnerability to negative outcomes from CWD, or increases perceived response efficacy for CWD risk minimization actions, may be effective ways to increase adoption of protective behaviors recommended by DEC.

We found that a majority of active deer hunters held positive views toward the whole deer carcass import ban and many thought it was an effective way to keep CWD outside New York. Although a majority of active deer hunters never hunt deer outside New York and would not be directly affected by that regulation, there appears to be broad support for the regulation among active deer hunters. Messages communicating our finding that 1 in 5 respondents had hunted cervids outside New York within the preceding 5 years could give active hunters a more accurate perception of the need to minimize the risk that CWD will be brought into New York by hunters who take a deer out of state.

## Study Limitations and Future Research

This study had limitations that should be addressed in future studies focused on CWD risk minimization in New York. First, the low response rate to this survey raises some concerns about using the results to make general statements about hunter subgroups of interest (e.g., active hunters who do vs. do not take recommended CWD risk-minimization actions). The relatively low response to this survey may have occurred due to low salience of the survey topic (CWD risk management) among New York State deer hunters. It may also stem from the relative complexity of the survey instrument (e.g., 7-point response scales, inclusion of semantic differential items, questions about risks that may seem hypothetical to the respondent). Important similarities between respondents and nonrespondents (Appendix B) provide some reassurance that the findings of this study are robust enough to make broad statements about New York State deer hunters. But differences between respondents and nonrespondents raise the possibility that the true level of concern about CWD, and that confidence in avoiding natural scent lures and disposing of deer carcasses as preventive measures, may all be lower than we estimated. Additional research is needed to increase confidence in statements about these topics, and to increase understanding of the perceptions and actions of specific hunter subgroups, such as those who leave New York to hunt deer.

We also had methodological limitations that should be addressed in future research. We had 4 study objectives, the order of which reflected their importance to the study contact team. Our top priorities were documenting the rate of hunter participation in CWD risk-minimization behaviors and understanding current risk perceptions (i.e., understanding factors that comprise protection motivation theory). The final objective (i.e., understanding why hunters practice risk-minimization behaviors) was the lowest priority, and given space limitations, received minimal treatment in the survey instrument. We could have learned more about the factors that drive decisions about preventive actions had we devoted more space to this objective in the instrument. For example, we could have explored additional concepts (e.g., internal and external behavioral rewards) or developed multiple indicators instead of single indicators of response and self efficacy. Additional research will be needed to provide deeper understanding of why hunters do or do not practice prevention recommendations. Qualitative studies would be especially valuable to develop testable hypotheses about the drivers of CWD risk-minimization behaviors.

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## APPENDIX A: STUDY QUESTIONNAIRE

# Deer Hunting and

# Chronic Wasting Disease (CWD):

## Hunters' Views and Behaviors

Research conducted for the

NYS Department of Environmental Conservation

Division of Fish and Wildlife

by the

Center for Conservation Social Sciences

Department of Natural Resources, Cornell University

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 and subsequently in two white-tailed deer nearby. Intensive annual surveillance has not identified any new cases in that area or in the rest of the state.

The New York State Department of Environmental Conservation (DEC) is sponsoring this survey to learn more about hunters' views and behaviors related to CWD. Information gathered in this study will help DEC to improve communication with hunters about CWD.

We would like input from EVERYONE who receives this questionnaire, not just those who have strong opinions about deer hunting or CWD. We want the results of the survey to reflect the perspectives of all deer hunters across the state.

Please complete this questionnaire as soon as you can, seal it with the white re-sealable label provided, and drop it in any mailbox; ***return postage has been pre-paid***. Your identity will be kept confidential and the information you give us will never be associated with your name.

**THANK YOU FOR YOUR HELP!**

## PART I: YOUR DEER HUNTING

**1. Have you gone afield to hunt deer in New York State at least once during the last 5 years?** *(Circle one number.)*

1 No → → IF NO, SKIP TO QUESTION 4

2 Yes → → CONTINUE TO NEXT QUESTION

**2. Over the last 5 years, in how many different years have you done the following things <u>within New York State</u>?** *(Please circle one number per line.)*

| **<u>In New York</u>, how many different years have you…** | Number of years (0=none, 5=all years) | | | | | |
|---|---|---|---|---|---|---|
| a. Shot a deer | 0 | 1 | 2 | 3 | 4 | 5 |
| b. Took my meat to a processor | 0 | 1 | 2 | 3 | 4 | 5 |
| c. Took my deer to a taxidermist | 0 | 1 | 2 | 3 | 4 | 5 |
| d. Disposed of my deer carcass in the trash or a landfill | 0 | 1 | 2 | 3 | 4 | 5 |
| e. Disposed of the deer carcass on my own land | 0 | 1 | 2 | 3 | 4 | 5 |
| f. Disposed of the deer carcass on land that I hunt, but do not own | 0 | 1 | 2 | 3 | 4 | 5 |
| g. Shot white-tailed or mule deer or elk in a high-fence preserve | 0 | 1 | 2 | 3 | 4 | 5 |
| h. Used a natural (deer urine-based) lure when deer hunting | 0 | 1 | 2 | 3 | 4 | 5 |

3. **Over the last 5 years, how many <u>days per year</u> did you typically hunt during the following seasons in New York?** *(Circle one answer per line.)*

| **Deer hunting seasons** | Number of days you hunted in NY | | | |
|---|---|---|---|---|
| a. Archery | 0 | 1-2 | 3-7 | 8+ |
| b. Regular firearms | 0 | 1-2 | 3-7 | 8+ |
| c. Muzzleloader | 0 | 1-2 | 3-7 | 8+ |

4. **Over the last 5 years, in how many different years have you done the following things in states <u>other than</u> New York?** *(Please circle one number per line.)*

| **In how many different years have gone <u>OUTSIDE</u> New York and…** | Number of years (0=none, 5=all years) | | | | | |
|---|---|---|---|---|---|---|
| a. Hunted white-tailed or mule deer or elk | 0 | 1 | 2 | 3 | 4 | 5 |
| b. Killed white-tailed or mule deer or elk | 0 | 1 | 2 | 3 | 4 | 5 |
| c. Hunted white-tailed or mule deer or elk in a county where CWD had been detected | 0 | 1 | 2 | 3 | 4 | 5 |
| d. Shot white-tailed or mule deer or elk in a high-fence preserve | 0 | 1 | 2 | 3 | 4 | 5 |
| e. Brought a whole white-tailed or mule deer or elk carcass back into New York State | 0 | 1 | 2 | 3 | 4 | 5 |

**5. How likely are you to take the following actions within the next 3 years?** *(Circle one number.)*

| | Definitely will not | Probably will not | Might or might not | Probably will | Definitely will |
|---|---|---|---|---|---|
| a. Use natural deer urine-based scent lures when deer hunting | 1 | 2 | 3 | 4 | 5 |
| b. Bag all leftover parts of my deer carcass and dispose of them in the trash or a landfill | 1 | 2 | 3 | 4 | 5 |
| c. Debone my deer carcass before transport | 1 | 2 | 3 | 4 | 5 |

**6. Please indicate how much you agree or disagree with the following statements about disposing of deer parts.** *(Circle one number for each item.)*

| **Bagging all leftover parts of my deer carcass and disposing of them in the trash or a landfill is …** | Strongly Disagree | Moderately Disagree | Slightly Disagree | Neither | Slightly agree | Moderately agree | Strongly agree |
|---|---|---|---|---|---|---|---|
| a. Easy for me to do | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Inexpensive | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Convenient | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. Time consuming | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| e. Something I already do | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## PART II: YOUR VIEWS RELATED TO CWD

**7. How unlikely or likely do you think it is that the following events will occur in NY State <u>within the next 5 years</u>?** *(Circle one number per line.)*

| **How likely is it that CWD will be discovered…** | Very unlikely | Moderately unlikely | Slightly unlikely | Neither | Slightly likely | Moderately likely | Very |
|---|---|---|---|---|---|---|---|
| a. In a free-ranging deer <u>somewhere</u> in NY | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. In a free-ranging deer in an area of NY <u>where I hunt</u> | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. In a captive deer facility (e.g., deer farm) in NY | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**8. People have different levels of concern about CWD. How much concern would <u>you</u> have about the following possibilities?** *(Circle one number for each concern.)*

| | Not at all concerned | Not too concerned | Somewhat concerned | Very concerned |
|---|---|---|---|---|
| a. Eating venison from a free-ranging deer in New York that was not tested for CWD | 1 | 2 | 3 | 4 |
| b. Eating venison from a free-ranging deer that tested positive for CWD | 1 | 2 | 3 | 4 |
| c. Becoming ill from CWD | 1 | 2 | 3 | 4 |

**9. How would you describe the risks associated with CWD?** *(Circle one number between each word pair.)*

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Neither | | | |
| Controllable | 1 | 2 | 3 | 4 | 5 | Uncontrollable |
| Increasing | 1 | 2 | 3 | 4 | 5 | Decreasing |
| Dreadful | 1 | 2 | 3 | 4 | 5 | Not dreadful |
| Immediate effects | 1 | 2 | 3 | 4 | 5 | Delayed effects |
| Unknown to science | 1 | 2 | 3 | 4 | 5 | Known to science |
| Observable | 1 | 2 | 3 | 4 | 5 | Unobservable |

**10. How much do you agree or disagree with the following statements about the potential consequences if CWD re-enters and spreads across NY State?** *(Circle one number for each item.)*

| **Spread of CWD in NY would …** | Strongly Disagree | Moderately Disagree | Slightly Disagree | Neither | Slightly agree | Moderately agree | Strongly agree |
|---|---|---|---|---|---|---|---|
| a. Eventually lead to a significant decline in deer population | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Negatively impact hunting traditions | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Lead to a reduction in dollars spent by deer hunters | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. Divert DEC resources from other important wildlife conservation work | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| e. Cause me to stop hunting deer in NY | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**11. How effective do you believe the following actions will be in keeping CWD out of NY State?** *(Circle one number per line.)*

| | Not At All effective | Slightly effective | Moderately effective | Very effective | Unsure |
|---|---|---|---|---|---|
| a. Disposing of my deer carcass in the trash or a landfill | 1 | 2 | 3 | 4 | 5 |
| b. Strictly avoiding use of natural urine-based scent as lures when I hunt deer | 1 | 2 | 3 | 4 | 5 |
| c. Bringing home only deboned meat, clean capes or skull caps if I take a deer outside NY | 1 | 2 | 3 | 4 | 5 |

**12. Given whatever concerns you have about CWD, indicate your level of agreement with the following statements.**

| | Strongly Disagree | Moderately Disagree | Slightly Disagree | Neither | Slightly agree | Moderately agree | Strongly agree |
|---|---|---|---|---|---|---|---|
| a. My local area is affected by CWD. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. CWD mostly affects areas that are far away from where I live | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c.CWD has effects on people I know. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. CWD mostly affects people I don't know. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| e. I'm unlikely to be affected by CWD in the near future. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| f. I'm unlikely ever to be affected by CWD. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**13. DEC prohibits hunters from importing a whole deer carcass from <u>certain</u> states and provinces** (and has proposed expanding the prohibition to include all jurisdictions outside of New York). C**ircle the number between each word pair that best describes your views on that DEC regulation.** *(Circle one number per line.)*

| | Very | Somewhat | Neither /nor | Somewhat | Very | |
|---|---|---|---|---|---|---|
| Bad | 1 | 2 | 3 | 4 | 5 | Good |
| Wise | 1 | 2 | 3 | 4 | 5 | Foolish |
| Unfavorable | 1 | 2 | 3 | 4 | 5 | Favorable |
| Positive | 1 | 2 | 3 | 4 | 5 | Negative |
| Undesirable | 1 | 2 | 3 | 4 | 5 | Desirable |
| Safe | 1 | 2 | 3 | 4 | 5 | Dangerous |
| Necessary | 1 | 2 | 3 | 4 | 5 | Unnecessary |

**14. How much do you agree or disagree with the following statements about DEC.** *(Circle one number for each item.)*

| **I trust the NYS Dept. of Environmental Conservation to…** | Strongly Disagree | Moderately Disagree | Slightly Disagree | Neither | Slightly agree | Moderately agree | Strongly agree |
|---|---|---|---|---|---|---|---|
| a. Make good deer management decisions regarding CWD issues | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Follow the best available science in managing CWD | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Properly address CWD in NY | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## PART IV: BACKGROUND INFORMATION

**15. What is the highest level of school you have completed?** *(Circle one number.)*

1 Grade 8 or lower
2 Some high school, no diploma
3 High school diploma or equivalent
4 Some college, no degree
5 Associate degree
6 Bachelor's degree
7 Masters, professional, or PhD

**16. In what year were you born?** *(Fill in the year.)* _____

**17. How much do you trust the following entities to provide accurate information about the risks of CWD?** *(Circle one number for each line.)*

| | Do not trust at all | Trust a little | Trust somewhat | Trust a lot | Trust completely |
|---|---|---|---|---|---|
| a. NYS Dept. of Environ. Conservation (DEC) | 1 | 2 | 3 | 4 | 5 |
| b. NYS Dept. of Agriculture and Markets | 1 | 2 | 3 | 4 | 5 |
| c. NYS Dept. of Health | 1 | 2 | 3 | 4 | 5 |
| d. National deer hunting organizations (QDMA, National Deer Alliance) | 1 | 2 | 3 | 4 | 5 |
| e. North American Deer Farmers Association | 1 | 2 | 3 | 4 | 5 |
| f. Centers for Disease Control (CDC) | 1 | 2 | 3 | 4 | 5 |
| g. Celebrity hunters | 1 | 2 | 3 | 4 | 5 |

***THANK YOU FOR YOUR INPUT!***

# APPENDIX B: RESPONDENT-NONRESPONDENT COMPARISONS

**Table B1.** Comparison of respondents to nonrespondents on participation in deer hunting in last 5 years.

| | Respondents (n) % | Nonrespondents (n) % | $\chi^2$ | df | P value |
|---|---|---|---|---|---|
| Hunted 1 or more days in last 5 years | (478) 85.1 | (66) 88.0 | 0.288 | 1 | 0.591 |
| Hunted no days in last 5 years | (84) 14.9 | (9) 12.0 | | | |
| Total | (562) 100.0 | (75) 100.0 | | | |

**Table B2.** Percentage of hunters who had taken deer hunting behaviors in the last 5 years (includes only respondents who indicated that they had hunted deer in the last 5 years).

| Behavior taken 1 or more times in last 5 years | | Resp (n) % | Nonresp (n) % | $\chi^2$ | df | P value |
|---|---|---|---|---|---|---|
| Took my [deer] meat to a processor | Yes | (250) 53.3 | (23) 34.8 | 7.886 | 1 | **0.004** |
| | No | (219) 46.7 | (43) 65.2 | | | |
| Used a natural (deer urine-based) lure when deer hunting | Yes | (164) 35.2 | (21) 31.8 | 0.290 | 1 | 0.590 |
| | No | (302) 64.8 | (45) 68.2 | | | |
| Disposed of my deer carcass in the trash or a landfill | Yes | (116) 25.1 | (20) 30.8 | 0.953 | 1 | 0.328 |
| | No | (346) 74.9 | (45) 69.2 | | | |

**Table B3.** Percentage of hunters who had taken deer hunting behaviors outside New York in the last 5 years.

| | | Resp | Nonresp | $\chi^2$ | df | P value |
|---|---|---|---|---|---|---|
| Behavior taken 1 or more times in last 5 years | | (n)<br>% | (n)<br>% | | | |
| Hunted deer or elk outside New York | Yes | (104)<br>19.9 | (9)<br>12.0 | 2.661 | 1 | 0.102 |
| | No | (419)<br>80.1 | (66)<br>88.0 | | | |
| Hunted deer or elk outside New York in a CWD positive areas | Yes | (24)<br>4.7 | (1)<br>1.4 | 1.657 | 1 | 0.197 |
| | No | (491)<br>95.3 | (71)<br>98.6 | | | |

**Table B4.** Comparision of yearborn, respondents and nonrespondents.

| | n | $\bar{X}$ | SD | t | P value |
|---|---|---|---|---|---|
| | | Year born (age in years) | | | |
| **All** | | | | | |
| Nonrespondents | 75 | 1970.9 (48 years old) | 16.89 | 4.91 | <0.001 |
| Respondents | 543 | 1960.7 (58 years old) | 16.06 | | |
| **Active hunters only** | | | | | |
| Nonrespondents | 66 | 1973.6 (45 years old) | 15.55 | 5.49 | <0.001 |
| Respondents | 468 | 1962.3 (57 years old) | 15.78 | | |

**Table B5.** Comparison of respondents to nonrespondents on whether they had shot a deer in the last 5 years (includes only respondents who indicated that they had hunted deer in the last 5 years).

| Number of deer shot in last 5 years | Respondents (n) % | Nonrespondents (n) % | $\chi^2$ | df | P value |
|---|---|---|---|---|---|
| None | (62) 13.1 | (16) 24.6 | 6.185 | 1 | **0.012** |
| 1 or more | (413) 86.9 | (49) 75.4 | | | |
| Total | (475) 100.0 | (65) 100.0 | | | |

**Table B6.** Comparison of respondents to nonrespondents on whether they believed disposing of their deer carcass in the trash or landfill would be effective in keeping CWD outside New York (includes only respondents who indicated that they had hunted deer in the last 5 years).

| Perceived effectiveness | Respondents (n) % | Nonrespondents (n) % | $\chi^2$ | df | P value |
|---|---|---|---|---|---|
| Not/slightly effective | (141) 31.6 | (19) 28.8 | 9.724 | 2 | **0.007** |
| Moderately/very effective | (178) 39.7 | (16) 24.2 | | | |
| Unsure | (130) 29.0 | (31) 47.0 | | | |
| Total | (449) 100.0 | (66) 100.0 | | | |

**Table B7.** Comparison of respondents to nonrespondents on whether they believed avoiding use of natural deer scent lures when they hunt deer would be effective in keeping CWD outside New York (includes only respondents who indicated that they had hunted deer in the last 5 years).

| Perceived effectiveness | Respondents (n) % | Nonrespondents (n) % | $\chi^2$ | df | P value |
|---|---|---|---|---|---|
| Not/slightly effective | (169) 37.4 | (23) 35.4 | 7.463 | 2 | **0.023** |
| Moderately/very effective | (129) 28.6 | (10) 15.4 | | | |
| Unsure | (153) 33.9 | (32) 49.2 | | | |
| Total | (451) 100.0 | (65) 100.0 | | | |

**Table B8.** Comparison of respondents to nonrespondents on whether they agreed that bagging leftover parts of a deer carcass and disposing of them in the trash or a landfill is easy for them to do (Note: includes only respondents who indicated that they had hunted deer in the last 5 years, and had taken a deer in New York State in the last 5 years).

| Easy for me to do | Respondents (n) % | Nonrespondents (n) % | $\chi^2$ | df | P value |
|---|---|---|---|---|---|
| Slightly-Strongly agree | (146) 36.3 | (17) 35.4 | 3.781 | 2 | 0.150 |
| Neither | (75) 18.7 | (4) 8.3 | | | |
| Slightly-Strongly disagree | (181) 45.0 | (27) 56.2 | | | |
| Total | (402) 100.0 | (48) 100.0 | | | |

**Table B9.** Comparison of respondents to nonrespondents on whether they agreed that bagging leftover parts of a deer carcass and disposing of them in the trash or a landfill is something they already do (Note: includes only respondents who indicated that they had hunted deer in the last 5 years, and had taken a deer in New York State in the last 5 years).

| Something I already do | Respondents (n) % | Nonrespondents (n) % | $\chi^2$ | df | P value |
|---|---|---|---|---|---|
| Slightly-Strongly agree | (186) 46.5 | (31) 63.3 | 7.979 | 2 | **0.018** |
| Neither | (88) 22.0 | (3) 6.1 | | | |
| Slightly-Strongly disagree | (126) 31.5 | (15) 30.6 | | | |
| Total | (400) 100.0 | (49) 100.0 | | | |

**Table B10.** Comparison of respondents to nonrespondents on mean values for multiple variables (Note: includes only respondents who indicated that they had hunted deer in the last 5 years).

| | Respondents | | | Nonrespondents | | | | |
|---|---|---|---|---|---|---|---|---|
| | n | M | SD | n | M | SD | t | P value |
| Likelihood CWD will be discovered in free-ranging deer somewhere in NY | 464 | 4.44[a] | 1.792 | 65 | 4.37[a] | 2.028 | 0.264 | 0.792 |
| Level of concern about eating venison from deer in NY that had not been tested for CWD | 468 | 2.09[b] | 0.952 | 66 | 1.73[b] | 0.869 | 3.111 | **0.002** |
| Attitude toward deer carcass import ban: unfavorable or favorable | 436 | 3.70[c] | 1.248 | 66 | 3.45[c] | 1.291 | 1.472 | 0.144 |
| Attitude toward deer carcass import ban: Positive or negative | 433 | 2.29[d] | 1.293 | 65 | 2.68[d] | 1.312 | 2.238 | **0.028** |
| Trust DEC to make deer management decisions regarding CWD issues | 452 | 5.54[e] | 1.619 | 66 | 5.58[e] | 1.755 | 0.174 | 0.861 |

[a] Response options 1=very unlikely, 2=moderately unlikely, 3 slightly unlikely, 4=neither, 5=slightly likely, 6=moderately likely, 7=very likely

[b] Response options 1=not at all concerned, 2=slightly concerned, 3=moderately concerned, 4=very concerned

[c] Response options 1=very unfavorable, 2=somewhat unfavorable, 3=neither, 4=somewhat favorable, 5=very favorable

[d] Response options 1=very positive, 2=somewhat positive, 3=neither, 4=somewhat negative, 5=very negative

[e] Response options 1=strongly disagree, 2=moderately disagree, 3=slightly disagree, 4=neither, 5=slightly agree, 6=moderately agree, 7=strongly agree