

THE ROLE OF RISK PERCEPTIONS IN HUNTER SUPPORT FOR DEER DENSITY
REDUCTION AS A CHRONIC WASTING DISEASE (CWD)
MANAGEMENT STRATEGY IN WISCONSIN

By

Erin E. Cooney

A Thesis

Submitted in partial fulfillment of the requirements of the degree

MASTER OF SCIENCE

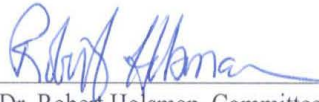
IN

NATURAL RESOURCES (WILDLIFE)

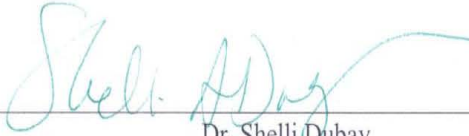
College of Natural Resources
UNIVERSITY OF WISCONSIN
Stevens Point, Wisconsin

May 2008

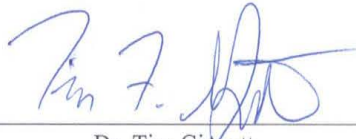
APPROVED BY THE GRADUATE COMMITTEE OF:



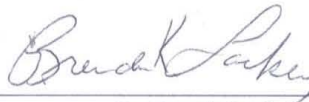
Dr. Robert Holsman, Committee Chairman
Assistant Professor of Wildlife
University of Wisconsin – Stevens Point



Dr. Shelli Dubay
Assistant Professor of Wildlife
University of Wisconsin – Stevens Point



Dr. Tim Gimnett
Associate Professor of Wildlife
University of Wisconsin – Stevens Point



Dr. Brenda Lackey
Assistant Professor of Environmental Education and Interpretation
University of Wisconsin – Stevens Point

ACKNOWLEDGMENTS

I thank my advisor, Dr. Robert Holsman, for giving me the opportunity to pursue a Master's of Science degree and for advice, encouragement, guidance, and critical review of this manuscript. The knowledge and training I received while under your supervision is priceless. I leave graduate school knowing that I possess the tools to be an effective natural resource manager for I have now been to “the dark side.”

The Wisconsin Department of Natural Resources was the primary funding source for this research project. I thank Alan Crossley, Jordan Petchenik, Robert Rolley, Brian Dhuey, and Gerald Bartelt for their assistance in obtaining important data and documents, and providing feedback on presentations and reports throughout this process.

I thank Dr. Shelli Dubay, Dr. Tim Ginnett, and Dr. Brenda Lackey for agreeing to serve on my committee and teach and mentor me through this process. I thank all the undergraduate and graduate students that took time from their busy schedules to stuff hundreds of envelopes for a couple slices of pizza. I thank Kristina Artner and Mandie Cyr for their dedication to the daunting task of entering data from over 700 surveys.

To my office mates—ladies of CNR 315—graduate school would not have been the same without the three of you. Special thanks to Janet King and Leslie Adams for formatting and editing assistance during the final stages of preparation of this manuscript. Thanks to my fellow graduate students for introducing me to the marathon. Lastly, but certainly not least, I thank my family, boyfriend, and friends for their continual support, encouragement, listening ears, and advice throughout my academic career.

FOREWORD

My thesis is written in 2 chapters and each will be submitted to different journals for publication. Stylistic formatting follows guidelines for the Journal of Wildlife Management and Human Dimensions of Wildlife. Duplication of figures and material in the Introduction, Study Area, Methods, Analysis, and Results is intentional.

TABLE OF CONTENTS

ACKNOWLEDGMENTS iii
FOREWORD iv
LIST OF TABLES vii
LIST OF FIGURES viii
LIST OF APPENDICES ix
PREFACE x
LITERATURE CITED xi

CHAPTER 1: HUNTER RISK PERCEPTIONS AND SALIENT BELIEFS ABOUT
CHRONIC WASTING DISEASE (CWD) IN WISCONSIN 1

ABSTRACT 1
INTRODUCTION 2
 Risk Perceptions 3
 CWD and Other Relevant Research 4
 The Role of Experience 6
STUDY AREA 8
METHODS 9
 Survey Administration 9
 Sampling 9
 Variables Used 10
ANALYSIS 11
RESULTS 13
 Survey Response 13
 Experience 14
 Salient Beliefs 14
 Risk Perception Index (RPI) 15
DISCUSSION 16
 Hunter Risk Perceptions 16
 The Role of Experience 20
MANAGEMENT IMPLICATIONS 22
SUMMARY 23
LITERATURE CITED 24

CHAPTER 2: INFLUENCES ON HUNTER SUPPORT FOR DEER HERD REDUCTION
AS A CHRONIC WASTING DISEASE (CWD) MANAGEMENT STRATEGY 35

ABSTRACT 35
INTRODUCTION 36
 Risk Perceptions 38
 Support: Eradication & Herd Reduction 39
 The Model 42
STUDY AREA 43

METHODS	43
Survey administration	43
Sampling	44
Measurement of Variables	45
ANALYSIS	46
RESULTS	48
Survey Response.....	48
The Model.....	49
DISCUSSION	51
MANAGEMENT IMPLICATIONS	53
SUMMARY	55
LITERATURE CITED	56

LIST OF TABLES

CHAPTER 1

Table 1. Theme categories for the open-ended word association, sample responses, and response frequency (%) for disease eradication zone (DEZ) hunters, Wisconsin, 2006.....	30
Table 2. Principle Component Analysis (PCA) factor loadings with one component extraction and Cronbach alpha test of reliability (α) results for disease eradication zone (DEZ) hunters, Wisconsin, 2006	31
Table 3. Descriptive statistics (\bar{x} , SD, mode) for the six risk concern questions in order of highest concern to lowest concern for disease eradication zone (DEZ) hunters, Wisconsin, 2006.....	32
Table 4. Theme categories and corresponding mean Risk Perception Index (RPI) scores (\bar{x}) out of 30 with standard deviation (SD) for disease eradication zone (DEZ) hunters, Wisconsin, 2006. Scores are ranked from highest concern to lowest concern.....	33

CHAPTER 2

Table 1. Variables included in the measurement model with their corresponding measurement question from the 2006 deer hunter opinion questionnaire	59
Table 2. Descriptive statistics (\bar{x} , SD, mode) for the 6 risk concern questions used to measure the 2 latent risk variables (Riskspd and Riskimp) and the 4 measures of Efficacy based on responses from 655 survey respondents.....	60
Table 3. Principle Component Analysis (PCA) factor loadings with one component extraction and Cronbach alpha test of reliability (α) results for the initial model.....	61
Table 4. Mean (\bar{x}), standard deviation (SD), variance inflation factors (VIF), and zero order correlations of variables included in path analysis. Responses are from 655 respondents prior to recoding of variables.....	62
Table 5. Goodness-of-fit indices of global model fit from path analysis output for the initial model and model 2	63
Table 6. Direct, indirect, and total effects of independent variables on the dependent variables generated from path analysis for model 2	64
Table 7. Original and bias-corrected bootstrapped path coefficients (β) for model 2	65

LIST OF FIGURES

CHAPTER 1

Figure 1. Boundaries for the 2006 herd reduction zone (HRZ), western disease eradication zone (DEZ), and eastern disease eradication zone (EDEZ) in southern Wisconsin. The study area (DEZ) was 331,767.2 ha (1,281 sq. mi.) during the 2006 deer hunting season (Wisconsin Department of Natural Resources 2006).....34

CHAPTER 2

Figure 1. Initial model depicting influence of several independent observed (squares) and latent (circles) variables on support for deer herd reduction (Goal). Diagram as drawn for input into AMOS 16.0 for evaluation using path analysis66

Figure 2. Cognitive hierarchy showing the relationship between concepts involved in thought and action eventually leading to the explanation of behavior (Decker et al., 2001)67

Figure 3. Boundaries for the 2006 herd reduction zone (HRZ), western disease eradication zone (DEZ) and eastern disease eradication zone (EDEZ) in southern Wisconsin. The study area (DEZ) was 331,767.2 ha (1,281 sq. mi.) during the 2006 deer hunting season (Wisconsin Department of Natural Resources, 2006).....68

Figure 4. Model 2 depicting influence of several independent observed (squares) and latent (circles) variables on support for deer herd reduction (Goal) as revised from the initial model. Diagram as drawn for input into AMOS 16.0 for evaluation using path analysis69

Figure 5. Model 2 path analysis results showing path coefficients (β) and R² values for the dependent variables Neces and Goal70

LIST OF APPENDICES

Appendix A. 2006 Disease Eradication Zone (DEZ) Hunter Opinion Questionnaire.....	71
Appendix B. Open-ended word association responses from disease eradication zone (DEZ) hunters that responded to the 2006 opinion questionnaire	86

PREFACE

On February 28, 2002, scientists made a discovery in southern Wisconsin that would have a profound impact on the hunting culture in the state. Three male white-tailed deer (*Odocoileus virginianus*) harvested in Dane County, Wisconsin tested positive for chronic wasting disease (CWD), a transmissible spongiform encephalopathy (TSE). First identified in mule deer (*O. hemionus*) in a wildlife research facility in Colorado in 1967, CWD has since been identified in free-ranging and captive Rocky Mountain elk (*Cervus elaphus nelsoni*), mule deer, and white-tailed deer in at least 14 states, 2 provinces and South Korea (Mathiason et al. 2006, Williams et al. 2002). In 2005, CWD was found in a hunter harvested free-ranging moose in Colorado (*Alces alces*) (Colorado Division of Wildlife 2005).

TSEs are a group of diseases caused by abnormal, proteinaceous agents known as prions that form lesions on the brain and inevitably result in death (Williams and Barker 2001). Researchers have found that prions have the potential to persist in the environment for up to two years and can be transmitted through saliva, blood, placental fluid, feces and urine (Mathiason et al. 2006, Miller et al. 2000, Williams and Barker 2001). The potential ability for prions to persist in the environment allows for both direct and indirect transmission between and among susceptible cervid populations (Williams et al. 2002). To decrease direct and indirect contact with the disease, managers in states and provinces with CWD have designed management plans focused around reducing deer densities.

Following the lead of other states (i.e., CO, WY, SD) and provinces (i.e., Saskatchewan, Alberta) impacted by CWD, Wisconsin banned feeding and baiting of deer where CWD is present, initiated intense surveillance and testing programs, practiced random and selective culling and conducted hunter harvest-based surveys (Williams et al. 2002). In addition, Wisconsin created three disease management zones (Eastern Disease Eradication Zone, Western Disease Eradication Zone, and the Herd Reduction Zone). Of particular interest has been the western disease eradication zone (DEZ) which encompasses the core area where CWD was first discovered in the state. Within these three zones, Wisconsin wildlife managers set a goal of eradicating CWD from the deer herd. The goal within the boundaries of the DEZ is to reduce deer densities to 5-deer/square mile as a means of reducing the frequency of contacts between infected and susceptible deer.

Since the discovery of CWD in the state, the Wisconsin Department of Natural Resources (DNR) has asked deer hunters to reduce deer densities within the DEZ. In pursuit of this objective, gun season lengths were extended and liberal harvest quotas were employed to encourage hunters to harvest as many deer as possible. Unfortunately, recreational hunters have not significantly reduced deer densities (R. Rolley, Wisconsin Department of Natural Resources, unpublished data) within the DEZ despite extended season lengths and liberal harvest regulations. While managers continue to express concern over the potential risks and impacts of CWD, hunters express minimal concern over the potential risks posed to deer populations and humans from CWD and are more concerned about the future of deer hunting (Holsman 2005, Holsman and Petchenik 2006, Holsman and Smail 2006). The apparent lack of concern on the part of hunters for the presence of CWD in the state and reluctance to reduce deer densities has and will continue to have implications for the management of CWD in the state.

LITERATURE CITED

- Colorado Division of Wildlife. 2005. Hunter harvested moose tests positive for CWD. Colorado Division of Wildlife Press Release, 29 Sep, Denver, Colorado, USA.
- Holsman, R.H. 2005. Untangling the relationship between hunter effort and hunter harvest: results from the 2004 (year 2) study of deer hunters in Wisconsin's chronic wasting disease eradication zone. College of Natural Resources, University of Wisconsin, Stevens Point, Wisconsin, USA.
- Holsman, R.H. and J. Petchenik. 2006. Predicting deer hunter harvest in Wisconsin's chronic wasting disease eradication zone. *Human Dimensions of Wildlife* 11:177-189.
- Holsman, R.H. and R. A. Smail. 2006. Tracking DEZ deer hunters: A report of the hunter effort and attitudes for the 2005 deer hunting season with relevant three-year trends. College of Natural Resources, University of Wisconsin, Stevens Point, Wisconsin, USA.
- Mathiason, C.K., J.G. Powers, S.J. Dahmes, D.A. Osborn, K.V. Miller, R.J. Warren, G.L. Mason, S.A. Hays, J. Hayes-Klug, D.M. Seelig, M.A. Wild, L.L. Wolfe, T.R. Spraker, M.W. Miller, C.J. Sigurdson, G.C. Telling, and E.A. Hoover. 2006. Infectious prions in the saliva and blood of deer with chronic wasting disease. *Science* 314:133-135.
- Miller, M.W., E.S. Williams, C.W. McCarty, T.R. Spraker, T.J. Kreeger, C.T. Larsen, and E.T. Thorne. 2000. Epizootiology of chronic wasting disease in free-ranging cervids in Colorado and Wyoming. *Journal of Wildlife Diseases* 36:676-690.

Williams, E.S., and I.K. Barker. 2001. Infectious diseases of wild mammals. Third edition. Blackwell Publishing, Ames, Iowa, USA.

Williams, E.S., M.W. Miller, T.J Kreeger, R.H. Kahn, and E.T. Thorne. 2002. Chronic wasting disease of deer and elk: a review with recommendations for management. *Journal of Wildlife Management* 66:551-563

CHAPTER ONE

HUNTER RISK PERCEPTIONS AND SALIENT BELIEFS ABOUT CHRONIC WASTING DISEASE (CWD) IN WISCONSIN

ABSTRACT

Efforts to persuade deer hunters to participate in lowering deer densities in Wisconsin's chronic wasting disease (CWD) management zones have not been successful. As concern over the potential impacts of CWD has risen among managers, concern among hunters has remained stable or declined leading managers to question why hunters are not taking CWD more seriously. Using the continued word method, I asked western disease eradication zone (DEZ) hunters in an opinion questionnaire to provide the "first thought or image that comes to your mind when you hear the words Chronic Wasting Disease." I found that many hunters seem to accept CWD as part of nature. This belief was often held in conjunction with notions that Mother Nature can or should be allowed to take its course. Images related to the disease often focused on "sickly looking" individual deer rather than expressing concerns over the deer population. More respondents' comments discounted the seriousness of the disease, especially with respect to human health risks than those who expressed concern over the safety of consuming venison. The results of this study suggest that the use of recreational hunters to control CWD will continue to fail unless communication efforts change the beliefs of DEZ hunters. To do this, managers must alter their message to target the dominant beliefs of hunters towards CWD. However, this strategy is compromised by the uncertainty surrounding CWD transmission and ultimate impacts to deer populations.

INTRODUCTION

The emergence of infectious diseases in wildlife populations across North America poses several categories of potential risk. One, there are biological risks to populations of infected species from direct and indirect mortality. Two, there may be economic risks associated with declines in the quality of hunting and wildlife viewing opportunities as a consequence of lower populations. Three, public health risks associated with handling or consuming infected animal products may also be present, as well as threats to livestock and pets. Collectively, these risks provide the rationale for trying to control or eradicate diseases from wild animals rather than allowing the disease to take its natural course (Wobeser 2006).

Public support is an essential component of successful wildlife disease management (Decker et al. 2006, Dorn and Mertig 2005, Pfeiffer 2006). In the case of white-tailed deer (*Odocoileus virginianus*) populations, disease management strategies for white-tailed deer infected with bovine tuberculosis (TB) and chronic wasting disease (CWD) have attempted to reduce deer densities to slow or prevent disease transmission. In Wisconsin, strategies and goals created to manage CWD were based on risk assessments of managers in combination with uncertainties surrounding the disease (i.e., long-term impacts, human and domestic animal health risks). The greatest driving force behind CWD management was managers' sense of professional ethics, defined by the idea that the disease needed to be controlled and ultimately eliminated from the state. Understanding how hunters perceive risks is paramount to anticipating their voluntary participation in efforts to reduce deer numbers.

Several studies have investigated hunter concerns and perceptions of CWD risks (Gigliotti 2004, Miller 2004, Needham et al. 2004, Needham et al. 2006, Needham et al. 2007, Peterson et al. 2006, Vaske et al. 2004), yet most of these efforts have largely measured responses to hypothetical future scenarios or initial reactions to new disease outbreaks. My objective was to analyze the extent and types of risks Wisconsin hunters perceive following five years of actual experience with CWD in the state's deer herd.

Risk and Perceptions

Risk is defined by Freudenburg (1988) as the actual probability and consequence of undesired outcomes. Risk perceptions are defined as intuitive risk judgments (Slovic 1987), and are a byproduct of risk assessment and risk communication (Slovic 1987, Pfeiffer 2006). Perceptions of risk are essentially evaluations of probabilities and consequences of negative outcomes (Sjöberg et al. 2004). People's perceptions of risk are often based on characteristics of the risk such as dread, voluntariness, uncertainty, and controllability (Burger et al. 1997, Slovic 1987, Slovic et al. 1982). Risky situations that are viewed as involuntary, uncontrollable with high dread risk are those in which people are most likely to take action to reduce the risk (Slovic 1987).

People often overestimate or misjudge human health and environmental risks (Kluger 2006, Lichtenstein et al. 1978, Sandman et al. 1987, Slovic 1987) or focus on those risks of lesser probability (Kluger 2006). For example, Lichtenstein et al. (1978) found that when asked to judge the frequency of lethal events, specifically human death from certain causes, respondents had a tendency to overestimate low-frequency events (accidents, natural disasters, cancer) and underestimate high-frequency events (heart

disease, asthma, tuberculosis). People also have a tendency to estimate risk to self much lower compared to risk to other people (Sjöberg 2000).

Assessment of risk and development of risk perceptions varies by individual and across groups (Savadori et al. 2004). There are often observed differences in the way that lay people and experts assess risk (Lazo et al. 2000, Slovic 1987). Risk managers and experts use scientific evidence to judge risk and often assess risk based on potential number of fatalities (Slovic et al. 1979). In contrast, lay people evaluate riskiness of a situation based on personal experience and information from various media sources, and nonexperts (Slovic 1987, Slovic et al. 1979). As a result, lay people tend to misjudge riskiness when compared to risk managers and experts.

To effectively assess, communicate, and manage risks, managers that are responsible for regulating health and safety need to have an understanding of how people perceive and respond to risks (Slovic 1987). Following the discovery of CWD in Wisconsin in 2002, deer hunting license sales dropped 11% from the previous year (Vaske et al. 2004). When deserting hunters were asked why they did not buy a license, 52% indicated CWD as the reason (Vaske et al. 2004). Although CWD is the focus of a large body of research, many uncertainties still surround the disease. Questions that are still looming involve exact transmission dynamics, long-term impacts to cervid populations, and the potential for CWD to cross the species barrier into humans.

CWD and Other Relevant Research

At this time, there is no scientific evidence to indicate that humans can or will become ill from exposure to CWD (Belay et al. 2004). However, research suggests that if left unchecked, CWD could have severe negative consequences on deer populations (Gross

and Miller 2001). While DEZ hunters express low to moderate concern about human health impacts of CWD, they do express concern about the threat CWD and its management pose to their ability to hunt deer in Wisconsin in the future (Holsman and Petchenik 2006, Holsman and Smail 2006). More specifically, will deer hunting remain a viable recreation if management is successful in reducing deer densities to 5-deer/square mile?

A recent study of hunting and nonhunting landowners in the DEZ found that hunters were concerned about impacts of CWD to deer hunting in Wisconsin, and both groups were neutral or slightly concerned about the safety of venison (Stafford et al. 2007). Studies of Illinois and South Dakota hunters following the discovery of CWD found only a small percentage of respondents who were concerned about human health risks (Gigliotti 2004, Miller 2004). In comparison, a survey of deer and elk (*Cervus elaphus*) hunters in 8 states found varying degrees of concern for CWD based on residency, participation in hunting, species hunted (elk or deer), and disease occurrence in the state (present or not present) (Needham and Vaske 2006).

Perceptions of danger or threats to personal health should motivate people to take protective action (Rogers and Prentice-Dunn 1997). However, in studies on global warming, CWD, and bovine TB, there is similar unwillingness among stakeholders to change personal behaviors to reduce risks that seem remote, distant, and uncertain even when most stakeholders indicate a general concern about the problem. For example, Leiserowitz (2006) found that the public is very concerned about climate change and believes that the U.S. should participate in international agreements to decrease greenhouse gas emissions. However, when asked if they would support higher fossil

fuel-based energy or gasoline prices to decrease greenhouse gas emission, 60% -78% of respondents opposed the taxes.

In Michigan, Dorn and Mertig (2005) found that stakeholders supported the goal of eradicating bovine TB (69%), but did not necessarily support the specific eradication policies. Similarly, surveys of DEZ hunters and landowners have revealed general concern about CWD and a desire for state agencies to control the disease (Holsman and Smail 2006, Petchenik 2004). However, hunters appear unwilling to sacrifice the quality of their hunting experiences now for the good of hunting in the future (Holsman and Smail 2006). This is reflected in the relatively stable deer densities over the past 5 years in the DEZ and the large number of hunters indicating that they do not support the reduction goal of 5-deer/sq. mi. (Holsman 2005, Holsman and Smail 2006).

The risk literature is clear on how people react to risks posed to their personal well-being and others, but what if the risk is to a valued resource, such as deer? Do the same general characteristics of perceptions of risks to humans apply to a valued environmental attribute? At this time it is not clear how exactly DEZ hunters are perceiving risks associated with CWD and what factors may be influencing these perceptions. One factor that may provide insight into hunter risk perceptions of CWD is experience with the disease.

The Role of Experience

In judging risks under uncertainty, the availability heuristic states that people associate higher risks with those events that are easily imagined or recalled (Tversky and Kahneman 1974). An example would be assessing the risk of cancer to those over 35 years of age by recalling instances in your own life of family, friends or acquaintances

that have had or died from cancer. In the context of this study, experience is defined on two different levels. Hunters likely have a general awareness of the presence of CWD from media accounts and DNR information. I refer to this as “global experience”. By contrast, “personal experience” is defined by having harvested and potentially handled a CWD positive deer. This level of experience is more concrete and direct than simply being told that CWD is present and may pose risks.

Current CWD prevalence levels in the DEZ are low (<2%) and the chance of a hunter encountering a clinically ill deer (one showing actual outward physical signs of disease) are low. As a result, the ability of hunters to perceive the risks of CWD is limited by the fact that most have not experienced or observed the disease in the environment. Those that are considered to have personal experience most likely have only received a phone call or letter informing them that the deer they harvested tested positive for CWD with a recommendation to dispose of the meat.

In the case of CWD, understanding the role of personal experience with the disease will allow managers to anticipate hunter reactions to increases in prevalence levels and spread of CWD that may occur in the future, especially in the absence of aggressive control efforts. Needham et al. (2004) illustrated these potential changes in behavior through a survey conducted on hunters in 8 states. Resident and nonresident deer and elk hunters were presented with hypothetical situations concerning CWD prevalence and human health risks. As a general trend, the percentage of respondents that indicated they would stop hunting increased as disease prevalence, distribution, and human health risks increased.

If managers in Wisconsin must depend on recreational deer hunters to control CWD, it is important to identify where hunter and manager opinions conflict. Current hunter risk concerns are often associated with potential impacts of CWD to hunting. With minimal concern expressed for human health and risks to the deer herd, and low support of hunters for reducing deer densities to 5-deer/sq. mi. (Holsman 2005, Holsman and Smail 2006) it has become increasingly important to understand hunters beliefs about CWD. This chapter addresses two primary research objectives. The first is to describe DEZ hunter risk perceptions towards CWD. The second is to identify the role of personal experience with CWD in hunter risk perceptions associated with CWD and its management. I hypothesize that hunters that have harvested a CWD positive deer will have higher perceptions of risks associated with CWD because the impacts of the disease are more tangible to this group of hunters.

STUDY AREA

The study area was the western disease eradication zone (DEZ) located in southwest Wisconsin (Fig. 1). The DEZ was first created in 2002 and has been modified in size and was 331,767.2 ha (1,281 sq. mi.) during the 2006 deer hunting season. The core area, where the first CWD positive deer were discovered, is located in Dane County in the DEZ. The DEZ also includes portions of the following counties: Columbia, Sauk, Richland, Iowa, Lafayette and Green. Eight deer management units (DMUs) are part of the DEZ. DMUs are areas of similar land bounded by rivers and major road ways (WDNR 2006) designated to help understand the deer population and harvest history in an area. All of DMU 70A is located in the DEZ. Portions of DMU 70, 70B, 71, 73E, 75C, 75D, 76, and 76M are also within the DEZ boundaries.

METHODS

Survey Administration

A 12-page questionnaire was used to obtain DEZ deer hunter opinions about CWD and its current management (Appendix A). I followed procedures of Dillman (2000) and sent cover letters, first class postage stamps, post card reminders and duplicate survey packets to nonrespondents. Each study subject was assigned a survey code to allow tracking of individual response rates, while ensuring that each individual remained anonymous. Incorrect addresses, deceased individuals, and refusals to participate were removed from the initial sample to calculate response rate. The University of Wisconsin-Stevens Point Institutional Review Board for research involving human subjects approved the research protocol used in this study.

Sampling

I surveyed two sample populations. The first sample ($n = 1,200$) was randomly selected from the Wisconsin Department of Natural Resources (DNR) records of resident deer hunters >18 years old who harvested a deer with a firearm during the 2003, 2004 or 2005 seasons in the DEZ. Though sampling from successful hunters has the potential to introduce bias, past results have indicated that hunter attitudes and behaviors have not differed between successful and unsuccessful hunters in the DEZ (Holsman and Smail 2006). Furthermore, WDNR does not collect DMU information at their point-of-sale license sales so the only available option for linking hunters to the DEZ was through registration information.

Since CWD prevalence rates remain relatively low even in the core of the DEZ, it seemed improbable that I would capture enough hunters who had harvested a CWD-

positive deer from a random sample of 1,200 to make meaningful comparisons based on experience (global vs. personal). Therefore, I also censused an additional 390 hunters who were known from disease testing results to have harvested a CWD positive deer from 2001-2006 in the DEZ (personal experience). Hunters harvesting deer from the DEZ are encouraged to submit the head of the deer to DNR laboratories for disease testing. If a deer tests positive for CWD, the hunter is immediately notified and disposal of the meat is recommended. Results are also posted on the DNR website.

Variables Used

Thoughts and Feelings about CWD.— The continued word method (Leiserowitz 2006) was used to measure hunter beliefs about CWD. Hunters were asked to provide “the first thought or image that comes to your mind when you hear the words Chronic Wasting Disease.” This question preceded subsequent Likert scale responses about specific risk categories to capture the respondents’ most salient thoughts. In order to understand how the thought or image provided in the open-ended word association influenced the respondent, I asked participants to indicate the extent that the thought or image caused them positive or negative feelings. This question was measured on a 7-point Likert scale ranging from “very negative” (-3) to “very positive” (+3). This was used to evaluate the affective component of the thought or image provided to better categorize responses to the open-ended word association.

Risk Perceptions.— Level of concern over potential risks of CWD was measured using 6 questions pertaining to CWD prevalence levels, geographic spread of the disease, health of the deer herd, and threats to human health. Response choices for each question were given a numerical value from “very concerned” (5), to “not at all concerned” (2),

and “not sure” (1). I created a ‘Risk Perception Index’ (RPI) (Leiserowitz 2006) by summing individual responses to the series of questions. RPI scores range from 6 to 30. Higher RPI scores are indicative of higher perceived risks towards CWD.

Personal Experience.— Experience was measured using a single dichotomous question that asked respondents to indicate whether or not they had shot a CWD positive deer.

ANALYSIS

Responses were collected and analyzed in SPSS 14.0 (SPSS Inc., Chicago, Illinois). One item on the questionnaire asked respondents if they had ever shot a CWD positive deer. A small number of hunters from the random sample of 1,200 who indicated that they had shot a CWD-positive deer were added to the “personal experience” group when comparisons were made. Responses from hunters in the personal experience group were compared to responses of hunters in the global experience group.

Responses to the open-ended word association (continued word method) were compiled in Excel and reviewed by three separate reviewers. Keeping with the intention of measuring “first thoughts”, coders disregarded content provided by responses that were more than one sentence. In other words, if a respondent provided a paragraph that contained numerous thoughts or images, only the thought provided in the first sentence was used to generate the theme.

Categorization of themes and creation of a master theme list was conducted in four steps (modified from Strauss 1987). The initial list of responses was reviewed by two reviewers. In step one, reviewer 1 and reviewer 2 assessed all open-ended responses on their own and grouped like responses into categories. Reviewer 1 and 2 then

compared their categorization schemes to identify any discrepancies. In step two, reviewer 1 created a theme coding list based on the initial categories that emerged in step one. In step three, reviewer 1 and 2 re-categorized each response using the list of 13 dominant themes and then compared placement of responses to settle any discrepancies. This step resulted in the creation of a master theme code list. All responses were placed into a single theme category. In step four, a third reviewer evaluated final response categorization based on the 13 themes to establish an inter-rater reliability for coding. Reviewer three randomly selected a starting point in the list and reviewed every tenth response and its associated code from that point forward resulting in a review of 10% of the response list. Third reviewer evaluation resulted in an inter-rater reliability score of 93%. Each of the responses was placed into a single category based on the first theme presented in the thought or image provided (Appendix B).

Principle Component Analysis (PCA) was used to determine if the 6 risk measurement items were intercorrelated and loading on a single factor defined as hunter risk perceptions. Factor loadings ≥ 0.40 were considered adequate to conclude that all variables were measuring the single, predefined factor (Stevens 2002). Cronbach Alpha test of reliability was used to measure internal consistency among the 6 risk measurement items. Reliability scores ≥ 0.70 were indicative of internal consistency among the 6 variables (Nunnally 1978).

Frequency tables were constructed to visualize the distribution of respondents across themes for the open-ended word association. This allowed for comparison of theme categorization of hunters by experience with CWD. A t-test was run to compare mean RPI scores of personal experienced hunters to global experienced hunters. Basic

descriptive statistics were run to compare RPI scores across the 13 theme codes for the 1,200 original respondents and to compare personal experience respondents to global experience respondents.

RESULTS

Survey Response

Of the random sample of 1,200, 82 individuals were lost because of incorrect addresses or people who had moved, were now deceased or refused to participate in the study bringing the sample down to 1,118. Five hundred and ten questionnaires were returned for a total response rate of 46%. The questionnaire was only one part of a series of surveys sent to the same 1,200 individuals over a 6 month period. Response rate to the questionnaire may be low because of to the high response burden, as subjects were also asked to complete and return a series of hunting diary cards (results not part of thesis) prior to receiving the questionnaire.

I checked for nonresponse bias by contacting 30 nonrespondents by telephone. Responses from a subsample of 7 questionnaire items asked during the telephone survey of nonrespondents were compared to those of mail survey respondents. Nonrespondents were less likely to have hunted in the DEZ in 2006, and indicated that hunting was less central to their lives compared to respondents. However, no significant differences were found between respondents and nonrespondents across the 7 questions. It was concluded that CWD and deer hunting in general were slightly less salient issues for nonrespondents.

For the CWD-positive hunter mailing ($n = 390$), 36 hunters were removed because of incorrect addresses and refusal to participate for a final sample of 354. Two hundred and thirteen hunters responded yielding an overall response rate of 60%.

Experience

Analysis comparing personal and global experience hunters failed to yield any significant differences between the groups in mean RPI scores ($P = 0.14$). Although no significant differences were found between RPI scores, the groups differed in their first salient thought provided in the open-ended responses. These differences are discussed in future sections. With no significant differences found between groups regarding RPI scores, future discussions of RPI scores are based on all hunter responses ($n = 510 + 213$), regardless of experience.

Salient Beliefs

Of all the respondents ($n = 510 + 213$), 702 provided usable responses to the open-ended word association. The master theme coding list consisted of 13 categories based on dominant themes that emerged during the review process (Table 1). The 13 themes were disease is natural, images of sick deer, human health impacts, no worries, waste of resources (i.e., time, money, labor), general negative thoughts, comments about management rules, regulations, and strategies, questions and concerns, overreaction to CWD, agency credibility, impacts to deer populations, hunting impacts, and other (responses that did not fit into any of the other 12 categories).

The three predominant themes with sample responses from the questionnaire were disease is natural (“mother nature’s way of getting rid of the weaker gene pool”), images of sick deer (“a sick, skinny, suffering deer”), and human health impacts (“is the meat

safe to eat?"). Of the 13 themes, only 3 reflected risk perceptions. Those themes were human health impacts ("fear of eating deer that are not tested"), impacts to the deer herd ("the deer herd is at risk"), and impacts to hunting ("I'm concerned about my and my sons future deer hunting"). These categories only accounted for 16.5% of the total responses.

The two most common themes for hunters who had not harvested a CWD-positive deer were 1) the disease (CWD) is natural (15%), and 2) images of sick deer (13%). Sixty-two percent of these respondents indicated that the thought or image they provided in the open-ended question caused them negative feelings. Only 13% of respondents indicated positive feelings with 25% of respondents indicating neutral feelings. The two dominant themes for personal experience respondents were 1) general negative thoughts (15%), and 2) images of sick deer (12%). Sixty-five percent of these respondents indicated that the thought or image that they provided caused them negative feelings. Only 18% indicated positive feelings with 17% of respondents indicating neutral feelings.

Risk Perception Index (RPI)

PCA and Cronbach alpha scores for all 6 risk questions had factor loadings in excess of the 0.40 and 0.70 convention indicating strong correlations and internal consistency of the measurement items to create the RPI (Table 2). The mean RPI score for all respondents was 19.4 ± 5.7 . Scores ranged from 6 to 30, with most respondents receiving a RPI score of 12. Average risk scores ranged from 2.9 to 3.4 implying that respondents are, at the least, slightly concerned about the potential negative consequences of CWD (Table 3). Concern for CWD negatively impacting future deer hunting satisfaction by reducing the health of deer where hunters do most of their hunting had the highest

average risk score. Concern about human health risks from consumption of infected venison had the lowest average risk score (Table 3).

When dominant themes (responses to the open-ended word association) were compared by RPI score, the highest RPI score was found in the “general negative thoughts” category with a mean RPI score of 21 ± 6.2 , with most respondents receiving a RPI score of 30 (maximum risk score). The lowest RPI score was found in the “management waste of resources” category with a mean RPI score of 18 ± 5.7 , with most respondents receiving a RPI score of 30 (Table 4).

DISCUSSION

Hunter Risk Perceptions

The direct measurement of hunter risk perceptions through Likert scale questions produced findings similar to other studies that have suggested at least a moderate level of concern about CWD (Gigliotti 2004, Holsman 2005, Holsman and Smail 2006, Miller 2004, Needham et al. 2004, Vaske et al. 2004). The two highest concerns were potential impacts to hunting satisfaction because of declining deer health from CWD and potential increases in prevalence levels in the next 5 years. In contrast, the top responses to the open-ended word association were that the disease is natural and images of sick deer.

The difference found in beliefs between the two measurement techniques may simply be a result of the way in which the questions were asked. For Likert scale risk questions, hunters were only asked about certain risks of the disease and were not allowed to provide beliefs beyond what was asked. The open-ended word association allowed hunters to provide their most salient belief after 5 years of experience with the disease, regardless of category (e.g., CWD, management, deer, hunting, use of resources).

As a result, the open ended word association may be more instructive when it comes to hunter beliefs about CWD.

In the case of previous studies addressing hypothetical situations and new occurrences of CWD (Gigliotti 2004, Holsman 2005, Holsman and Smail 2006, Miller 2004, Needham et al. 2004, Needham et al. 2007, Peterson et al. 2006, Vaske et al. 2004) we find hunter responses reflecting risk perceptions. However, when asked directly about CWD, salient thoughts and images of most hunters (74%) do not reflect risk perceptions. The responses reflect general beliefs about the disease or its management with a majority carrying negative connotations.

Conflicts arise between managers (experts) and publics when there is a discrepancy in how certain concepts, such as riskiness, are defined (Slovic 1987). At this time, hunters appear to be more accepting of CWD than managers', which is revealed in the small proportion of respondents (16.5%) that actually provided a thought or image that reflected a risk perception (impacts to human health, deer herd, or hunting). The perceptions of CWD among hunters reflect 1) low to moderate levels of risk associated with CWD, and 2) questions regarding their ability and the ability of their children and grandchildren to hunt deer in the state of Wisconsin 5, 10 or 20 years into the future. Manager perceptions of CWD seem to be based on a strong sense of professional obligation—this disease needs to be controlled and ultimately eradicated before the disease spreads beyond its current boundaries, impacts other deer populations and/or human health. Unfortunately, to manage this disease, managers need the support of hunters, many of whom do not view CWD as a significant risk. Most hunters are not

focused on the negative consequences of the disease that managers, as professionals, have a strong desire to minimize or avoid altogether.

The low to moderate level of concern that hunters expressed towards CWD may be construed by managers as hunters underestimating the risks CWD poses to human health and the deer herd. However, at this time there is no evidence to lead hunters to believe that they should be concerned about becoming ill from infected venison. In terms of impacts to deer, CWD is always fatal. Although CWD prevalence levels are low within the DEZ, infected deer will eventually die and transmission and infection rates have the potential to increase if deer densities remain high or increase (Gross and Miller 2001). With this in mind, current deer abundance within the DEZ has the potential to decrease as a result of disease related mortality. We do not know the time frame necessary for the decrease to occur. However, it appears that any concern hunters have for the deer herd is based on the outcome of severe depopulation efforts, not the disease itself. Deer abundance will decrease indefinitely if the DNR continues with the depopulation efforts, working towards a goal of 5-deer/sq. mi. within the DEZ.

In the case of past research on zoonotic diseases, most investigations regarding social dimensions (hunter and public reactions) have been based on hypothetical disease situations, new occurrences of the disease or hypothetical diseases that are based on actual wildlife diseases (Gigliotti 2004, Holsman 2005, Holsman and Smail 2006, Miller 2004, Needham et al. 2004, Needham et al. 2007, Peterson et al. 2006, Vaske et al. 2004). While these studies have uncovered some important information, some erroneous conclusions have been made about how publics may respond to a disease with similar characteristics to CWD.

In particular, Peterson et al. (2006) surveyed long-term residents and new residents in an area of Idaho currently free from any zoonotic disease. The study measured support for management strategies for two hypothetical diseases, one with similar risk characteristics to CWD. The authors categorized one of the hypothetical diseases (the disease in the study that represented CWD) as a disease with high levels of unknown risk and dread risk (Slovic 1987). Of the two, dread risk is viewed as more important in understanding risk perceptions. High dread risk leads to high perceived risk and more people wanting the risk to be reduced. Increased support for risk reduction leads to support by publics for strict regulations to achieve desired risk reductions (Slovic 1987).

I would argue that the classification by Peterson et al. (2006) of CWD as a disease with high unknown and dread risk is not necessarily appropriate for all areas where CWD occurs. I found that 22.5% of respondents believe CWD is a natural disease or are not worried about the disease. For example, one respondent wrote “not worried, its been here for a long time.” In addition, 26.5% of responses reflected management, specifically how management has handled the disease (resources, strategies and goals, overreaction, agency credibility). For example, one respondent wrote “ever changing hunting seasons and changing regulations.” Another wrote “a good excuse for the DNR to have more deer shot than what needs to be.” Based on these results, longer exposure time changes the way that hunters view CWD and management strategies compared to beliefs following new outbreaks or hypothetical prevalence levels of the disease (Brown et al. 2006, Needham et al. 2004, Vaske et al. 2004).

CWD is only a “new” disease in terms of new occurrences. The disease itself was first discovered in the late 1960’s and has since been the focus of intense research. The authors conclude that in the case of a disease such as CWD, wildlife managers should be able to develop “draconian” management strategies “without facing high levels of resistance” (Peterson et al. 2006:1751). However, based on research of CWD and hunters in Wisconsin, we know this to be incorrect (Holsman 2005, Holsman and Smail 2006). The Wisconsin Department of Natural Resources has implemented what could be considered draconian strategies to eradicate CWD from the state. Harvest efforts involving hunters and sharpshooters have been met with hunter backlash, dissatisfaction with hunting, and low levels of support for reducing deer to 5-deer/sq. mi. within the DEZ (Holsman 2005, Holsman 2006, Holsman and Smail 2006). How people respond to hypothetical situations does not necessarily reflect reality. Caution should be taken when attempting to extrapolate results of disease research based on hypothetical situations to real life situations of publics dealing with a wildlife disease.

The role of experience

Results of the open-ended word association tell a very interesting story about hunters who have experienced CWD on some level. The results show that hunters who have been notified that the deer they harvested tested positive for CWD do not differ statistically in their salient beliefs from global experience hunters. However, when looking at the most salient belief about CWD, the two groups did differ. The most salient belief of hunters that have harvested a CWD positive deer was general negative thoughts (15%), while the most salient belief of hunters that have not shot a CWD positive deer was that the disease is natural (15%). Based on this difference it appears that hunters

who harvested a CWD positive deer have a slightly more negative view of the disease and are slightly less accepting of CWD as a natural disease than other hunters. However, this did not translate into overall higher perceptions of risk associated with CWD among personal experience hunters. It is possible that hunters who harvested a CWD positive deer may see the disease as more of an annoyance than a risk because they are encouraged to throw away venison from a deer they harvested, field dressed, and already had processed. Unfortunately, there are no open-ended responses that directly support this idea.

The availability heuristic tells us that people associate higher risks with those events that are easily imagined or recalled (Tversky and Kahneman 1974). The results of this study have led to the rejection of the hypothesis that hunters with experience with CWD have higher risk perceptions because the disease is more tangible to this group of hunters. Experience with CWD appears to have little to no affect on risk perceptions. This is reflected in the finding that personal experienced hunters are no more likely than other hunters to view CWD as a risk.

The results of this study indicate that CWD is not a high priority concern for a majority of hunters. A number of the beliefs held by hunters differ from those of managers in that hunters are less focused on potential risks to the herd or to human health and more focused on impacts to hunting quality. Furthermore, hunters with beliefs unrelated to risks outnumber those hunters that actually do fear negative consequences of CWD and/or the management of the disease. Only 13.5% of respondents were worried about the potential impacts of CWD on the health of humans or to the deer herd.

Theories on overestimation of risks by lay people when compared to risk managers and experts do not appear to hold true in the case of DEZ hunters and CWD. Typically we find that publics overestimate risks and managers work to help the public develop realistic risks from low probability threats. Managers have spent millions of dollars over the last 5 years to eradicate a disease believed by many hunters to be a natural disease of wild deer that will never be eliminated from the herd. In addition, some hunters believe that managers have overreacted to CWD and that efforts to eradicate the disease have been a waste of management resources. It is possible that 5 years of over “exposure” to CWD via media and research in combination with no evidence of success in reducing deer densities in the DEZ has desensitized hunters to a point that they are no longer worried, and maybe many of them never were.

MANAGEMENT IMPLICATIONS

The future of CWD management and of the disease in Wisconsin is uncertain. If prevalence levels increase or the disease spreads, the number of hunters harvesting a CWD positive deer will also increase. Based on the findings of this study, deer managers can anticipate that unless there is a change in actual risks—specifically to deer or humans—hunters’ perceived risks are not likely to change even as personal experience with the disease increases.

An option may be to alter communication efforts concerning potential risks associated with CWD to target hunter beliefs about the disease in a way that leads to an increase in concern about the disease. However, there are two potential negative consequences with attempting to increase risk concerns. The first is the potential for hunter drop-out in participation. To avoid a repeat drop-out as occurred in 2002

following the discovery of CWD, it would be essential to identify that narrow window where concern is increased to a level that leads to higher harvests but does not facilitate drop-out from concern over human health or herd impacts.

The second issue is loss of agency credibility. Current strategies are based on fear of uncertain long-term impacts of CWD. Only a few respondents most salient beliefs addressed agency credibility (5%), but this idea could become a major issue in the future. If managers continue to cry wolf and the wolf never comes, people will stop believing, further eroding agency credibility. Efforts should communicate the real, scientific based threats, focusing on attributes of hunting that are most important to hunters. An example would be to address the higher CWD prevalence rates found in older male deer, which are the age group most hunters desire to harvest. Lastly, addressing short-term impacts (e.g., decline in health and possibly numbers of older male deer) rather than the uncertain long-term impacts may be a more productive communication strategy.

SUMMARY

For a wildlife disease control program to be successful, stakeholders must feel a deep level of commitment to the cause (Pfeiffer 2006). At this time DEZ hunters do not seem to be threatened by the presence of CWD, except for the idea of losing their ability and the ability of future generations to hunt deer in Wisconsin as a result of low deer densities. Risk research has addressed the importance of experts or institutions understanding what people perceive to be risky, what is not risky, and what factors influence these perceptions (Slovic 1987).

The results of this study suggest that the use of recreational hunters to control CWD will continue to fail unless communication efforts change the beliefs of DEZ

hunters. To do this, managers must alter their message to target the dominant beliefs identified in this study. The challenge now becomes how to alter management and communication strategies to encourage hunters to alter their behavior to reduce risks that at this time seem remote, distant, and uncertain. Managers should continue to monitor hunter beliefs and attitudes towards CWD and management strategies to improve relations and communication between managers and publics, and further develop effective management strategies.

LITERATURE CITED

- Belay, E.D., R.A. Maddox, E.S. Williams, M.W. Miller, P. Gambetti, and L.B. Schonberger. 2004. Chronic wasting disease and potential transmission to humans. *Emerging Infectious Diseases* 10:977-984.
- Brown, T.L., D.J. Decker, J.T. Major, P.D. Curtis, J.E. Shanahan, and W.F. Siemer. 2006. Hunters' and other citizens' reactions to discovery of cwd in central New York. *Human Dimensions of Wildlife* 11:203-214.
- Burger, J., J. Sanchez, J. Whitfield Gibbons, and M. Gochfeld. 1997. Risk perception, federal spending, and the savannah river site: attitudes of hunters and fishermen. *Risk Analysis* 17:313-320.
- Decker, D.J., M.A. Wild, S.J. Riley, W.F. Siemer, M.M. Miller, K.M. Leong, J.G. Powers, and J.C. Rhyan. 2006. Wildlife disease management: a manager's model. *Human Dimensions of Wildlife* 11:151-158.

- Dillman, D.A. 2000. Mail and internet surveys: the tailored design method. John Wiley and Sons, New York, New York, USA.
- Dorn, M.L., and A.G. Mertig. 2005. Bovine tuberculosis in Michigan: stakeholder attitudes and implications for eradication efforts. *Wildlife Society Bulletin* 33:539-552.
- Freudenburg, W.R. 1988. Perceived risk, real risk: social science and the art of probabilistic risk assessment. *Science* 242:44-49.
- Gigliotti, L.M. 2004. Hunters' concerns about chronic wasting disease in South Dakota. *Human Dimensions of Wildlife* 9:233-235.
- Gross, J.E., and M.W. Miller. 2001. Chronic wasting disease in mule deer: disease dynamics and control. *Journal of Wildlife Management* 65:205-215.
- Holsman, R.H. 2005. Untangling the relationship between hunter effort and hunter harvest: results from the 2004 (year 2) study of deer hunters in Wisconsin's chronic wasting disease eradication zone. College of Natural Resources, University of Wisconsin, Stevens Point, Wisconsin, USA.
- Holsman, R.H. 2006. What Wisconsin deer hunters think about SAK, deer populations, and DNR credibility: results of a 2006 statewide survey. College of Natural Resources, University of Wisconsin, Stevens Point, Wisconsin, USA.
- Holsman, R.H. and J. Petchenik. 2006. Predicting deer hunter harvest in Wisconsin's chronic wasting disease eradication zone. *Human Dimensions of Wildlife Journal* 11:177-189.

- Holsman, R.H. and R. A. Smail. 2006. Tracking DEZ deer hunters: A report of the hunter effort and attitudes for the 2005 deer hunting season with relevant three-year trends. College of Natural Resources, University of Wisconsin, Stevens Point, Wisconsin, USA.
- Kluger, J. 2006. Why we worry about the things we shouldn't and ignore the things we should. *Time* 168:65-71.
- Lazo, J.K., J. Kinnell, and A. Fisher. 2000. Expert and layperson perceptions of ecosystem risk. *Risk Analysis* 20:179-193.
- Leiserowitz, A. 2006. Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climate Change* 77:45-72.
- Lichtenstein, S., P. Slovic, B. Fischhoff, M. Layman, and B. Combs. 1978. Judged frequency of lethal events. *Journal of Experimental Psychology: Human Learning and Memory* 4:551-578.
- Miller, C.A. 2004. Deer hunter participation and chronic wasting disease in Illinois: an assessment at time zero. *Human Dimensions of Wildlife* 9:237-239.
- Needham, M.D., J.J. Vaske, and M.J. Manfreda. 2004. Hunters' behavior and acceptance of management actions related to chronic wasting disease in eight states. *Human Dimensions of Wildlife* 9:211-231.
- Needham, M.D., and J.J. Vaske. 2006. Beliefs about chronic wasting disease risk across multiple states, years, and interest groups. *Human Dimensions of Wildlife* 11:215-220.

- Needham, M.D., J.J. Vaske, J.J., and M.J. Manfred. 2006. State and residency differences in hunters' response to chronic wasting disease. *Human Dimensions of Wildlife* 11:159-176.
- Needham, M.D., J.J. Vaske, M.P. Donnelly, and M.J. Manfred. 2007. Hunting specialization and its relationship to participation in response to chronic wasting disease. *Journal of Leisure Research* 39:413-437.
- Nunnally, J. 1978. *Psychometric theory*. McGraw-Hill, New York, New York, USA.
- Petchenik, J. 2004. Landowner response to chronic wasting disease and its management in Wisconsin's southwest disease eradication zone. Wisconsin Department of Natural Resources, Bureau of Integrated Science Services, Madison, Wisconsin, USA.
- Peterson, M.N., A.G. Mertig, and J. Liu. 2006. Effects of zoonotic disease attributes on public attitudes towards wildlife management. *Journal of Wildlife Management* 70:1746-1753.
- Pfeiffer, D.U. 2006. Communicating risk and uncertainty in relation to development and implementation of disease control policies. *Veterinary Microbiology* 112:259-264.
- Rogers, R.W., and S. Prentice-Dunn. 1997. Protection motivation theory. *Handbook of health behavior research 1: personal and social determinants*. David S. Gochman, editor. Plenum Press, New York, New York, USA.
- Sandman, P.M., N.D. Weinstein, and M.L. Klotz. Public response to the risk from geological radon. *Communicating Risk* 37:93-108.

- Savadori, L., S. Savio, E. Nicotra, R. Rumiati, M. Finucane, and P. Slovic. 2004. Expert and public perception of risk from biotechnology. *Risk Analysis* 24:1289-1299.
- Sjöberg, L. 2000. Factors in risk perception. *Risk Analysis* 20:1-10.
- Sjöberg, L., B.E. Moen, and T. Rundmo. 2004. Explaining risk perception. An evaluation of the psychometric paradigm in risk perception research. *Rotunde* 84:1-39.
- Slovic, P. 1987. Perception of risk. *Science* 236:280-285.
- Slovic, P., B. Fischhoff, and S. Lichtenstein. 1979. Rating the risks. *Environment* 21:14-39.
- Slovic, P., B. Fischhoff, and S. Lichtenstein. 1982. Why study risk perception? *Risk Analysis* 2:83-93.
- Stafford, N.T., M.D. Needham, J.J. Vaske, and J. Petchenik. 2007. Hunter and nonhunter beliefs about chronic wasting disease in Wisconsin. *Journal of Wildlife Management* 71:1739-1744.
- Stevens, J. 2002. *Applied multivariate statistics for the social sciences*. Fourth edition. Lawrence Erlbaum, Mahwah, New Jersey, USA.
- Strauss, A.L. 1987. *Qualitative analysis for social scientists*. Cambridge University Press, Cambridge, New York, USA.
- Tversky, A., and D. Kahneman. 1974. Judgment under uncertainty: heuristics and biases. *Science* 185: 1124-1131.
- Vaske, J.J., N.R. Timmons, J. Beaman, and J. Petchenik. 2004. Chronic wasting disease in Wisconsin: hunter behavior, perceived risk, and agency trust. *Human Dimensions of Wildlife* 9:193-209.

Wisconsin Department of Natural Resources. 2006. Chronic wasting disease update.

Wisconsin Department of Natural Resources, Madison, Wisconsin, USA.

Wobeser, G.A. 2006. Essentials of disease in wild animals. Blackwell Publishing,

Ames, Iowa, USA.

Table 1. Theme categories for the open-ended word association, sample responses, and response frequency (%) for disease eradication zone (DEZ) hunters, Wisconsin, 2006.

Theme	Sample Quotes	Response Frequency
Disease is natural	“It has always been here, it will always be here, just get use to it.” “I believe CWD is a natural disease.”	13.5%
Images of sick deer	“A gaunt, drooling, disoriented animal.” “A sick, skinny, suffering deer.”	12%
Human health impacts ^a	“Fear of eating deer that are not tested” “There is no evidence that it adversely affects human beings.”	9.5%
No worries	“I do not worry about it.” “No problem.”	9%
Waste of resources	“Waste of time and money to try and stop it!” “It’s a big waste of DNR money.”	9%
General negative thoughts	“Something like mad cow disease.” “Disease spreading.”	8%
Comments about management rules, regulations, goals, and strategies	“Extended deer season.” “Excessive killing of deer for management purposes.”	7.5%
Questions and concerns	“Why does this have to happen?” “Is it really a risk?”	5%
Overreaction to CWD	“Blown out of proportion.” “I feel it is not as big a problem as people think it is.”	5%
Agency Credibility	“Bad choices by the DNR.” “No solutions in Colorado, how does our DNR think they will find one?”	5%
Impacts to deer population ^a	“Fear of the harm it may cause to our deer herd.” “Fewer deer.”	4%
Hunting impacts ^a (general)	“Good old days of hunting gone for me and my family.” “Change in how we hunt deer.”	3%
Other		9.5%

^aThemes reflecting risk perceptions

Table 2. Principle Component Analysis (PCA) factor loadings with one component extraction and Cronbach alpha test of reliability (α) results for disease eradication zone (DEZ) hunters, Wisconsin, 2006.

Concern Questions	PCA	α
RPI		0.92
Concern for current CWD prevalence levels	0.848	
Concern for the spread of CWD	0.886	
Concern for increases in prevalence levels	0.887	
Concern for deer deaths negatively impacting hunting	0.816	
Concern for decrease in hunting satisfaction due to decrease in deer health from CWD	0.877	
Concern for human health	0.657	

Table 3. Descriptive statistics (\bar{x} , SD, mode) for the six risk concern questions in order of highest concern to lowest concern for disease eradication zone (DEZ) hunters, Wisconsin, 2006.

Risk Concern Questions^a	\bar{x}	SD	Mode
How concerned are you that CWD will negatively impact your future deer hunting satisfaction by reducing the health of deer where you do most of your hunting?	3.4	1.2	2.0
How concerned are you that prevalence levels will increase in the DEZ over the next 5 years?	3.3	1.1	3.0
How concerned are you that CWD will spread to deer in other areas of the state in the next 5 years?	3.3	1.2	3.0
How concerned are you that deer deaths as a result of this disease negatively impact your hunting satisfaction by reducing the number of deer where you do most of your hunting?	3.3	1.2	2.0
How concerned are you with the current CWD prevalence levels in the DEZ?	3.2	1.0	3.0
How concerned are you that a human will get sick as a result of eating venison from a deer that has CWD?	2.9	1.1	2.0

^aVariables coded on a 5-point scale: (1) not sure, (2) not at all concerned, (3) slightly concerned, (4) moderately concerned, (5) very concerned.

Table 4. Theme categories and corresponding mean Risk Perception Index (RPI) scores (\bar{x}) out of 30 with standard deviation (SD) for disease eradication zone hunters, Wisconsin, 2006. Scores are ranked from highest concern to lowest concern.

Theme	\bar{x}	SD
General negative thoughts-disease	21	6.2
Hunting impacts-general	21	5.2
Impacts to the deer population-not specific to management or CWD	21	6.0
Human health impacts	21	5.9
Comments about management rules, regulations, goals, and strategies	19	5.4
Images of sick deer	19	6.1
Disease is natural	19	5.9
Questions and concerns about CWD	19	6.4
Agency credibility	19	5.0
Management overreaction	19	5.6
No worries	18	5.4
Management waste of resources (time, money, labor)	18	5.7

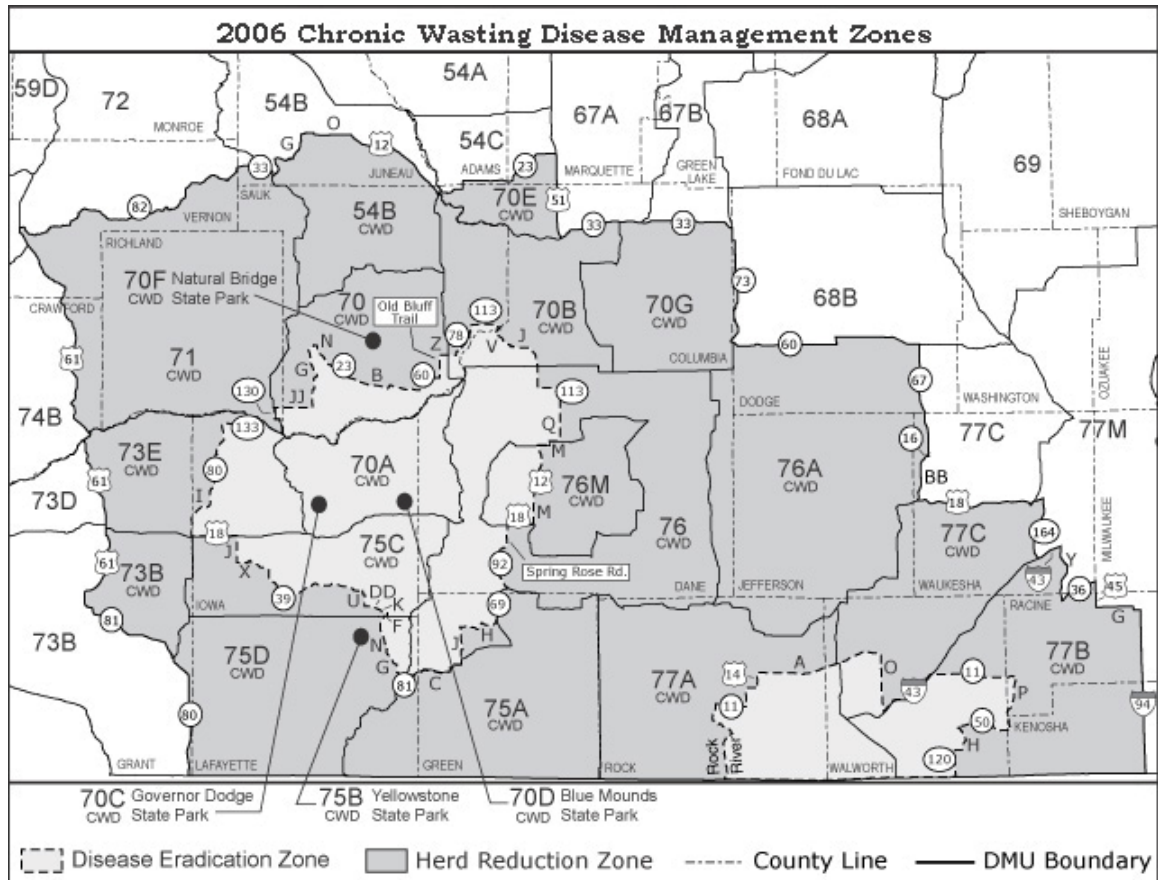


Fig. 1. Boundaries for the 2006 herd reduction zone (HRZ), western disease eradication zone (DEZ), and eastern disease eradication zone (EDEZ) in southern Wisconsin. The study area (DEZ) was 331,767.2 ha (1,281 sq. mi.) during the 2006 deer hunting season (Wisconsin Department of Natural Resources 2006).

CHAPTER TWO

INFLUENCES ON HUNTER SUPPORT FOR DEER HERD REDUCTION AS A CHRONIC WASTING DISEASE (CWD) MANAGEMENT STRATEGY

ABSTRACT

On February 28, 2002, chronic wasting disease (CWD), a contagious *prion* disease, was discovered in three, free-ranging, male white-tailed deer (*Odocoileus virginianus*) in southwestern Wisconsin. The Wisconsin Department of Natural Resources (DNR) immediately responded by implementing a management plan with an overall goal of eradicating CWD from the state. The plan relies on recreational hunters to reduce deer densities through liberal harvests. Support management is influenced by what stakeholders perceive to be immediate and long-term consequences of the proposed management strategies and also by their attitudes and beliefs towards the proposed strategies. Since CWD eradication is predicated on risk management, the extent to which hunters perceive risks related to CWD may be one important factor influencing hunter support for deer density reduction. However, little research is available to describe hunter support for deer density reduction in general or to predict factors most likely to influence it. I tested a model that explored the influence of risk perceptions and other salient beliefs on deer hunter support for deer density reduction. I found that the influence of risk on hunter support for specific management strategies was mediated through beliefs about whether eradication is necessary. Model results suggest that hunter beliefs about the likelihood of deer reduction contributing to eradication had the greatest influence on support for specific herd reduction goals. If managers intend to continue using recreational hunters to reduce deer densities within the disease eradication zone (DEZ), managers need to provide tangible evidence that reduction strides toward control of CWD to increase

beliefs in the efficacy of the strategy.

INTRODUCTION

Successful wildlife disease management strategies are those that are well communicated and supported by stakeholder groups (Pfeiffer, 2006). For decades wildlife managers have used recreational hunters to manipulate wildlife populations to maintain populations at or below the carrying capacity of the habitat (Association of Fish and Wildlife Agencies & Southwick, 2008). However, changes in wildlife values and the urbanization of America have altered the distribution of wildlife causing a decline in the effectiveness of hunting to control wildlife populations (Brown, Decker, Riley, Enck, Lauber, Curtis, & Mattfeld, 2000). Despite this shift, recreational hunting is still a preferred method for managers to control wildlife populations and has become increasingly important to control diseases in free-ranging wildlife populations (e.g. bovine tuberculosis, chronic wasting disease).

In the case of white-tailed deer (*Odocoileus virginianus*) populations, disease management strategies for controlling bovine tuberculosis (TB) and chronic wasting disease (CWD) have attempted to achieve reductions in deer densities as one means of slowing or preventing disease transmission (Bartelt, Pardee, & Thiede, 2003; Minnesota Department of Natural Resources, 2008). The purpose of reducing deer populations as part of CWD management is to decrease the number of infected deer dispersing to sites with uninfected deer. Based on model simulations of mule deer (*O. hemionus*) populations with CWD, researchers have concluded that population reductions may lower dispersal rates of deer from infected to uninfected populations, controlling the spread of CWD (Gross & Miller, 2001). Selective culling and recreational harvest of deer from

infected populations have the potential to reduce CWD prevalence levels if maintained for an unknown, but potentially lengthy period of time. Unfortunately, Gross and Miller (2001) concluded that CWD and wild deer populations cannot coexist under any circumstances. Local extinctions of deer populations may occur or CWD could eventually be lost from the deer population under certain conditions (i.e., insufficient transmission, death of infected individuals, low deer densities and prevalence rates of CWD) (Gross & Miller, 2001).

Since its discovery in southern Wisconsin in 2002, managers have established a disease eradication zone (DEZ) with a goal of reducing deer densities to 5-deer/sq. mi. This goal represents a 10-fold decrease in deer densities in an area where as many as 50-60 deer/sq. mi. occurred in 2002 (R. Rolley, WDNR, pers. comm.). The likely effectiveness of severely reducing the deer population in the DEZ as a means to control or eliminate CWD is unknown. Research from Colorado suggests that it may take many decades to determine if population reduction efforts are successful in controlling or eliminating CWD from wild cervid populations (Gross & Miller, 2001).

Despite the uncertainty of reduction strategies, the DNR solicited support and participation of hunters that would be critical in reaching the goal of disease eradication. While liberalized harvest regulations may initially enhance hunter opportunities and increase satisfaction, achievement of the population reduction strategy ultimately asks hunters to sacrifice short term recreational benefits (e.g., deer sightings) for a future outcome (e.g., a disease-free herd) that is highly uncertain. Given the uncertainty, deer hunters, in essence, are being asked to forego short-term hunting benefits indefinitely.

Compounding management uncertainties are the biological uncertainties associated with CWD. At this time, the long-term effects of CWD on wild cervid populations are unknown. Exact transmission routes are unknown but appear to be lateral through contact with infected saliva, blood, urine, feces, or placental tissues and fluids (Mathiason, Powers, Dahmes, Osborn, Miller, Warren, Mason, Hays, Hayes-Klug, Seelig, Wild, Wolfe, Spraker, Miller, Sigurdson, Telling, & Hoover, 2006; Miller, William, McCarty, Spraker, Kreeger, Larsen, & Thorne, 2000; Williams & Barker, 2001). The ambiguous nature of CWD and its management offers several challenges to managers when attempting to obtain and maintain stakeholder support for management strategies to control the disease, particularly when dealing with numerous uncertainties.

When developing wildlife disease management strategies biologists must identify factors that influence the public's willingness to support lethal wildlife control. Stakeholder groups in urban and suburban areas are often more likely to favor nonlethal strategies (Curtis, Decker, Stout, Richmond, & Loker, 1993), except when they feel that lethal management is necessary to reduce risks (Loker, Decker, & Schwager, 1999). Situations where lethal control is deemed necessary include reducing human-wildlife conflicts, damage to the natural environment, economic losses, and controlling nuisance wildlife and wildlife diseases (Fulton, Skerl, Shank, & Lime, 2004; Koval & Mertig, 2004; Loker et al., 1999).

Risk Perceptions

Risk is defined by Freudenburg (1988) as the *actual* probability and consequence of undesired outcomes. Risk perceptions are defined as intuitive risk judgments (Slovic, 1987), and are a byproduct of risk assessment and risk communication (Slovic, 1987;

Pfeiffer, 2006). When looking specifically at disease management, strategies are typically aimed at reducing assessed risks determined by characteristics of disease epidemiology and potential consequences of the disease (Bartelt et al., 2003; Pfeiffer, 2006). Therefore, the extent to which stakeholders share disease related risk assessments with managers likely has a significant influence on their support for management goals and strategies.

Several studies have investigated stakeholder concerns and perceptions of risks posed by CWD (Gigliotti, 2004; Holsman, 2005; Holsman & Smail, 2006; Miller, 2004, Needham et al., 2004; Needham et al., 2006; Needham et al., 2007; Peterson et al., 2006; Vaske et al., 2004). At this time, it appears that hunters and managers are assessing risks associated with CWD differently. Managers continue to express concern for the presence of CWD in the deer herd and the potential impacts of the disease on human health, while studies continue to find minimal concern among hunters for potential impacts of CWD to human health (Gigliotti, 2004; Holsman & Smail, 2006; Miller, 2004). However, hunters in Wisconsin are concerned about impacts that CWD and its management may have on their ability and the ability of future generations to hunt deer in the state. (Holsman & Petchenik, 2006).

Support: Eradication & Herd Reduction

Following the re-discovery of bovine TB in white-tailed deer in 1994 and in cattle in 1998 in the northeast Lower Peninsula of Michigan, managers placed a ban on feeding and baiting and initiated a deer reduction strategy to eradicate the disease. Deer hunting season lengths were extended and hunters were allowed unlimited antlerless tags. Dorn and Mertig (2005) found that stakeholders in Michigan supported the goal of eradicating

bovine TB (69%), but did not necessarily support specific eradication policies. Similar strategies have been used in Wisconsin in an effort to eliminate CWD from the Wisconsin deer population. Recent studies have found that DEZ hunters support the goal of eradicating CWD from the state, but oppose the strategy of reducing deer to 5-deer/sq. mi. (Holsman, 2005; Holsman & Smail, 2006).

Currently, herd reduction is believed to be the best way to help control or eliminate CWD from deer populations. With over 700,000 deer hunters in the state of Wisconsin (Wisconsin Department of Natural Resources, 2006), it was believed that the use of recreational hunters would be the most cost effective and efficient way to reduce deer densities in hopes of eradicating CWD (Bartelt et al., 2003). Unfortunately, recent surveys of DEZ hunters have revealed beliefs indicating low efficacy regarding current management strategies that rely on hunter effort. For example, most respondents do not believe that the DNR can be successful in eliminating CWD from wild deer if they get cooperation from hunters and landowners (Holsman, 2005; Holsman & Smail, 2006). Dorn and Mertig (2005) found a significant relationship between belief that it was possible to eradicate bovine TB and support for the goal of eradication. A majority of DEZ hunters also believed that it may be difficult to eliminate CWD because too many hunters oppose state control efforts (Holsman, 2005).

It has been suggested that providing evidence (positive reinforcement) proving deer density reduction has been successful may cause public support for management strategies to increase (Dorn & Mertig, 2005). This follows with the theory of locus of control (LOC) which is used to understand an individual or groups' intentions to behave adaptively based on the belief that they will or will not be positively reinforced for taking

action (Hungerford, Bluhm, Volk, & Ramsey, 1998). For example, a hunter with an internal LOC believes that he/she will be positively reinforced for participating in CWD management and is therefore more likely to take action in compliance with management strategies.

A study based on a hypothetical disease with similar characteristics to CWD concluded that hunters would support “draconian” deer density reductions given the unknown and dread factors associated with a disease like CWD (Peterson, Mertig, & Liu, 2006). These findings seem incongruent with experiences in both Michigan and Wisconsin where broad support for disease eradication did not translate into specific support for deer herd reduction as a strategy (Dorn & Mertig, 2005; Holsman & Smail, 2006) or widespread participation in the deer reduction effort (Holsman & Petchenik, 2006). This raises questions about the role of risk perceptions in hunter support for deer density reduction.

With CWD eradication predicated on risk management (Bartelt et al., 2003), the extent to which hunters perceive risks related to CWD may be one important factor influencing their support for deer density reduction. Little research is available to describe hunter support for deer density reduction in general or to predict the factors most likely to influence support. Collecting social data can help assess the level of stakeholder support for management strategies and identify areas of concern or areas for future communication efforts (Dorn & Mertig, 2005). Such information would be valuable to managers working to garner support for management of wildlife diseases where deer abundance poses social or ecological risks.

Support is influenced by what stakeholders perceive to be immediate and long-term consequences of the proposed management strategies and also by their attitudes and beliefs towards the proposed strategies. If managers in Wisconsin intend to continue the use of recreational deer hunters to control CWD, it is important to identify what factors may be influencing hunter support for deer density reduction in the DEZ. I tested a model that explored the influence of risk perceptions and other salient beliefs on deer hunter support for deer density reduction.

The Model

The proposed model (Figure 1) explores the relationships between several beliefs and their influence on hunter attitude toward specific deer density goals. The theoretical background for the relationships is described by the cognitive hierarchy (Figure 2). The cognitive hierarchy examines the underlying concepts in the process from thought to action and the relationships between the concepts with the end goal of explaining behavior (Decker, Brown, & Siemer, 2001). Of interest to this study is the portion of the hierarchy concerned with basic beliefs and attitudes and the relationship between these two concepts. Beliefs are reflections of thoughts about objects or issues (Decker et al., 2001, p.41) while attitudes are evaluations of a person, object, concept, or action (Decker et al., 2001, p.42). In the model, risk perceptions related to disease spread (Riskspd), disease impacts (Riskimp), belief that CWD needs to be eradicated (Neces) and belief that reduction strategies can be effective in controlling CWD (Efficacy) are considered independent variables influencing the dependent variable, support for deer density reduction in the DEZ (Goal). A description of each of the variables in the model can be found in Table 1.

Single-headed arrows in the model indicate the influence of one variable on another in the direction of the arrow. The hypothesized relationships are that risk perceptions are indirectly influencing support for reduction strategies through the belief that CWD needs to be eradicated, need to eradicate and efficacy of the reduction strategy are directly influencing goal support and efficacy is also indirectly influencing goal support through belief that CWD needs to be eradicated.

STUDY AREA

Data to test the hypothesized model were collected from the western disease eradication zone (DEZ) located in southwest Wisconsin (Figure 3). The DEZ was first created in 2002 and has been modified in size and was 331,767.2 ha (1,281 sq. mi.) during the 2006 deer hunting season. The core area, where the first CWD positive deer were discovered, is located in Dane County in the DEZ. The DEZ also includes portions of the following counties: Columbia, Sauk, Richland, Iowa, Lafayette and Green. Eight deer management units (DMUs) are part of the DEZ. DMUs are areas of similar land bounded by rivers and major road ways (WDNR 2006) set up to help understand the deer population and harvest history in an area. All of DMU 70A is located in the DEZ. Portions of DMU 70, 70B, 71, 73E, 75C, 75D, 76, and 76M are also within the DEZ boundaries.

METHODS

Survey Administration

A 12-page questionnaire was used to obtain DEZ deer hunter opinions about CWD and its current management (Appendix A). I followed procedures of Dillman (2000) and sent cover letters, first class postage stamps, post card reminders and

duplicate survey packets to non-respondents. Each study subject was assigned a survey code to allow tracking of individual response rates, while ensuring that each individual remained anonymous. Incorrect addresses, deceased individuals, and refusals to participate were removed from the initial samples in calculating response rates. All responses from usable questionnaires were recorded in SPSS 14.0 for analysis. The University of Wisconsin-Stevens Point Institutional Review Board for research involving human subjects approved the research protocol used in this study.

Sampling

The study population was comprised of two separate samples. The first sample ($n = 1,200$) was randomly selected from Wisconsin Department of Natural Resources (DNR) records of resident deer hunters >18 years old who harvested a deer with a firearm during the 2003, 2004 or 2005 seasons in the DEZ from DNR records. Though sampling of successful hunters has the potential to introduce bias, past results have indicated that hunter attitudes and behaviors have not differed between successful and unsuccessful hunters in the DEZ (Holsman & Smail, 2006). Furthermore, WDNR does not collect DMU information at their point-of-sale license sales so the only available option for linking hunters to the DEZ was through registration information.

The second sample population was a group of 390 hunters that had harvested a CWD positive deer between 2001 and 2006. This group was sampled to look at the role of experience for a separate part of the study. No differences were found to exist in survey responses between the two sample populations therefore the two samples were combined to increase the sample size to 1,590.

Measurement of Variables

Goal support. Support for deer reduction was measured on a 6-point scale ranging from “I support the DNR objective of 5 deer per square mile” (6) to “I do not support ANY further reductions of deer populations in the DEZ” (1) using 5 deer per square mile increments. Agency personnel reviewing the questionnaire were unwilling to allow response options that would have *increased* deer numbers.

Need to eradicate CWD. Attitudes regarding necessity of eradicating CWD were measured using a single variable on a 7-point semantic differential. Respondents were asked to provide an opinion about the need to eradicate CWD ranging from “necessary” (1) to “unnecessary” (7).

Risk Perceptions. Level of concern over the potential risks of CWD was measured using 6 questions pertaining to CWD prevalence levels, geographic spread of the disease, health of the deer, and threats to human health. Response choices to each question were given a numerical value from “very concerned” (5), to “not at all concerned” (2), and “not sure” (1). Prior to analysis “not sure” responses were removed based on the small portion of the responses in this category (~3%). Risk was divided into 2 separate variables to evaluate the influence of geographic based risks and potential impacts of CWD. Risk of spread (Riskspd) encompassed geographical concerns such as spread of the disease and changes in prevalence. Risk of disease impacts (Riskimp) encompassed concerns about the impacts of CWD on deer health, deer hunting, and human health.

Efficacy of the reduction strategy. Efficacy was measured using several statements addressing hunter beliefs about effects of deer reduction on prevalence and distribution of CWD. The statements were 1) reducing the deer population will reduce

the prevalence of CWD in the DEZ, 2) reducing the deer population will reduce the spread of CWD outside of the boundaries of its current locations, 3) reducing the deer population will help eliminate CWD in the DEZ, and 4) I trust that the deer reduction plan is based on the best available science. Each of the four questions was measured on a 5-point Likert scale ranging from “strongly agree” (2) to “strongly disagree” (-2) with unsure receiving a value of 0.

Prior to conducting the path analysis, I recoded negatively-worded independent variables so their values were consistent with direction of scale for the dependent variable—goal support. Cases with missing values on any variable were deleted. This reduced the sample to 591, which was then split to allow testing of model revisions. The first sample ($n = 315$) was used to evaluate the initial model fit to the data. The second sample ($n = 276$) was used to evaluate a revised model.

ANALYSIS

I tested the proposed model and investigated influences on hunter support for deer reduction goals using path analysis. An advantage of using path analysis over multiple regression is that path analysis allows for testing of direct and indirect relationships (Woods, Guynn, Hammitt, & Patterson, 1996). In addition, variables do not have to be independent of one another. Assumptions of path analysis are that the data are continuous and follow a normal distribution. I performed Structural Equation Modeling (SEM), a specific type of path analysis based on confirmatory statistical methodology that allows the simultaneous evaluation of the conceptual model and the underlying measurement model including latent or unobserved variables (Byrne, 2001).

Principle Component Analysis (PCA) and Cronbach test of reliability were used to confirm the hypotheses that the underlying measurement items for Riskspd, Riskimp, and Efficacy were measuring these latent variables. Measurement items that load on a single factor (component) indicate that the items are measuring the underlying construct. PCA values ≥ 0.40 (Stevens, 2002) and Cronbach alpha reliability scores ≥ 0.70 (Nunnaly, 1978) were indicative of internal consistency among the variables.

Path analysis was performed using AMOS Graphics 16.0. Path coefficients (β) for direct, indirect, and total effects in model 1 were generated. Hypothesized path model results were evaluated using several goodness-of-fit tests including chi-square (χ^2), the normed fit index (NFI), the comparative fit index (CFI), minimum discrepancy divided by degrees of freedom (CMIN/DF), root mean square error of approximation (RMSEA) with 90% confidence intervals (LO 90, HI 90), and Akaike information criterion (AIC). These additional model fit indices are used by researchers to avoid rejecting an adequate model based on inflated chi-square values (Byrne, 2001). Modification indices (MI) were calculated for the initial model to test for model misspecification. MI's identify areas of model misspecification regardless of normality or other test assumption violations and suggest how the model could be redrawn to better fit the data. Data were also tested for normality. To correct for potential inflated chi-square values resulting from nonnormal data, Bollen-Stine bootstrapped values were calculated and bootstrap resampling procedures were used to generate bias-corrected path coefficients and R^2 values.

Basic descriptive statistics, zero-order correlations, and variance inflation factors (VIF) were obtained in SPSS prior to importing data into AMOS. I examined VIF to

assess multicollinearity which can produce biased estimates of path coefficients in the model (Woods et al., 1996).

RESULTS

Survey Response

Of the random sample of 1,200, 82 individuals were lost due to bad addresses and people who had moved, were now deceased or refused to participate in the study bringing the sample down to 1,118. Five hundred and ten questionnaires were returned for a total response rate of 46%. The questionnaire was only one part of a series of surveys sent to the same 1,200 individuals over a 6 month period. Response rate to the questionnaire may be low because of the high response burden, as the questionnaire was the last survey tool administered.

Of the sample of hunters who harvested a CWD positive deer ($n = 390$), 36 hunters were removed because of bad addresses and refusal to participate for a final sample of 354. Two hundred and thirteen hunters responded yielding an overall response rate of 60%. When combined total sample size was 723 for a final response rate of 46%.

To address the issue of nonresponse bias for the questionnaire, 30 nonrespondents from the 1,200 random sample were contacted and surveyed by telephone. Responses from a subsample of 7 questionnaire items asked during the telephone survey of nonrespondents were compared to those of mail survey respondents. While no significant differences were found between respondents and nonrespondents, it was concluded that CWD and deer hunting in general are slightly less salient issues for nonrespondents. Nonrespondents were less likely to have hunted in the DEZ in 2006, and indicated that hunting was less central to their lives compared to respondents.

Mean scores for the 6 risk concern questions indicated that hunters are most concerned about hunting satisfaction declining from a reduction in deer health because of CWD ($\bar{x} = 3.38$) and the potential for CWD to spread to other areas of the state in the next 5 years ($\bar{x} = 3.36$) (Table 2). Hunters are least concerned about a human getting sick as a result of eating venison from a deer with CWD ($\bar{x} = 2.94$) (Table 2). Mean scores for the questions pertaining to efficacy of the management goal were low, most indicating neutral or dissenting opinions with the given statement (Table 2). When asked their opinion about the need to eradicate CWD, 37% of respondents believed that it was slightly to very necessary while 44% believed it was unnecessary. Thirty-five percent of respondents did not support any further herd reductions in the DEZ, while 51% supported reducing deer to somewhere between 10 and 25-deer/sq. mi. Only 14% supported the DNR goal of 5-deer/sq. mi.

PCA and Cronbach alpha scores for all 3 latent variables had factor loadings in excess of the 0.40 and 0.70 convention indicating strong correlations and internal consistency of the measurement items for each of the latent variables (Table 3).

The Model

All correlations between variables in the model were significant at the 0.01 level (Table 4). None of the variance inflation values for the independent variables included in the path model exceeded 10 (Table 4). Therefore, multicollinearity was not considered to be an issue in this model analysis (Woods et al., 1996). The chi-square goodness-of-fit test ($\chi^2 = 532.6$, $df = 51$, $p < .001$) for the initial model indicates poor fit of the model to the data based on the significant p -value. The Bollen-Stine bootstrapped p -value was also significant ($p < .001$) indicating poor model fit (Table 5).

Values for the additional model fit indices NFI and CFI were below the 0.95 convention of superior model fit. RMSEA was >0.05 with a fairly precise confidence interval and AIC was high (Table 5). These values support the chi-square and Bollen-Stine values leading to rejection of the initial model.

AMOS generated MI's suggested several areas for model respecification to improve overall model fit. I acknowledged that following MI's was going beyond confirmatory analysis and into exploratory analysis. However, MI's are considered equivalent to post hoc testing supported by other statistical tests and use of MI's was promoted in path analysis instructions (Byrne, 2001). Only modifications that were theoretically justified were included.

A second model (model 2) was generated based on the addition or removal of parameters suggested by MI's. Humrisk ($\beta = 0.55$), and Deermort ($\beta = 0.87$) were removed from the model and Riskimp and Riskspd were collapsed into one latent variable labeled Risk in model 2. Efficacy was reduced by eliminating the weak paths to Trust ($\beta = 0.68$), and Reducel ($\beta = 0.79$). The results of the MI's indicated that several additional modifications could be made to the model to create a model that would better fit the data. A double-sided arrow representing covariance or correlations between pairs of variables was added to connect Efficacy and Risk.

Model 2 (Figure 5) yielded substantial improvement in the chi-square goodness-of-fit test ($\chi^2 = 43.8$, $df = 17$, $p < .001$) and Bollen-Stine bootstrapped p -value ($p < 0.05$), yet they still were significant indicating a misspecified model (Table 5). To avoid rejecting an adequate model based on inflation of chi-square values, additional model-fit indices were again consulted. NFI and CFI values were above the 0.95 convention,

RMSEA was suggestive of adequate fit of the model to the data, and the CMIN/DF and AIC values were much lower compared to the initial model (Table 5).

Standardized path coefficients from Risk and Efficacy to Necessity were 0.43, and -0.38 respectively. Standardized path coefficients from Necessity and Efficacy to Goal were 0.24 and 0.54. The R^2 values for Necessity and Goal were 0.54 and 0.53 (Figure 5).

Bootstrapping was used to correct for nonnormality in the data sample. Bootstrap estimates were calculated using the lower and upper bounds for the standardized bias-corrected estimates. Only minor variations in values were found between bootstrap estimates and original maximum likelihood estimates for model 2 and were not enough to change the final outputs in the path diagram (Table 6).

Direct, indirect, and total effects for all the relationships included in model 2 as well as the R^2 values for Necessity and Goal are shown in Table 7. When looking at the total effects of each of the independent variables on the dependent, risk perceptions had a greater total effect on belief that CWD needs to be eradicated compared to efficacy of the management strategy. Furthermore, efficacy of the management strategy had the greatest total effect on support for specific deer reduction goals compared to risk perceptions or belief that CWD needs to be eradicated.

DISCUSSION

Congruent with other studies of hunters in CWD areas (Gigliotti, 2004; Holsman, 2005; Holsman & Smail 2006; Miller, 2004), I found minimal concern for human health risks of CWD and moderate concern for spread of the disease and impacts to hunting. When asked about the current reduction strategy, hunters continue to express doubt and uncertainty about the efficacy of deer reduction to produce desired outcomes (i.e.,

reducing prevalence of CWD, controlling spread, eliminating CWD from Wisconsin deer).

From the final model, it appears that the influence of risk perceptions on hunter support for deer density reduction goals is mediated by the belief that CWD needs to be eradicated. While risk perceptions play a role in understanding goal support, belief that reducing deer densities will be effective in eradicating CWD was found to be the greatest influence on support for deer density reduction. Dorn and Mertig (2005) concluded that evidence that management strategies are being effective in controlling disease may help increase stakeholder support for deer reduction strategies.

According to van der Pligt (2006), increased sense of risk and low expectations of success in dealing with the risk lead to feelings of helplessness, decreasing an individual or groups' intentions to behave adaptively. In the final model, a fairly strong relationship was found between risk perceptions and efficacy of the management strategy. However, the direction of the relationships described by van der Pligt (2006) does not hold true for DEZ hunters. Hunters associate low levels of risk with CWD and continue to express beliefs that reducing deer densities will not be effective in controlling or eliminating CWD. More specifically, they do not believe that hunters can be effective in reducing deer densities and even if they were successful, while desirable, eradication of CWD is probably not possible.

Reflecting back on the cognitive hierarchy I found that basic beliefs about CWD predicted attitudes toward deer reduction, but explained only 53% of the variance in the model. Hunters may have beliefs about what deer densities should be in the DEZ independent of CWD. For example, a hunter that is also a farmer may be experiencing

crop damage and want to see deer densities lowered. On the other hand, some hunters may not want to see deer densities reduced regardless of the presence of a disease, because they simply like to see high deer numbers. In addition, the cognitive hierarchy suggests that other concepts that were not included in this study also influence attitudes (i.e., norms, value orientations).

Lastly, it is possible that variables in the model could be rescaled and tested again. For example, the question used to measure goal support was truncated based on feedback provided by managers during questionnaire development. The DNR was not willing to allow deer densities in the DEZ to go higher than the current estimates of 33-deer/sq. mi, consequently the respondents were not given the option. It would not have been appropriate for the question to mislead respondents and allow them to believe that reduction efforts may cease.

MANAGEMENT IMPLICATIONS

Based on the mediated and fairly minimal influence of risk on support for deer density reduction, it appears that hunters perceptions of risk associated with CWD are not consistent with the current management rationale. The consequence of this imbalance is that the fundamental basis of the CWD management strategy is essentially based on risks that hunters do not hold. From the relationships described in the revised model, it is possible that increasing risk perceptions may increase hunter belief that CWD needs to be eradicated. However, that may not translate directly to an increase in support for management goals.

Attempting to increase risk perceptions of hunters would only be a temporary solution and would eventually lead to undesired outcomes. As Needham et al. (2004)

found, eventually risks will get too high (human death, extensive spread of the disease or substantial increases in prevalence) and people will cease hunting. Recreational hunters are a key component in CWD management. Significant declines in hunter participation would have severe consequences on the success of the management program.

A change in communication efforts between management agencies and stakeholders may be in order. At this time, the message is “eradication.” However, with most hunters worried about spread and hunting impacts, the more appropriate and effective message may be to reduce deer densities to reduce prevalence and reduce spread of CWD. Managers need to focus on the efficacy of the strategy, providing hunters with tangible evidence that their efforts have not been in vain. As managers begin to detect declines in prevalence or signs that the disease is no longer spreading they need to find a way to communicate these findings to stakeholders. Hunters and landowners need positive reinforcement to increase their willingness to sacrifice their personal preferences (e.g., high deer densities) for the good of the deer resource in the future. In addition, evidence of success in reducing prevalence and spread may increase hunter trust in the science behind the reduction strategy.

Previous studies have found little support among DEZ hunters for the reduction goal of 5-deer/sq. mi (Holsman, 2005; Holsman & Smail, 2006). I found that 51% of respondents are willing to meet the DNR half way by reducing deer densities to somewhere between 10 and 25-deer/sq. mi. Perhaps it is worth taking a more gradual management approach to reduction in an effort to accommodate hunter attitudes and allow managers to build a case for the reduction strategy. This would give managers a

chance to provide the positive reinforcement discussed in the previous paragraph that will be important in encouraging hunters to act in compliance with herd reduction.

SUMMARY

Successful wildlife disease management strategies are those that are well communicated and supported by stakeholder groups (Pfeiffer, 2006). My findings suggest changing communication strategies to better address hunter attitudes and beliefs towards the management of CWD may increase support for specific strategies.

Currently, hunters express doubt about the efficacy of herd reduction as a CWD control strategy, and are unsure about the science upon which the reduction strategy is based.

Providing hunters with tangible evidence that reduction strategies have in fact been successful in reducing prevalence and controlling the spread of CWD may encourage hunter support and participation in herd reduction.

Contrary to recent studies that have found strong opposition to the 5-deer/sq. mi. goal for the DEZ, it appears that a slight majority of hunters are willing to reduce deer to some density between 10 and 25-deer/sq. mi in the DEZ. If managers intend to continue soliciting the participation of recreational hunters in herd reduction strategies it may be worth adopting a more gradual reduction strategy that focuses on reducing spread and prevalence as many hunters do not believe eradication to be an obtainable goal.

LITERATURE CITED

- Association of Fish and Wildlife Agencies, & Smithwick, R. (2008). Hunting helps maintain deer as valued public resource. *Human-Wildlife Conflicts* 2, 9-11.
- Bartlett, G., Pardee, J., & Thiede, K. (2003). *Environmental impact statement on rules to eradicate chronic wasting disease in Wisconsin's free-ranging white-tailed deer herd*. Madison: Wisconsin Department of Natural Resources.
- Brown, T.L., Decker, D.J., Riley, S.J., Enck, J.W., Lauber, T.B., Curtis, P.D., & Mattfeld, G.F. (2000). The future of hunting as a mechanism to control white-tailed deer populations. *Wildlife Society Bulletin*, 28, 797-807.
- Byrne, B.M. (2001). *Structural equation modeling with AMOS: basic concepts, applications, and programming*. New Jersey: Lawrence Erlbaum Associates.
- Curtis, P.D., D.J. Decker, R.J. Stout, M.E. Richmond, & Loker, C.A. (1993). Human dimensions of contraception in wildlife management. Proceedings of the Contraception in Wildlife Management Symposium. Denver, CO.
- Decker, D.J., & Purdy, K.G. (1988). Toward a concept of wildlife acceptance capacity in wildlife management. *Wildlife Society Bulletin*, 16, 53-57.
- Decker, D.J., Brown, T.L., & Siemer, W.F. (Eds.). (2001). *Human dimensions of wildlife management in north America*. Maryland: The Wildlife Society.
- Dillman, D.A. (2000). *Mail and internet surveys: the tailored design method*. New York: John Wiley and Sons.
- Dorn, M.L., & Mertig, A.G. (2005). Bovine tuberculosis in Michigan: stakeholder attitudes and implications for eradication efforts. *Wildlife Society Bulletin*, 33, 539-552.
- Freudenburg, W.R. (1988). Perceived risk, real risk: Social science and the art of probabilistic risk assessment. *Science*, 242, 44-49.
- Fulton, D.C., K. Skerl, E.M. Shank, & Lime, D.W. (2004). Beliefs and attitudes toward lethal management of deer in cuyahoga valley national park. *Wildlife Society Bulletin*, 32, 1166-1176.
- Gross, J.E., & Miller, M.W. (2001). Chronic wasting disease in mule deer: Disease dynamics and control. *Journal of Wildlife Management*, 65, 205-215.
- Hines, J.M, Hungerford, H.R., & Tomera, A.N. (1987). Analysis and synthesis of research on responsible environmental behavior: a meta-analysis. *Journal of Environmental Education*, 18, 1-8.

- Holsman, R.H. & Petchenik, J. (2006). Predicting deer hunter harvest in Wisconsin's Chronic Wasting Disease Eradication Zone. *Human Dimensions of Wildlife Journal*, 11, 177-189.
- Holsman, R.H. & Smail, R.A. (2006). *Tracking DEZ deer hunters: A report of the Hunter Effort and Attitudes for the 2005 deer hunting season with relevant three-year trends*. College of Natural Resources: University of Wisconsin-Stevens Point.
- Holsman, R.H. (2005). *Untangling the relationship between hunter effort and hunter harvest: Results from the 2004 (year 2) study of deer hunters in Wisconsin's Chronic Wasting Disease Eradication Zone*. College of Natural Resources: University of Wisconsin-Stevens Point.
- Hungerford, H.R., Bluhm, W.J., Volk, T.L., & Ramsey, J.M. (1998). *Essential readings in environmental education*. Illinois: Stipes Publishing L.L.C.
- Koval, M.H., & Mertig, A.G. (2004). Attitudes of the Michigan public and wildlife agency personnel toward lethal wildlife management. *Wildlife Society Bulletin*, 32, 232-243.
- Loker, C.A., Decker, D.J., & Schwager, S.J. (1999). Social acceptability of wildlife management actions in suburban areas: 3 cases from New York. *Wildlife Society Bulletin*, 27, 152-159.
- Mathiason, C.K., Powers, J.G., Dahmes, S.J., Osborn, D.A., Miller, K.V., Warren, R.J., Mason, G.L., Hays, S.A., Hayes-Klug, J., Seelig, D.M., Wild, M.A., Wolfe, L.L., Spraker, T.R., Miller, M.W., Sigurdson, C.J., Telling, G.C., & Hoover, E.A. 2006. Infectious prions in the saliva and blood of deer with chronic wasting disease. *Science*, 314, 133-135.
- Miller, M.W., Williams, E.S., McCarty, C.W., Spraker, T.R., Kreeger, T.J., Larsen, C.T., & Thorne, E.T. (2000). Epizootiology of chronic wasting disease in free-ranging cervids in Colorado and Wyoming. *Journal of Wildlife Diseases*, 36, 676-690.
- Minnesota Department of Natural Resources. (2008). *Managing bovine tuberculosis in Minnesota's wild deer*. St. Paul: Minnesota Department of Natural Resources.
- Needham, M.D., Vaske, J.J., Donnelly, M.P., & Manfredo, M.J. (2007). Hunting specialization and its relationship to participation in response to chronic wasting disease. *Journal of Leisure Research*, 39, 413-437.
- Nunnally, J. (1978). *Psychometric theory*. New York: McGraw-Hill.

- Peterson, M.N., Mertig, A.G., & Liu, J. (2006). Effects of zoonotic disease attributes on public attitudes towards wildlife management. *Journal of Wildlife Management*, 70, 1746-1753.
- Pfeiffer, D.U. (2006). Communicating risk and uncertainty in relation to development and implementation of disease control policies. *Veterinary Microbiology*, 112, 259-264.
- Sjöberg, L. (2000). Factors in risk perception. *Risk Analysis*, 20, 1-10.
- Slovic, P. (1987). Perception of risk. *Science*, 236, 280-285.
- Stevens, J. (2002). Applied multivariate statistics for the social sciences (4th ed). New Jersey: Lawrence Erlbaum.
- van der Pligt, J. (1996). Risk perception and self-protective behavior. *European Psychologist*, 1, 34-43.
- Williams, E.S., & Barker, I.K. (2001). *Infectious diseases of wild mammals* (3rd ed.). Iowa: Blackwell Publishing.
- Wisconsin Department of Natural Resources. (2006). *Chronic wasting disease update*. Madison: Wisconsin Department of Natural Resources.
- Woods, G.R., Guynn, D.C., Hammitt, W.E., & Patterson, M.E. (1996). Determinants of participant satisfaction with quality deer management. *Wildlife Society Bulletin*, 24, 318-324.

Table 1. Variables included in the measurement model with their corresponding measurement question from the 2006 deer hunter opinion questionnaire.

Variable in Model	Question in survey
Goal	Which of the following deer population goals do you support for the DEZ?
Neces	In my opinion eradication CWD is...necessary --> unnecessary?
<i>Riskspd</i>	
Curprev	How concerned are you with the current prevalence levels of CWD in the DEZ?
Previnc	How concerned are you that prevalence levels will increase in the DEZ over the next 5 years?
Spread	How concerned are you that CWD will spread to deer in other areas of the state in the next 5 years?
<i>Riskimp</i>	
Deermort	How concerned are you that deer deaths as a result of this disease will negatively impact your future deer hunting satisfaction by reducing the number of deer where you do more of your hunting?
Deersat	How concerned are you that CWD will negatively impact your future deer hunting satisfaction by reducing the health of deer where you do more of your hunting?
Humrisk	How concerned are you that a human will get sick as a result of eating venison from a deer that has CWD?
<i>Efficacy</i>	
Reducpr	Reducing the deer population will reduce the prevalence of CWD in the DEZ.
Reducsp	Reducing the deer population will reduce the spread of CWD outside the boundaries of its current locations.
Reducel	Reducing the deer population will help eliminate CWD in the DEZ.
Trust	I trust that the deer reduction plan is based on the best available science.

Table 2. Descriptive statistics (\bar{x} , SD, mode) for the 6 risk concern questions used to measure the 2 latent risk variables (Riskspd and Riskimp) and the 4 measures of Efficacy based on responses from 655 survey respondents prior to recoding.

Survey Question	\bar{x}	SD	Mode
Risk^a			
How concerned are you that CWD will negatively impact your future deer hunting satisfaction by reducing the health of deer where you do more of your hunting?	3.38	1.17	2
How concerned are you that CWD will spread to deer in other areas of the state in the next 5 years?	3.36	1.16	3
How concerned are you that prevalence levels will increase in the DEZ over the next 5 years?	3.29	1.12	3
How concerned are you that deer deaths as a result of this disease negatively impact your hunting satisfaction by reducing the number of deer where you do most of your hunting?	3.29	1.23	2
How concerned are you with the current CWD prevalence levels in the DEZ?	3.25	1.04	3
How concerned are you that a human will get sick as a result of eating venison from a deer that has CWD?	2.94	1.14	2
Efficacy^b			
Reducing the deer population will reduce the prevalence of CWD in the DEZ.	0.12	1.29	1
Reducing the deer population will reduce the spread of CWD outside of the boundaries of its current locations.	0.00	1.27	1
I trust that the deer reduction plan is based on the best available science.	-0.01	1.28	1
Reducing the deer population will help eliminate CWD in the DEZ.	-0.29	1.27	-1

^aVariables coded on a 4-point scale: (1) not sure, (2) not at all concerned, (3) slightly concerned, (4) moderately concerned, (5) very concerned.

^bVariables coded on a 5-point scale: (-2) strongly disagree, (-1) disagree, (0) unsure, (1) agree, (2) strongly agree.

Table 3. Principle Component Analysis (PCA) factor loadings with one component extraction and Cronbach alpha test of reliability (α) results for the initial model.

Concern Questions	PCA	α
Riskspd		.930
Concern for current CWD prevalence levels	.931	
Concern for the spread of CWD	.943	
Concern for increases in prevalence levels	.938	
Riskimp		.828
Concern for deer deaths negatively impacting hunting	.907	
Concern for decrease in hunting satisfaction due to decrease in deer health from CWD	.930	
Concern for human health	.744	
Efficacy		.879
Reducing the deer population will reduce the prevalence of CWD in the DEZ	.904	
Reducing the deer population will reduce the spread of CWD outside the boundaries of its current locations	.899	
Reducing the deer population will help eliminate CWD in the DEZ	.845	
I trust that the deer reduction plan is based on the best available science	.775	

Table 4. Mean (\bar{x}), standard deviation (SD), variance inflation factors (VIF), and zero-order correlations of variables included in path analysis. Responses are from 655 respondents prior to recoding of variables.

	Variable	\bar{x}	SD	VIF	Zero-order correlations												
					1	2	3	4	5	6	7	8	9	10	11		
1	Curprev	3.25	1.04	3.43													
2	Previnc	3.29	1.12	3.99	.82												
3	Spread	3.36	1.16	3.87	.79	.81											
4	Deermort	3.29	1.23	3.18	.56	.60	.62										
5	Deersat	3.38	1.17	4.06	.64	.68	.71	.82									
6	Humrisk	2.94	1.14	1.47	.48	.51	.52	.47	.54								
7	Neces	4.22	2.04	2.21	-.58	-.58	-.61	-.49	-.55	-.43							
8	Reducpr	0.12	1.29	2.90	.47	.47	.49	.34	.40	.34	-.56						
9	Reducsp	0.00	1.27	2.86	.48	.47	.52	.36	.43	.33	-.58	.76					
10	Reducel	-0.29	1.27	2.13	.42	.45	.47	.34	.37	.30	-.55	.66	.65				
11	Trust	-0.01	1.28	1.77	.45	.43	.48	.30	.38	.30	-.55	.56	.56	.49			
12	Goal	4.01	1.83		-.51	-.52	-.56	-.38	-.42	-.31	.61	-.57	-.57	-.54	-.56		

*All correlations are significant at the .01 level

Table 5. Goodness-of-fit indices of global model fit from path analysis output for the initial model and model 2.

Model	<i>n</i>	χ^2	<i>df</i>	<i>p</i>- value	Bollen- Stine	NFI	CFI	CMIN /DF	RMSEA	LO 90	HI 90	AIC
^a Initial Model	315	532.6	51	.000	.000	.818	.831	10.44	.173	.160	.187	610.6
^b Model 2	276	43.8	17	.000	.004	.974	.984	2.57	.076	.048	.104	97.8

^aIncludes the following observed variables: curprev, previnc, spread, deermort, deersat, humrisk, reducpr, reducsp, reducel, trust, neces, and goal; latent variables: riskspd, riskimp, and efficacy.

^bIncludes the following variables: deersat, curprev, previnc, spread, reducepr, reducsp, neces, and goal; latent variables: RPI, and efficacy

Table 6. Direct, indirect and total effects of the independent variables on the dependent variables generated from path analysis for model 2.

Effect	Causal effects			R ²
	Direct	Indirect	Total	
On Necessity				.54
Risk	.430	---	.430	
Efficacy	.383	---	.383	
On Goal				.53
Necessity	.244	---	.244	
Risk	---	.105	.105	
Efficacy	.541	.094	.634	

Table 7. Original and bias-corrected bootstrapped path coefficients (β) for model 2.

Parameter	Estimate	Bootstrap Estimate	Lower bound	Upper bound	<i>p</i>-value
Risk → Neces	.430	.426	.308	.545	.001
err1 → Neces	-.675	-.677	-.735	-.618	.001
Efficacy → Neces	.383	.382	.255	.508	.001
Risk → Deersat	.763	.759	.703	.815	.001
Risk → Curprev	.891	.883	.852	.915	.003
Risk → Spread	.915	.907	.871	.943	.003
Risk → Previnc	.933	.932	.907	.957	.001
Efficacy → Reducpr	.859	.855	.795	.914	.001
Efficacy → Reducsp	.852	.844	.790	.897	.002
Neces → Goal	.244	.235	.101	.369	.009
Efficacy → Goal	.541	.544	.419	.668	.001
err2 → Goal	.688	.692	.683	.745	.000

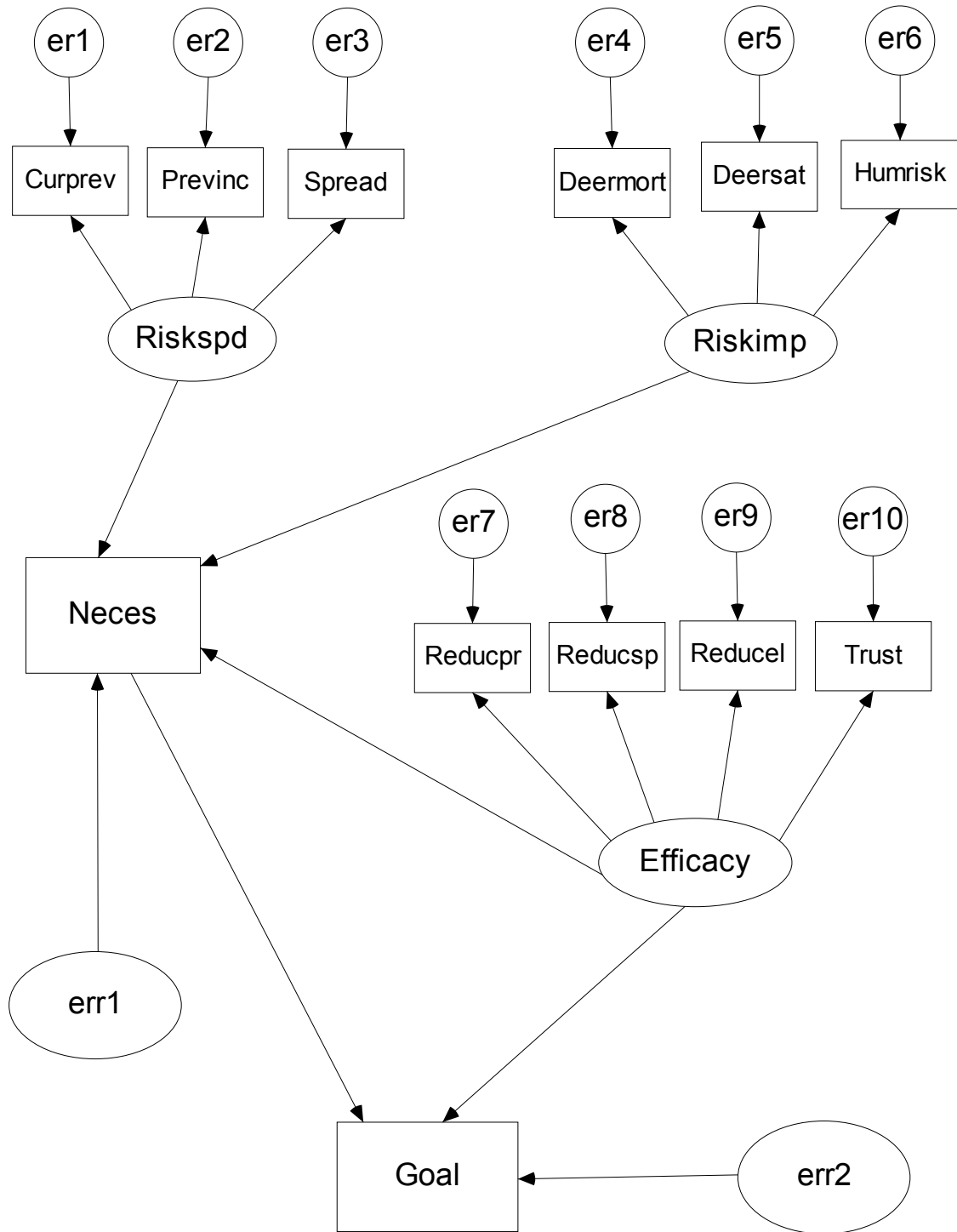


Figure 1. Initial model depicting influence of several independent observed (squares) and latent (circles) variables on support for deer herd reduction (Goal). Diagram as drawn for input into AMOS Graphics 16.0 for evaluation using path analysis.

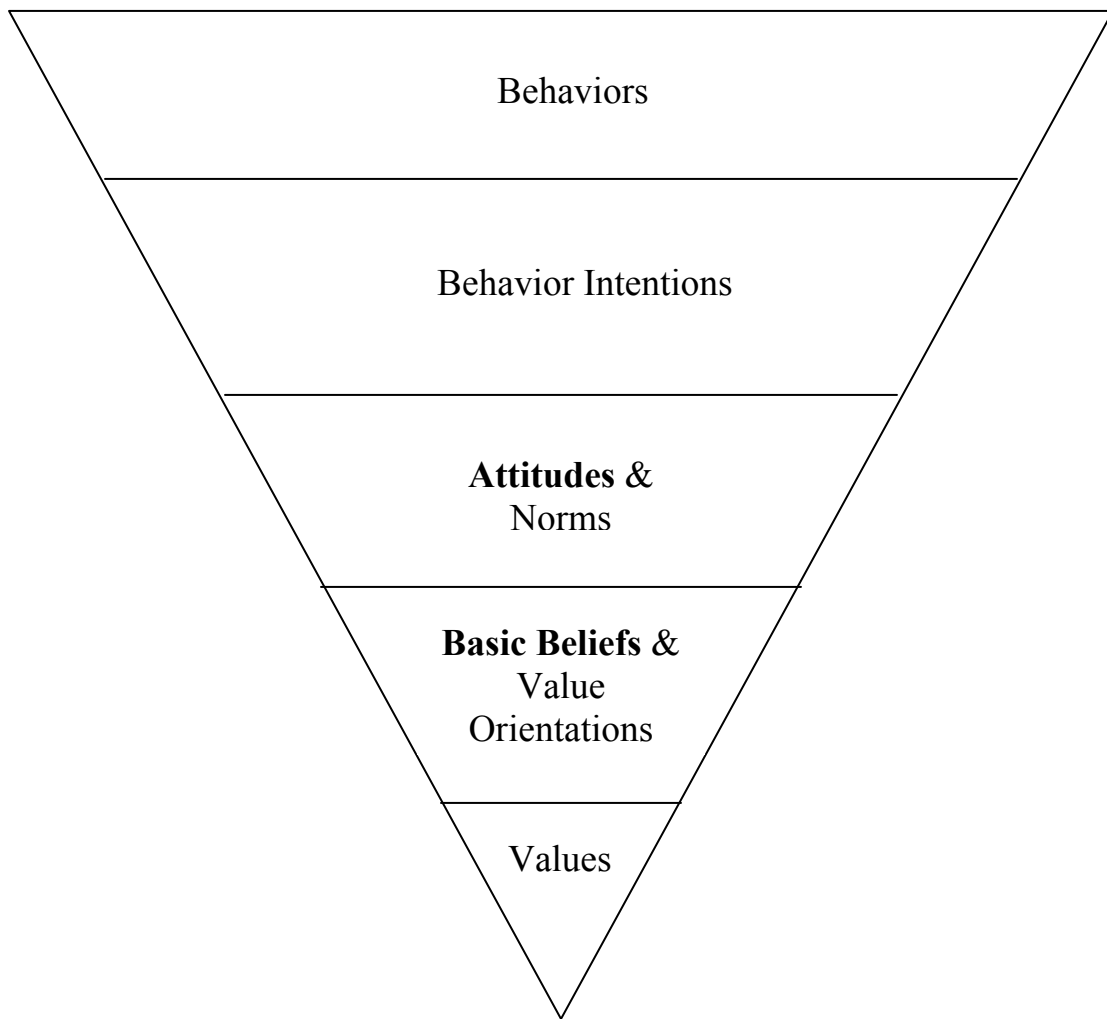


Figure 2. Cognitive hierarchy showing the relationship between concepts involved in thought and action eventually leading to the explanation of behavior (Decker et al., 2001).

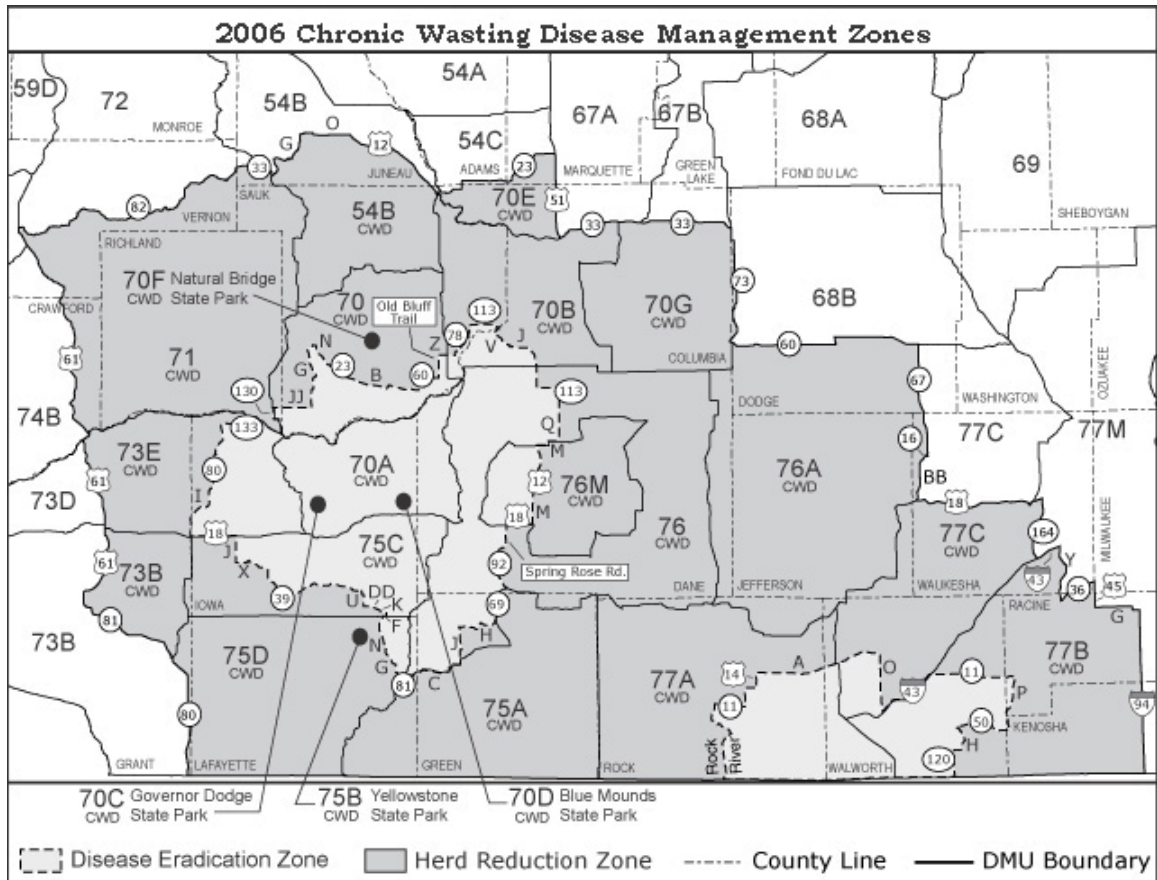


Figure 3. Boundaries for the 2006 herd reduction zone (HRZ), western disease eradication zone (DEZ) and eastern disease eradication zone (EDEZ) in southern Wisconsin. The study area (DEZ) was 331,767.2 ha (1,281 sq. mi.) during the 2006 deer hunting season (Wisconsin Department of Natural Resources, 2006).

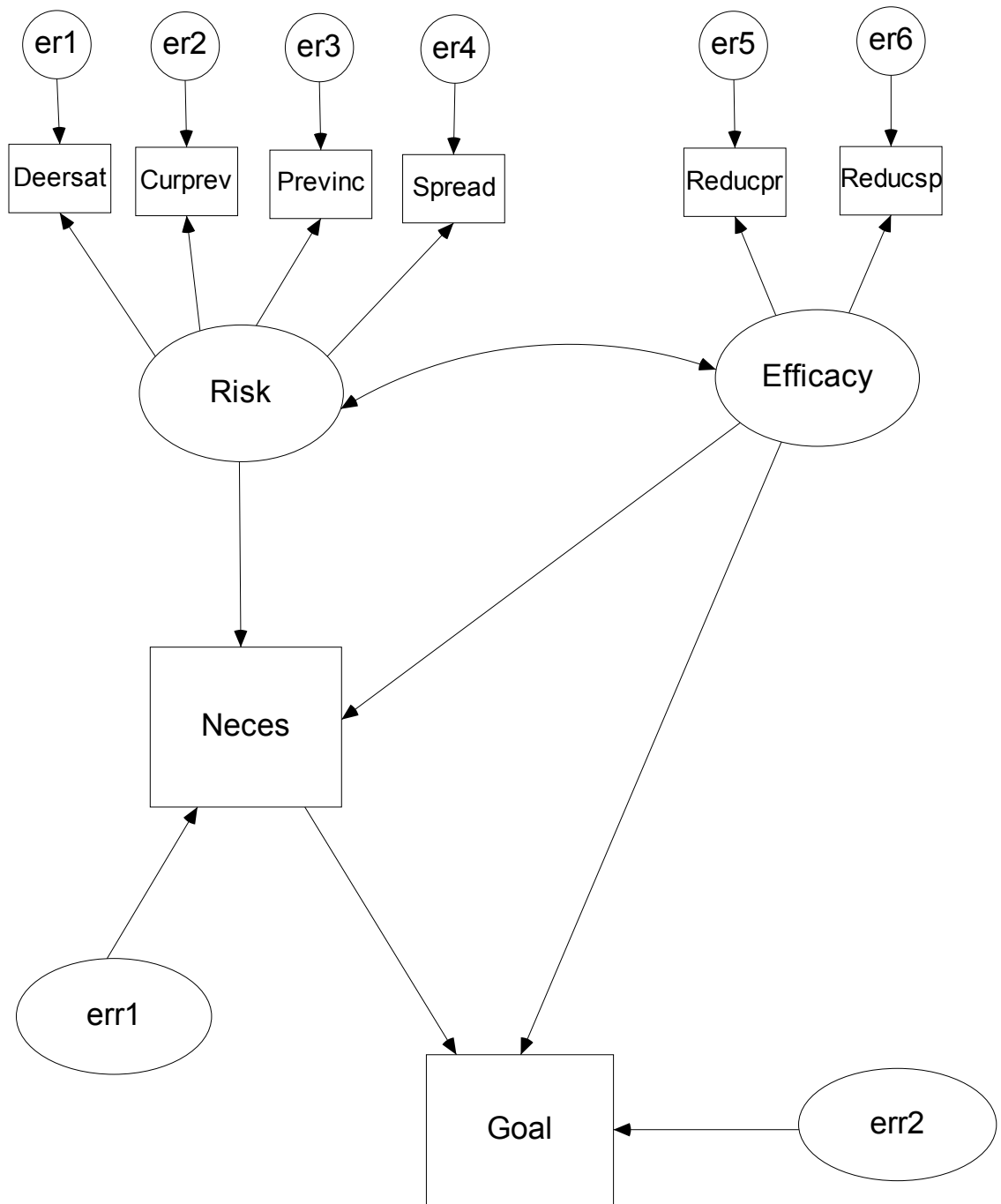


Figure 4. Model 2 depicting influence of several independent observed (squares) and latent (circles) variables on support for deer herd reduction (Goal) as revised from initial model. Diagram as drawn for input into AMOS Graphics 16.0 for evaluation using path analysis.

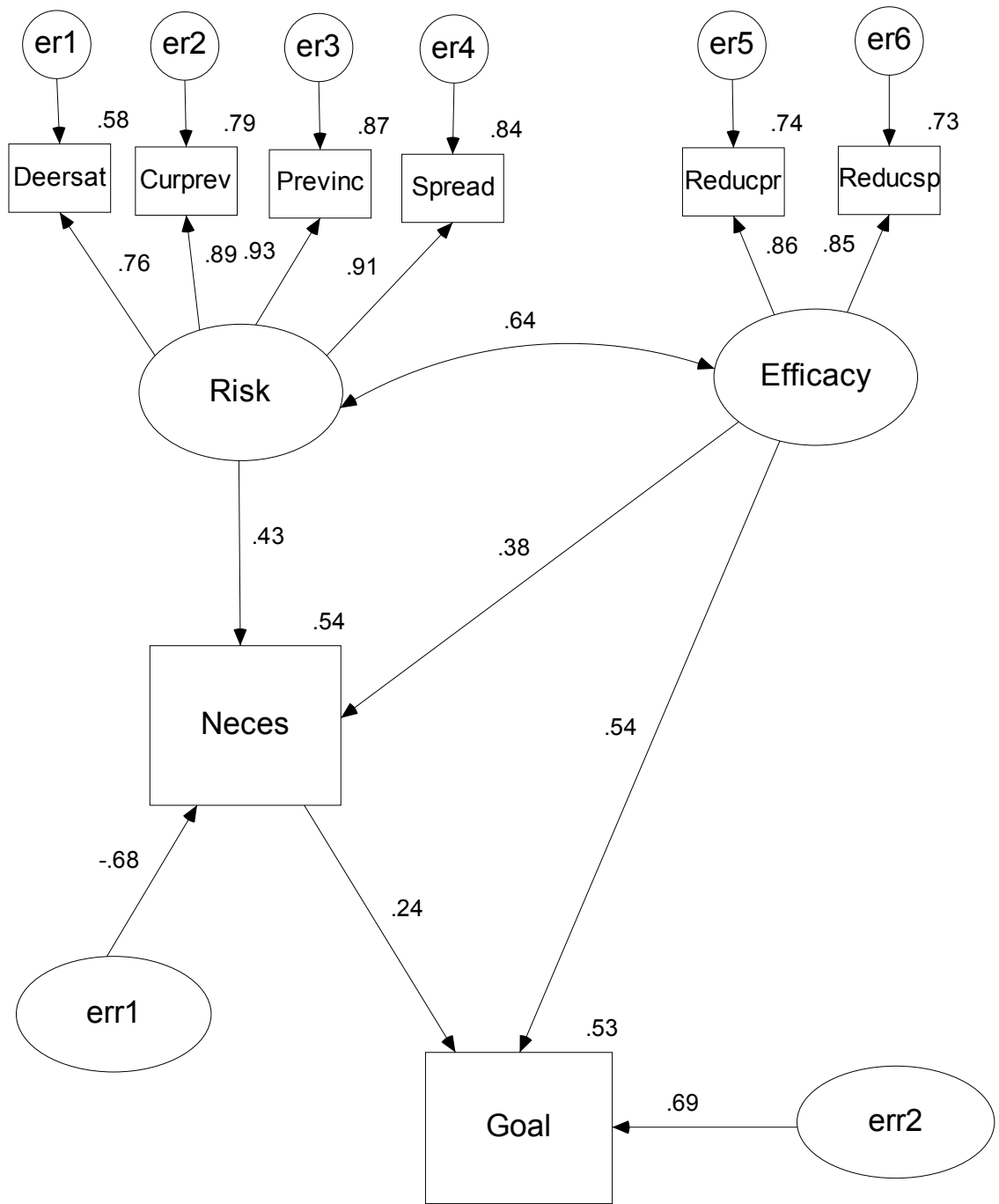


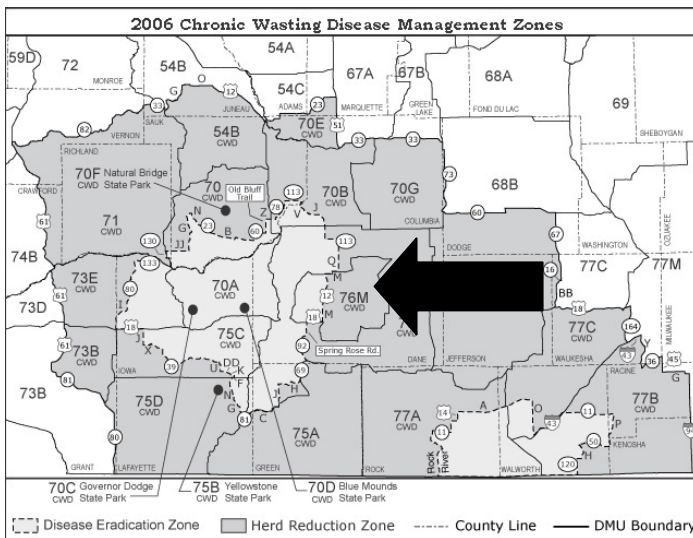
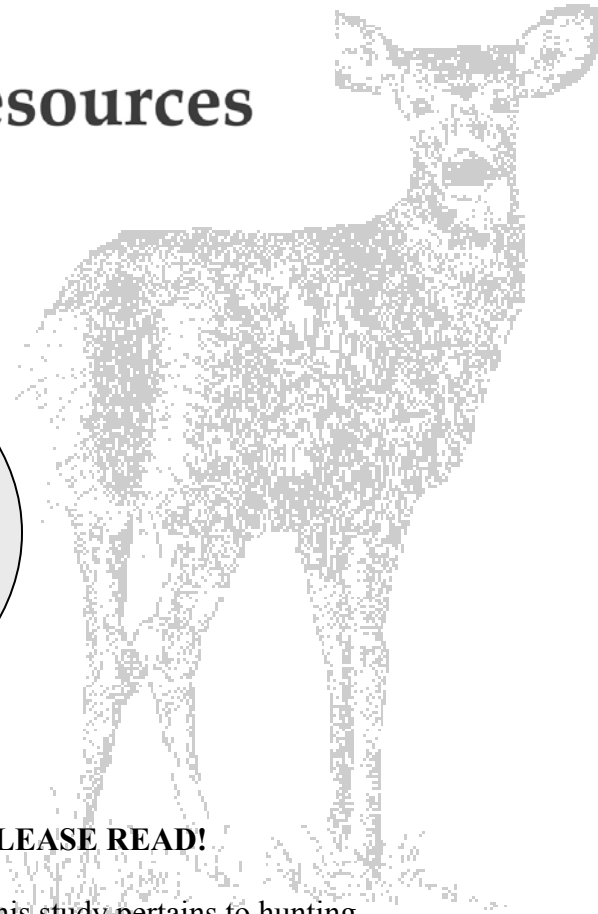
Figure 5. Model 2 path analysis results showing path coefficients (β) and R² values for the dependent variables Neces and Goal.

Appendix A: 2006 Disease Eradication Zone (DEZ) Hunter Opinion Questionnaire



College of Natural Resources

DEER HUNTING & CHRONIC WASTING DISEASE—A SURVEY OF HUNTER OPINIONS 2006 SEASON



PLEASE READ!


This study pertains to hunting that occurs in the western Disease Eradication Zone (DEZ). This area is represented by the light gray color to the left of the arrow. The questions on this survey pertain to hunting and management rules in that zone only.

We ask that you complete this questionnaire regardless of whether you did any hunting in

the DEZ in 2006. Answer all questions unless directed to skip ahead.

Questions are designed to assess your opinions about both current and hypothetical deer management ideas.

Section 1: Hunting in the DEZ during 2006

1. Did you personally do any gun deer hunting in the western Disease Eradication Zone (DEZ) (consult map on cover if necessary) during the 2006 Wisconsin deer season?
(Check yes or no)
 1. No  **Skip to question #5**
 - Yes **Answer Part 1B**

- 1b. How would you describe the land in the DEZ where you do most of your gun hunting? (Check one)
 - I own the land that I hunt on.
 - I lease the land that I hunt on.
 - I hunt on private land owned by a relative(s) or a friend(s) who also hunts.
 - I hunt on private land owned by a relative(s) or a friend(s) who DO NOT hunt.
 - I hunt on land owned by a deer hunting organization or group.
 - I hunt on public land
 - Other: _____

2. How many deer did you harvest with a gun in the DEZ during the 2006 season?
Enter the numbers here: _____ Antlered bucks _____ Antlerless deer

3. How many deer did you see while gun hunting in the DEZ compared to last year?
(Check one)
 - More deer
 - Fewer deer
 - About the same
 - I did not hunt the DEZ last year

4. Overall, please rate your level of satisfaction with the gun deer hunting season in the DEZ in 2006. **(Check one).**

VERY SATISFIED	MODERATELY SATISFIED	SLIGHTLY SATISFIED	NEUTRAL	SLIGHTLY DISSATISFIED	MODERATELY DISSATISFIED	VERY DISSATISFIED
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Did you personally do any archery deer hunting in the western Disease Eradication Zone (DEZ) during the 2006 Wisconsin deer season? **(Check yes or no)**

- No  **Skip to QUESTION #9**
- Yes

5b. How would you describe the land in the DEZ where you do most or your archery hunting? **(Check One)**

- I own the land that I hunt on.
- I lease the land that I hunt on.
- I hunt on private land owned by a relative(s) or a friend(s) who also hunts.
- I hunt on private land owned by a relative(s) or a friend(s) who DO NOT hunt.
- I hunt on land owned by a deer hunting organization or group.
- I hunt on public land
- Other: _____

6. How many deer did you harvest with a bow in the DEZ during the 2006 season?

Enter the numbers here: _____ Antlered bucks _____ Antlerless deer

7. How many deer did you see while bow hunting the DEZ compared to last year? **(Check one)**

- More deer
- Fewer deer
- About the same
- I did not archery hunt the DEZ last year

8. Overall, please rate your level of satisfaction with the archery deer hunting season in the DEZ in 2006. **(Check one).**

VERY SATISFIED	MODERATELY SATISFIED	SLIGHTLY SATISFIED	NEUTRAL	SLIGHTLY DISSATISFIED	MODERATELY DISSASTIFED	VERY DISSATISFIED
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. What is the maximum number of deer you are willing to shoot from the DEZ in a Single season ...

for your own use? _____

to give away to family or friends? _____

to donate to a food pantry? _____

Section 2: Your opinions about Current DEZ Regulations

In 2006, the length and timing of the gun season in the DEZ were reduced from over 60 days (in 2004 and 2005) to 32 days. This included a closed period between Oct 23rd and the traditional November opening day (Nov. 18th).

1. Did the shorter gun season in 2006 (fewer days compared to 2005) influence your ratings of hunting satisfaction?

- Yes, it was a positive influence on my hunting satisfaction.
- Yes, it was a negative influence on my hunting satisfaction.
- No, it did not influence my hunting satisfaction one way to the other.
- I am not sure

2. Did closing the gun season between Oct 23rd and Nov 17th influence your ratings of hunting satisfaction?

- Yes, it was a positive influence on my hunting satisfaction.
- Yes, it was a negative influence on my hunting satisfaction.
- No, it did not influence my hunting satisfaction one way to the other.
- I am not sure

3. In 2006, the DNR did not require Earn-A-Buck in the DEZ. Did the elimination of the EAB rule influence your ratings of hunting satisfaction?

- Yes, it was a positive influence on my hunting satisfaction.
- Yes, it was a negative influence on my hunting satisfaction.
- No, it did not influence my hunting satisfaction one way to the other.
- I am not sure

2b. If you answered yes to question 2, what did you do with the deer that tested positive for CWD?

- I ate the deer
- I disposed of the deer
- I turned the deer over to the DNR
- Other: _____

Prevalence of CWD in the DEZ:

The percentage of deer that have tested positive for CWD in the DEZ depends on the age of the deer, sex of the deer, and locations of harvest within the DEZ. The highest prevalence rates—17%— occur for mature bucks (4.5 years or older) in core areas of the DEZ. Infection rates for adult does run from 2-6%. Within the core pockets of the DEZ, disease rates average as high as 10%, but closer to the edge of the DEZ the chance of any deer being sick may be 1-2%. The following questions seek your opinion about these rates and whether you think the disease will spread.

3. Before receiving this survey, I was...

- aware of approximately the percentage of deer testing positive for CWD in the DEZ.
- NOT aware of the percentage of deer testing positive for CWD in the DEZ.

4. How concerned are you with the current prevalence levels of CWD in the DEZ?

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

5. How concerned are you that prevalence levels will increase in the DEZ over the next 5 years?

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

6. How concerned are you that CWD will spread to deer in other areas of the state in the next 5 years?
- Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
 - Not sure
7. How concerned are you that deer deaths as a result of this disease will negatively impact your future deer hunting satisfaction by reducing the number of deer where you do most of your hunting?
- Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
 - Not sure
8. How concerned are you that CWD will negatively impact your future deer hunting satisfaction by reducing the health of deer where you do most of your hunting?
- Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
 - Not sure
9. How concerned are you that a human will get sick as a result of eating venison from a deer that has CWD?
- Very concerned
 - Moderately concerned
 - Slightly concerned
 - Not at all concerned
 - Not sure

12. How likely do you think it is that hunters can significantly reduce the deer populations in the DEZ to try and stop or slow the spread of CWD?

Very likely	Moderately likely	Slightly likely	Neutral	Slightly unlikely	Moderately unlikely	Very unlikely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 4: Your opinions about CWD management goals & strategies

1. The current goal for management of CWD has been to eradicate the disease in the wild deer herd. Using the following paired words, circle the number on the line closest to the word that best describes your opinion regarding the goal of disease eradication. **Circling number 4 means you are neutral.**

In my opinion eradicating CWD is...

Realistic	1	2	3	4	5	6	7	Unrealistic
Necessary	1	2	3	4	5	6	7	Unnecessary
Desirable	1	2	3	4	5	6	7	Undesirable
Working	1	2	3	4	5	6	7	Not working
Possible	1	2	3	4	5	6	7	Impossible

2. The DNR has established a population goal of 5 deer or less per square mile in the DEZ. Please indicate your opinion about the following statements that address the current deer reduction strategy.

	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
Reducing the deer population will reduce the prevalence of CWD in the DEZ.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reducing the deer population will reduce the spread of CWD outside the boundaries of its current locations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is not necessary to reduce deer density to 5-deer/sq. mi to eliminate CWD.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reducing the deer population will help eliminate CWD in the DEZ.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is not realistic to expect hunters to reduce deer densities to 5-deer/sq. mi.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I trust that the deer reduction plan is based on the best available science.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The post-hunting season population estimate for the DEZ in 2005 was approximately 33 deer per square mile. Wildlife managers and disease experts believe sharp reductions in deer densities are the best chance of stopping CWD. The DNR has established 5 deer per square in the DEZ based on data from Colorado that has shown that CWD can still be present within fairly low populations of Mule Deer.

2. Which of the following deer population goals do you support for the DEZ?
(Check One)

- I do not support ANY further reductions of deer populations in the DEZ
- I support trying to reduce to 25 deer per square mile
- I support trying to reduce to 20 deer per square mile
- I support trying to reduce to 15 deer per square mile
- I support trying to reduce to 10 deer per square mile
- I support the DNR objective of 5 deer per square mile

3. Of the following statements, select the one that best describes your willingness to continue with the deer population reduction efforts being carried out through hunter harvests. **(Check One)**
- The herd reduction effort should end now.
 - I support continued population reductions for as long as it takes to determine if the plan is working.
 - I will support up to three more years of trying to reduce deer populations in the DEZ.
4. Currently, testing hunters' deer for CWD makes up 45% of all the money being spent on CWD in the state. If the state were to stop free testing of deer for CWD, select the option that best describes how that decision might influence your participation in hunting? **(Check one)**
- I would quit deer hunting altogether.
 - I would quit deer hunting in areas where CWD is known to be present.
 - I would keep hunting the same areas that I always have.
 - I am not sure.
5. If the state were to stop free testing of deer for CWD, select the option that best describes how that decision might influence your consumption of venison. **(Check ALL that apply)**
- I am not sure.
 - I would only eat deer taken from areas where there is no CWD.
 - I would eat the deer regardless of where it was harvested.
 - I would pay to have my deer tested before eating it.
6. If the state were to stop free testing of deer for CWD, how much would you be willing pay to have your deer tested?
- Enter amount here : \$ _____
7. Should the DNR offer free disease testing to hunters who shoot deer in areas where CWD is present?
- Definitely yes Probably yes Definitely no Probably no unsure
8. The DNR currently covers the processing fees and other costs associated with deer harvested from the DEZ that are donated to pantries. Has the availability of this program caused you to shoot more deer than you would have without it?
- Yes No Not sure

9. During the 2006 hunting season, how many deer did you donate to a food pantry?
(Check one)

Zero 1 2 3 4 5 more than 5.

10. The current cost of this program amounts to roughly \$120 per deer that is donated. Should the DNR continue to pay these costs as a way to encourage hunters to participate in the deer donation program?

Definitely yes Probably yes Definitely no Probably no unsure

Since landfills in Wisconsin have refused to accept and dispose of untested deer carcasses, butcher waste, and road kills from the DEZ, the DNR has assumed the cost and responsibility of deer disposal. It currently costs the DNR \$600/ton to chemically digest waste and \$1000/ton to incinerate waste from the DEZ. This despite the fact that the EPA has formally endorsed landfilling of carcasses and waste from CWD zones, as have the American Association of Vet Lab Diagnosticians, and the International Association of Fish and Wildlife Agencies.

11. To what extent do you agree or disagree with this statement: “The DNR should continue to assume responsibility for deer disposal from the DEZ and pay its associated costs.”

Strongly agree
 Agree
 Undecided
 Disagree
 Strongly disagree

12. Taking everything into consideration, what letter grade would you assign for the job the DNR has been doing handling the CWD problem? (Circle One)

A A- B+ B B- C+ C C- D F

Section 5: The role of deer hunting in your life

In this final section we would like you to answer a few questions about your background and your participation in deer hunting. This information will help us compare your answers with those of other hunters.

1. How many years have you hunted deer in Wisconsin? _____ I don't remember

2. Below is a list of statements describing different types of deer hunters. From this list please select the **ONE** statement that best describes you. **(Check one)**

<input type="checkbox"/> I am a trophy buck hunter	<input type="checkbox"/> I am a buck hunter
<input type="checkbox"/> I hunt for either a buck or an antlerless deer	<input type="checkbox"/> I prefer to hunt for bucks but will shoot an antlerless deer rather than go home without a deer

3. What type of deer hunting do you prefer?
 - I prefer bow hunting.
 - I prefer gun hunting.
 - I like bow and gun hunting equally.

4. For some people deer hunting may be one of the most important recreational activities in their lives. For others, it may be just one of a number of interests they have, something they enjoy but something to which they are not strongly committed. How important is deer hunting to you?
 - Most important recreational activity
 - One of the more important recreational activities
 - No more important than other recreational activities
 - Less important than other recreational activities
 - Not at all important to me as a recreational activity

5. How would you describe your involvement, if any, with farming? **(Check One)**
 - I am a full-time farmer
 - I am a part-time farmer
 - I am not a farmer

6. What county do you live in? _____

Thank you for completing this questionnaire. Please return it at your earliest convenience in the postage-paid envelope. Send to: Dr. Robert Holsman, College of Natural Resources, University of Wisconsin-Stevens Point, Stevens Point, WI 54481.

Appendix B: Open-ended word association responses from disease eradication zone (DEZ) hunters that responded to the 2006 opinion questionnaire

KEY

AC = Agency credibility, **DD** = Images of sick deer, **DG** = General negative thoughts, mostly related to the disease, **DN** = Disease is natural, **DP** = Impacts to the deer population-reason not specified (management or disease), **DU** = Questions and concerns about the disease, **H** = Human health impacts, **HI** = Hunting impacts-general, **MG** = Comments about management rules, regulations, strategies, **MW** = Management waste of resources (time, money, etc), **MO** = Management overreaction, **NW** = No worries, **O** = other

-3 = very negative, -2 = moderately negative, -1 = slightly negative, 0 = neutral,
 1 = slightly positive, 2 = moderately positive, 3 = very positive, 99 = did not respond

Thought or Image	Theme Code	Feeling Response (+/-)
CWD has been here a lot longer than you think and the DNR is not handling it properly	AC	-3
Why is the DNR trying to stop the inevitable!	AC	-3
It has been here for a long time and it did not hurt anyone before. DNR is just using this as an excuse to lower deer herd because of pressure from insurance company's.	AC	-3
I trust in quality research and scientific investigation. When proper procedures are followed, the results have validity. I question the standards set by the WI DNR's CWD study.	AC	-1
That the WI DNR is a bunch of hapless idiots.	AC	-3
DNR got greedy with tags and money.	AC	-2
DNR b.s.	AC	-1
Statewide disease in whitetail deer that will never be found in the northern forest because the DNR doesn't want to find it there.	AC	-3
DNR mishandling of problem	AC	-3
DNR mis-management of the CWD.	AC	-3
The DNR's conjured idea to help rid an area of deer!	AC	-3
I am very disappointed in the DNR for allowing this to happen here in WI. I feel that if there had been more strict rules on transporting domestic deer this may not have happened (CWD).	AC	-3
Bad choices by the DNR.	AC	-3
A good excuse for the DNR to have more deer shot than what needs to be.	AC	-1

Thought or Image	Theme Code	Feeling Response (+/-)
The DNR is doing a poor job managing CWD. They need to look at deer herd sizes in smaller mgt units. The area where most CWD cases have occurred is private land with no access and there is not a large kill in that area. In areas where land is easily accessible too many deer have been killed and numbers are way down.	AC	-3
Pointless to shoot all of the deer. There hasn't been one case of it harming humans. DNR doesn't know what they are doing.	AC	-3
The DNR mismanagement of the deer herd and now they're doing the same thing with the turkeys!	AC	-3
DNR control	AC	-3
DNR eradication	AC	-3
Boondoggle-DNR on wrong path and do not communicate with us-two faced DNR baits deer and shoots on adjacent property and keeps it quiet.	AC	-3
The DNR should not have allowed any transferring of animals from West to East.	AC	3
No solutions in Colorado, how does our DNR think they will find one here?	AC	-3
That the DNR are a bunch of self serving morons!	AC	0
Poor government action plan	AC	-2
the DNR is paid to manage the deer herd, and they failed miserably	AC	-3
Trying to kill most of the deer in the disease areas I think is a poor decision. The state of Colorado has had the disease for over 20 years. That thought has not crossed their minds!	AC	-3
An excuse to destroy our herds!	AC	-3
Oh no now what is the DNR going to do to our deer hunting?	AC	-2
The DNR is shooting deer over bait piles while I am trying to harvest trophy bucks in an ethical manner!	AC	-3
How is DNR going to screw up my bowhunting in the rut.	AC	-3

Thought or Image	Theme Code	Feeling Response (+/-)
Insurance payoff to get rid of car deer kills. I've hunted there 30 years with never seeing or having an infected deer, which has no effect on humans. While paying permit hunters are restricted by rules and the DNR breaks all the rules by baiting and night shooting. And they wonder why there's a drop in new or old hunters.	AC	-3
Fake-something the insurance companies have paid the DNR to focus on.	AC	3
A gaunt, drooling, disoriented animal	DD	-3
Small and thin deer	DD	0
Skinny sick deer	DD	-3
Sick, skinny, unhealthy deer.	DD	-3
Sick deer	DD	-3
Sick deer	DD	-3
Decimated deer. Never seen one other than pictures.	DD	0
A sick deer.	DD	0
Sickly looking deer.	DD	-2
Sick looking deer.	DD	-3
Skinny deer.	DD	-1
A sick and wasting away deer. Something I would not want to eat.	DD	-1
Sick deer	DD	-1
Sick, weak animals in poor condition	DD	0
A sick deer.	DD	0
Sick deer.	DD	-1
Sick deer.	DD	-2
Sick deer.	DD	-3
Sick deer.	DD	-1
Emaciated deer that needs to be eliminated.	DD	0
A thin, weak animal.	DD	-1
A sick, skinny, suffering deer.	DD	-2
Emaciated sickly looking deer.	DD	-3

Thought or Image	Theme Code	Feeling Response (+/-)
Sick and dying deer.	DD	0
Skinny	DD	0
A sick deer.	DD	3
Sick animal.	DD	-2
Sick deer.	DD	-3
Very sick deer. Kind of saddening.	DD	-2
Weak, sick deer, struggling to stand that also translates to concern over the venison we consume.	DD	-2
Sick deer.	DD	0
That there is sick deer that need to be put down. But I heard CWD has been around for awhile.	DD	0
Sick deer.	DD	-3
Sick debilitated deer.	DD	-2
Sick deer.	DD	0
Potentially sick deer in the woods.	DD	-2
Sick deer.	DD	0
Sick deer.	DD	0
An animal suffering.	DD	99
Sick emaciated animals	DD	-1
Skinny, unhealthy deer.	DD	0
A sick deer.	DD	0
A miserable animal.	DD	-2
A deer barely able to stand, head down, legs spread tail tucked under.	DD	-1
Sick deer, trouble deer, growing problem.	DD	-2
Suffering deer.	DD	-2
Stumbling, listless deer.	DD	-1
Sick deer.	DD	99
Sick deer.	DD	0
Emaciated looking deer.	DD	-3
Sick deer.	DD	-2
Suffering.	DD	-2

Thought or Image	Theme Code	Feeling Response (+/-)
Sick deer.	DD	-3
Sickly scrawny deer.	DD	-2
A sick deer.	DD	-1
Starving or deer that is emaciated.	DD	-2
Diseased animals.	DD	-2
Skinny sick deer.	DD	-2
Sickly looking.	DD	99
A deer that looks like its sick, or wasting away.	DD	-3
Sick deer.	DD	-2
Sick deer.	DD	-3
Weak-skinny deer.	DD	0
Dying deer.	DD	-1
A deer wasting away.	DD	-3
Sick deer.	DD	-2
Unhealthy, skinny looking deer	DD	-2
Skinny old deer	DD	0
Sick, suffering animals	DD	-3
Seeing a deer looking like a cow with mad cow disease. Uncontrolled shaking, etc.	DD	-3
Skinny malnourished looking deer.	DD	0
A sickly disoriented deer stumbling through the woods.	DD	-3
I think of deer starving, suffering from this disease and it has to be controlled to prevent suffering.	DD	0
Sickly looking deer.	DD	-2
A sickly looking deer	DD	-2
Sick deer.	DD	-3
Sick deer.	DD	-1
Sick and dying deer.	DD	-3
A diseased deer stumbling through the woods.	DD	-3
Sickly looking animals suffering away.	DD	-2
Trembling, drooling, sickly deer.	DD	-3
Sick starving deer.	DD	-3

Thought or Image	Theme Code	Feeling Response (+/-)
A slow agonizing death to deer infected.	DD	-2
A sick deer	DD	-3
A thin, weak deer that is wasting away.	DD	-3
Emancipated deer	DD	0
Thin deer.	DD	-2
Sick deer	DD	0
Very weak and sick deer.	DD	-3
The disease is winning.	DG	-2
Dismay	DG	-3
DISEASE! Can't be good.	DG	-2
Sad it is here.	DG	-3
Quagmire.	DG	-3
Something like mad cow disease.	DG	0
Terrible brain disease.	DG	-1
Chronic headache.	DG	-2
The thought of sick deer makes me feel sad. Yet I have been hunting in zone 70-A since 1972 and never seen a sick deer. I personally have had one year and a half year old test positive. I think the disease was here and is in the deer herd naturally. I also think we can not eliminate it.	DG	0
Disease spreading	DG	-2
Bad disease.	DG	-2
It is a terrible loss for the state of Wisconsin.	DG	-1
Concerned.	DG	-2
Concern.	DG	-2
Somewhat concerned.	DG	0
Danger-proceed with caution!	DG	-1
It is a terrible disease.	DG	3
Unfortunate.	DG	-2
The images of a mad cow when Britain had really bad 6-7 years ago. The cow shaking and falling down.	DG	-1
Tasmanian clusterf*** for the deer herd, the DNR and some of the hunting public.	DG	-2

Thought or Image	Theme Code	Feeling Response (+/-)
Problems.	DG	1
Sad	DG	0
Tarnished.	DG	-2
Prion disease.	DG	-3
Nightmare.	DG	-2
Mad cow disease	DG	-2
Mad cow disease	DG	-2
:(DG	-2
Problem we have to live with and manage.	DG	-2
Mad cow disease	DG	-1
A disaster!	DG	-2
A brain with tiny holes.	DG	0
Toxic	DG	-1
A tragedy	DG	0
A possible spread to dairy herd.	DG	-3
Disaster	DG	-3
Concern	DG	-1
A serious problem	DG	-2
Bummer	DG	-2
Sadness. What was once a pure pursuit has become a mess.	DG	-3
A disease.	DG	-2
A problem that has no positive way to control or eradicate at this time. I do believe that we must try to stop the spread.	DG	2
A disease we have to learn to live with.	DG	0
We finally have it.	DG	-3
Scary, how healthy some CWD deer appear. Would never know they had the disease.	DG	99
Dishearting	DG	-3
Sucks	DG	-3
Sick	DG	-2
Sick deer that drove away hunters and hunting pressure.	DG	-2
Chaos	DG	-1

Thought or Image	Theme Code	Feeling Response (+/-)
Life is over.	DG	2
The 10 point buck I shot with CWD was a dwarf that is my image now.	DG	0
Brain disease in deer	DG	2
Man made ways + mother nature ways = mad cow, CWD, AIDS ? ? (the list goes on)	DG	-2
Low incidence within the herd in the DEZ	DG	1
Disease that needs to take care	DG	2
Big problem- I don't think it will be stamped out.	DN	-2
It has been around forever!	DN	0
CWD is here to stay-no possible way to eliminate it. Hunting will never be the same.	DN	-3
Bullshit! It has been here for years and NOW we are doing something about it!	DN	-3
Stupid. Let natures take its course I don't see any animals affected by it. It has been in Elk herd for many years the elk herds are fine.	DN	2
I believe it has been in deer for years. Like a natural cancer.	DN	-2
Always been here	DN	99
It is mother nature's way of getting rid of the sick and old and young regardless of sex.	DN	0
Its been here for a long time.	DN	2
I think CWD has been around for many years	DN	-1
It has been here a long time, but was not discovered until hunters started enforcing quality deer hunting and older deer were harvested.	DN	0
It has been around for a long time and it hasn't hurt anything. Nature takes care of itself.	DN	1
Its mother nature's way of thinning an overpopulation of deer. And the DNR takes it way to seriously.	DN	-1
God's way of thinning the deer herd.	DN	1
Mother nature's way of getting rid of the weaker gene pool.	DN	0
In nature, there is a natural order to the way things work. Disease is natural selections way to cull an overpopulated herd. I am sure that all things in the natural state is the way it should be. In fact the DNR wants me to sacrifice our deer to save deer up north which those people will not even stop baiting disgusts me. Let nature take her own course.	DN	-3
A disease in nature.	DN	-3
Its here to say! Live with it!	DN	3

<u>Thought or Image</u>	<u>Theme Code</u>	<u>Feeling Response (+/-)</u>
A disease that has been here a long time and is just recently been discovered and addressed.	DN	0
Natures way of regulating herd sizes!	DN	0
A disease that has been present in the white tail deer for a long time.	DN	3
No one knows exactly how long it has been around. I think it is mother natures way of controlling deer population.	DN	-2
That is has been here a long time before it was discovered.	DN	0
Can never be wiped out.	DN	-1
It is a disease that has probably been around the country for many years we just did not know about it and the DNR is making more of a deal out of it that it should be.	DN	-2
It's always been here.	DN	0
I think that CWD has been in WI for years but they never even caught it. It is just like Colorado which has it for 30 years. You will never ever get rid of it I have dressed deer for 30 years- I am not afraid of it.	DN	-3
The deer naturally are thinning the herd.	DN	0
Uncontrollable.	DN	0
It was always here.	DN	-2
Mother natures way of controlling populations.	DN	0
Is probably a naturally occurring disease that has probably been around long before we started testing for it!	DN	2
Something we have to live with.	DN	-1
I think it's a part of nature taking its course. Eliminating the weak and over populated areas.	DN	0
Too many deer in one spot, and nature's way of thinning them out.	DN	0
Nature taking its course.	DN	0
Something that has been around a long time.	DN	0
It has been here longer than we think.	DN	0
That is has been around for a long time out west and hasn't had any affect on people.	DN	0
CWD was here for years.	DN	0
Its been known in states out west for many more years than here in WI and it has not ably controlled there and has not affected hunting or consumption in those states.	DN	2

Thought or Image	Theme Code	Feeling Response (+/-)
CWD has been around a long time.	DN	0
Been around for a long time (Colorado).	DN	3
I believe CWD is a natural disease.	DN	99
Ridiculous. Nature will take care of herself.	DN	-2
We will always have it.	DN	-1
It has probably been there for many years, its just that it was not tested for so why make a big deal of it now?	DN	-3
I have hunted deer since I was 12 years old, and I believe it has been around longer than 2002. I will not stop hunting because of CWD.	DN	-2
It will never be wiped out by hunters.	DN	0
It will not stop.	DN	2
Has been around a long time.	DN	1
I think its natures way of controlling population such as raccoons and rabbits.	DN	3
It has been here for a long time and will be here for a long time. If a deer is sick don't eat it.	DN	0
I think CWD has been here a long time.	DN	0
Natures way of taking care of a population or disease problem.	DN	0
An uncontrollable disease in a wild deer herd.	DN	-1
Mother nature has a way of taking care of her own. She is smarter than the DNR.	DN	-3
Let it take its course.	DN	1
Naturally occurring disease.	DN	0
Not controllable. Waste of time	DN	-2
Diseased animals that mother nature claims. They should not be eaten. I always have mine tested. If they stopped testing I would quit hunting.	DN	-1
It's everywhere! Let nature play its course.	DN	-2
It has been here longer than we think!	DN	0
It's always been around.	DN	1
It has always been present, there was just never a name for it before. So now that it has a name, now it's a problem?	DN	-1
It has always been here, it will always be here, just get used to it.	DN	0
Been here, will always be here.	DN	0

<u>Thought or Image</u>	<u>Theme Code</u>	<u>Feeling Response (+/-)</u>
CWD has been around for many years in other states. I just hope the state doesn't over react to it.	DN	-2
Let the disease run its course.	DN	0
Something that has always been here. Let nature take care of it.	DN	-2
It has been here since deer hunted started.	DN	0
Nature taking care of its own. Who wants to hunt an area that only has 1-3 deer per square mile. Not me-BORING!	DN	-3
Gods way of population control	DN	0
Mother nature needs to take her course. Its been here for years and years and will continue to be here forever.	DN	0
I think its been around for many, many years. But earn-a buck is NOT the answer. Either sex I feel is better, more hunters.	DN	3
It is merely nature's way of taking out the weak and is not a threat to our deer herds-strictly politics.	DN	-3
CWD is here to stay. You will not eliminate it ever! Having said that, stop wasting time, spending millions of dollars and creating a generation of non-hunters.	DN	-3
Leave mother nature take care of it.	DN	3
Naturally occurring disease that affect <2% of population at its extreme.	DN	99
Been around for years.	DN	-1
It's in lots of states all over.	DN	-3
That it will continue to spread to the rest of the state.	DN	-3
Mother nature solving a problem caused by mismanagement	DN	-3
Natural disease/Mother natures way.	DN	0
It's always been here and its insurance propaganda.	DN	-3
It's always been here.	DN	-2
It will be impossible to get rid of it.	DN	0
{let nature take its course} It's been out west since the early 60's and the herd is still their. Nobody's been sick yet.	DN	2
Unstoppable hopefully controllable	DN	-2
Always been here.	DN	-1

Thought or Image	Theme Code	Feeling Response (+/-)
The disease has been around longer than we think.	DN	0
It is here to stay	DN	-2
I hunt in 70A and have shot 1-2 deer ate the meat for the last 35 years. I think the disease has been here for a long time and I don't think you will completely get rid of it.	DN	0
Deer have had it since they got off the ark	DN	0
I think it has been here much much longer than 2002 and believe it is a natural disease and will not wipe out the whitetail species.	DN	-1
The possible elimination of the deer herd	DP	-1
The deer herd is at risk.	DP	-2
The demise of deer	DP	-3
No deer for the future.	DP	1
Long term, we will see a decline in herd health, quality.	DP	-3
I am afraid that it may affect deer hunting in the future.	DP	-2
Fewer deer	DP	-2
A hell of a lot less deer!	DP	-3
General concern about the health and welfare of the deer herd.	DP	-2
No deer left to hunt very disheartening.	DP	-3
A whole lot of dead deer.	DP	-3
Needless waste and destruction of deer population	DP	-2
Elimination of deer herds.	DP	-2
No deer.	DP	-2
Overpopulation.	DP	-1
Fear there will be no deer for my 10 and 12 year old sons to hunt in my area.	DP	-3
Herd reduction.	DP	-1
I think of our grand children will they be able to see or to hunt deer in their lives.	DP	3
Bad for the deer herd.	DP	-2
Fear of the harm it may cause to our deer herd.	DP	-3
Lower population	DP	1
Concern for deer herd	DP	-2

Thought or Image	Theme Code	Feeling Response (+/-)
Fewer deer	DP	0
Elimination of the deer where I hunt	DP	-3
Because of CWD there will be a lot less deer out there.	DP	3
Wastefully killing whitetail deer.	DP	-3
A horrible waste of perfectly healthy deer.	DP	-3
The deer that are just being shot and wasted because of a natural disease that doesn't harm anyone.	DP	-3
It's a very unclear DEER disease which needs to be studied more.	DU	-2
How many years has it actually been here.	DU	-2
?	DU	-1
How long has CWD existed in any deer population and does current policy have positive impact?	DU	-1
How did this ever get started. Let nature take its course.	DU	0
Why does this have to happen?	DU	3
Are we doing the proper things to control the problem?	DU	-1
Proof that it is out there. And if it will spread.	DU	1
A poorly understood disease that is difficult to control.	DU	0
Research it.	DU	-1
Confusion (Is eradication necessary?)	DU	-2
How bad is the problem really?	DU	-1
How did it get to WI?	DU	-3
How long has CWD actually been here?	DU	0
Skepticism	DU	-2
?	DU	0
Don't know enough about it to give a good opinion and I don't think anyone else does either it's a sore subject in this part of the state.	DU	0
Too many unknowns.	DU	-1
Too many unknowns.	DU	-3
Is it really a risk?	DU	0
I do not believe it.	DU	0

<u>Thought or Image</u>	<u>Theme Code</u>	<u>Feeling Response (+/-)</u>
Uncorrectable- with out knowing exactly how the disease is spread, how can you target a solution?	DU	-2
How much don't we know yet?	DU	-2
Not enough info about CWD.	DU	0
I wish scientists knew more about it.	DU	-1
Is it really a concern?	DU	0
Uncertainty that it might spread to domestic animals or people.	DU	-2
Unknown	DU	0
Was this here before and just go undetected	DU	-1
Can it be wiped out of the area's herd?	DU	-2
I wonder how many years its been here.	DU	-1
Hearing stories and talks and knowing its been in the west for years. The first question that comes to mind is where is the medical data and the DNR data on those regions as far as health effects or the relation to mad cow disease.	DU	99
Concerned, but not sure how concerned I should be!	DU	-1
A lot of unknown facts about the disease.	DU	0
?	DU	0
Reminds me of MH that humans get and mad cow	H	3
Is the food safe?	H	0
Won't eat meat.	H	-3
Food safety.	H	0
I like having my venison tested	H	0
I cant' eat venison	H	1
No person has contracted this disease that I know of.	H	0
All those years I lived in the are with my dad we had venison every year-What if? We always hunted near Mt. Horeb-the epicenter of all this.	H	-1
There is no evidence it adversely affects human beings.	H	2
I am concerned about the health risks, both for deer and humans.	H	-1
Less deer ok to eat if tested for CWD.	H	0
I don't bring the deer home anymore so I can cut them up in my garage.	H	-3

Thought or Image	Theme Code	Feeling Response (+/-)
Fear of eating deer that are not tested.	H	-3
Lost appetite for eating venison	H	-3
Bad meat.	H	-1
The presence of CWD does leave me a bit concerned about the consumption of the deer meat.	H	-1
Some people are afraid to eat the meat. It does not bother me. I always test the deer.	H	2
Use caution in meat processing	H	0
I would not want to consume a deer with the disease. I wait for test results before consumption.	H	-1
Food safety.	H	-2
Safety	H	-2
Is the meat safe to eat?	H	-2
Should a deer be eaten?	H	0
Not a big concern as long as we can test.	H	0
Is it going to hurt us eating the deer or not?	H	-1
Don't eat the meat was not sure if it would hurt you or not. Try to stop it.	H	1
Side effects to humans from consumption.	H	0
Not sure I want to consume the animal.	H	-1
Is animal safe to consume.	H	0
Sick people if eaten.	H	-1
They may have found the disease in the meat.	H	-2
People getting sick from CWD.	H	-3
I hope we can't get it from eating venison.	H	-2
Transmittal to humans	H	-2
Test and eat.	H	3
Not edible.	H	-3
Human infection	H	-3
Deer that are suffering from the prions in brain which has not actually been proven to carry over to humans.	H	-2
A transmittable disease possibly to humans.	H	1
Fear of unknown health impacts.	H	-2

Thought or Image	Theme Code	Feeling Response (+/-)
No danger to humans.	H	3
Could this spread to humans form touching or eating infected deer meat.	H	-3
Deer need to be tested before eating.	H	0
It does not bother me I would eat the meat anyway.	H	0
The safety in consuming the animal	H	-2
Can't eat deer.	H	-2
Sick deer that are questionable for some to consume.	H	-2
I wonder if it will some day spread to humans who eat the meat.	H	-1
CWD, CJD, Alzheimers, Dementia, are all Prion diseases, we don't know everything about them. We should be concerned and will learn more in the very near future.	H	3
Concern about eating venison and possible harmful effect.	H	-1
People eating the meat from a deer testing positive for CWD have not gotten sick	H	2
I would not feed any non-tested deer from that area to my family.	H	-1
Sick deer that don't look or act sick which makes me wonder if eating them could be harmful to me or my family.	H	-2
Unsure of health risk	H	-3
I ate deer for years now I don't	H	-3
Diseased animals unhealthy environment/food	H	-2
Nature can kill you.	H	0
It might affect human health	H	-1
I will never eat it again!	H	-3
Concern over eating an infected deer.	H	-3
Concern about food safety for my family	H	-3
I do not want to contract the human equivalent of CWD.	H	3
Shooting a healthy buck, eating the back straps, then throwing out a bunch of trim because it tested positive.	H	-1
Uncertainty, knowing you can eat the meat and most likely be ok, but it only takes one change and you die a horrible death. Kind of like plane crash, you know the odds are with you, but you don't want to be there when it happens.	H	0
Catching the disease	H	-1

Thought or Image	Theme Code	Feeling Response (+/-)
I don't want to eat deer meat.	H	-3
Overblown as a health risk.	H	0
A complicated pathogen that could change deer hunting in WI forever.	HI	-2
Good old days of hunting gone for me and my family	HI	-3
No deer left to hunt or watch.	HI	-2
Loss of deer hunting	HI	-3
Early on thought "it's the end of the great days of deer hunting", does not appear that way now.	HI	-3
It turned out to mean no deer and bad hunting.	HI	-3
No trophy deer to hunt.	HI	-3
No deer hunting.	HI	-1
Future of deer hunting.	HI	-1
CWD has really changed the deer hunting I grew up with.	HI	-2
The destruction of a great hunting tradition!	HI	-3
Radically changed desire to hunt deer.	HI	-3
Change in how we hunt deer.	HI	-1
Devalued tradition.	HI	-2
It has taken some of the satisfaction out of deer hunting.	HI	-1
I'm concerned about my and my sons future deer hunting.	HI	-3
Loss of resource/loss of deer hunting	HI	-3
It ruined our deer hunting.	HI	-3
The loss of deer hunting.	HI	-3
Spoiled my bow hunting experience.	HI	-3
What is the future of deer hunting going to be like in 10 years in black earth?	HI	-2
Could destroy the fun of deer hunting	HI	-3
Destroyed traditional deer hunting in this area	HI	3
changed deer hunting for the worse	HI	-3
The right thing was accomplished with the ban on baiting	MG	3
We need earn a buck	MG	-2
Unnecessary killing of too many deer.	MG	-3
Save the herd	MG	2

Thought or Image	Theme Code	Feeling Response (+/-)
Baiting should not be allowed and that includes the DNR and land owners who bait deer with small corn and soybean fields. These non farmers are baiting deer on a larger scale.	MG	-2
Too many deer are killed to find out if they are sick.	MG	-3
Implement a baiting and feeding ban statewide.	MG	3
Regulation book, not able to understand to some people.	MG	-1
All private game farms should be outlawed.	MG	-3
Trying to "eradicate" all the deer.	MG	-2
Dept of Ag dropped the ball on game farms.	MG	-3
I blame the game farms and the trophy hunters for infecting a world class whitetail ecosystem.	MG	-2
Need to manage the herd population for improved health related to all diseases.	MG	1
Excessive killing of deer for management purposes.	MG	-3
Have to control disease but had to stay up with regulations and changes.	MG	0
Hunters who continue to bait.	MG	-3
Public relations by DNR	MG	-1
Should be controlled so it doesn't spread. You have to open up all land. People not participating are hurting the whole states deer herd.	MG	-2
We need to control the disease but we also need to keep interested in deer hunting.	MG	-1
Too many deer being killed.	MG	-3
More tags, longer seasons.	MG	2
Thing...help it disappear	MG	2
A need to be controlled.	MG	2
My image id DNR "sharpshooters" killing does and fawns over large bait piles of corn needlessly.	MG	-3
Stop the spread of CWD--until we have a better solution!	MG	3
A way to cut deer herd	MG	-3
Deer management that did not reduce herd. Big bucks only taken no doe's.	MG	-1
Eradicating the deer herd is not the answer. If we kill all of the deer, we will be ruining it for the future hunters. You must saw the deer are still over populated, but every year I see less and less because I hunted for three days before I saw my first deer. that's pathetic.	MG	-3

<u>Thought or Image</u>	<u>Theme Code</u>	<u>Feeling Response (+/-)</u>
We have to stop the spread! I do not like the DNR wardens and their friends getting paid to shoot deer in our hunting areas (like devils lake state park and other areas) Questions call me 262-844-8989	MG	2
Had the state managed the deer herd as a natural resource instead of a financial resource, the prevalence of CWD would probably be lower.	MG	-1
I would rather have all deer in the CWD eradication zone eradicated than risk the possible spread of CWD to other areas.	MG	0
DEZ is a waste of our natural resource	MG	3
A disease that has no effect on me, besides the screwed up gun season.	MG	-3
One deer hunting season a year. More deer will be bagged, more deer hunters move more deer.	MG	3
DNR is eliminating all the deer to take away our hunting for. You hunt all day and don't see deer as before.	MG	-2
Long season.	MG	3
Kill all the deer so we have nothing left to hunt.	MG	-3
Please return all seasons back to normal. Just continue to test CWD for hunters.	MG	-3
A deer season where deer are treated like rodents and slob hunters shoot several bucks and no does. Even though earn a buck saves bucks according to the DNR, I believe it is needed because too many "hunters" won't shoot does.	MG	-3
Don't shoot all the deer.	MG	-3
To many tags giving out for not much pressure due to fewer hunters in the woods at one time.	MG	-3
DNR sharpshooters killing deer I may have had an opportunity to hunt.	MG	-3
Too long of season to hunt. And to watch for road hunters.	MG	1
Killing too many deer	MG	-3
More time to hunt.	MG	1
Go back to traditional hunting and leave it alone.	MG	2
At first, I liked all the extra hunting time and got 3 trophy bucks in December. But now I see a lot less deer than I ever have. My son and I have harvested 4 CWD bucks in the last 5 years. All have been ate. I have never seen a sick deer in 45 years of deer hunting.	MG	-1

Thought or Image	Theme Code	Feeling Response (+/-)
I need to find a new place to hunt out of the DEZ.	MG	-3
More hunting	MG	1
DNR ruined my hunting	MG	-2
Extended deer season.	MG	2
Ever changing hunting seasons and changing regulations.	MG	-1
More hunting season	MG	3
A disease the is blown way out of proportion regarding health factors and how contagious it might be.	MO	-3
Been around for years (overreacting).	MO	-1
DNR overreaction.	MO	-3
Blown out of proportion.	MO	-1
Overkill on everyone's part.	MO	-2
Overrated.	MO	-2
WI has overreaction to a problem the western states have dealt with for 39 years.	MO	0
DNR over reacting to a problem that nature will let run its course.	MO	-2
Overstated.	MO	0
Over reaction.	MO	3
Embellishment	MO	0
Over rated/never eliminate problem	MO	0
This is a gross over reaction to an act of nature.	MO	-3
Over reaction by the state.	MO	-3
Over rated.	MO	-3
DNR is over reacting. Wasting time and money.	MO	-2
Overhyped.	MO	-2
Blown way out of proportion. Natural disease that has always been in the deer herd.	MO	-1
A disease blown out of proportion by the WDNR.	MO	-3
Overhyped.	MO	0
DNR is over reacting the disease has been out west for years!	MO	0
Over reaction.	MO	-2
Overkill.	MO	-2
Over reaction of the DNR.	MO	-1

Thought or Image	Theme Code	Feeling Response (+/-)
I don't think it is as big a problem as the DNR suggests.	MO	1
Over -exaggerated by DNR to reduce herd numbers.	MO	-1
Blown way out of proportion. Not a big deal!	MO	0
DNR is over reacting. I strongly disagree with the eradication that is going on at Devils Lake State Park. It is a private hunt on public land They are not getting any support from local hunters when they are using bait to shoot these deer. They are probably spreading this so called CWD disease than stopping it. These so called "sharpshooters" . 3 deer have been found that were not recovered from these bait piles! So what is really going? The DNR did not find these deer.	MO	-3
I think you people have it blown way out of proportion.	MO	3
Over blown risk!	MO	-2
Not as bad as made out to be (over reacting).	MO	-2
Blown out of proportion.	MO	-1
It is over rated.	MO	0
I think the risks are overblown.	MO	0
I feel it is not as big a problem as people think it is.	MO	-2
I don't think its as big a deal as it is made out to be. Because when I registered the deer I shot in 2005, nothing at all was done with the deer other than tagging it. It was never tested.	MO	-2
Overblown reaction by the DNR.	MO	-3
DNR is over reacting.	MO	-3
It is being made into a bigger problem that it appears to be.	MO	-1
Don't think its as bad as DNR says	MO	-2
Media hype.	MO	-1
CWD, I think is an overstatement, it hasn't been found in humans, and has been here longer than we know it.	MO	-2
I think the DNR has over reacted about the severity of CWD.	MO	0
Over reaction.	MO	-3
Over-warring public.	MO	-1
Blown out of proportion.	MO	-3
Overblown	MO	-1
Something the DNR made to a big deal of.	MO	0

Thought or Image	Theme Code	Feeling Response (+/-)
Making a big deal out of it.	MO	-2
Over-rated. Let the CWD run its course. Moderate herd reduction (thru hunting) may help?	MO	2
Overreaction-waste of time and money by our DNR	MO	3
Overhyped	MO	-1
Over reaction/ public scare	MO	-1
Over reaction	MO	1
Over stated problem	MO	-2
Over reaction	MO	-3
Media hype.	MO	1
A lot of hype.	MO	-1
Basically overrated--I think it has been here for a long time.	MO	-1
DNR overreaction in panic and fear of a little misunderstood disease.	MO	-3
If CWD had not been discovered next door to the bleeding heart liberal capital of the USA (Madison), it would not be much of an issue. It has been documented out west for over 30 years.	MO	-2
It's a waste of money.	MW	-3
You, the DNR, are wasting your time and OUR money.	MW	-3
Stupid waste of time and money.	MW	-3
Lots of wasted money-let nature take its course.	MW	0
Waste of money! It has been around forever!	MW	-3
A waste of money-lose of rut hunting with bow and 9 day tradition	MW	-2
Waste of money.	MW	-1
Attempted control it is a waste of money and effort without stopping private game farm deer and animal raising. Treating symptoms and not the cause.	MW	-3
Wasted efforts.	MW	-2
A lot of money spent on something and not controlling it any better than before. Seasons are too long-interferes with bow hunting.	MW	-2
A waste of time trying to control it. Has probably been around forever.	MW	0
It's a big waste of DNR money	MW	-2
Millions of dollars wasted by DNR	MW	-3

<u>Thought or Image</u>	<u>Theme Code</u>	<u>Feeling Response (+/-)</u>
Waste of money. DNR scam/Insurance. I think this is a way that nature responds to over population.	MW	-3
Too expensive to try and control. Hurting other programs.	MW	-2
Waste of time and money to try to stop it!	MW	2
Waste of money test for it.	MW	-2
Waste of money.	MW	-1
Waste of taxpayer money	MW	-2
Wasted money by the DNR.	MW	-3
A waste of time and money	MW	3
27 million \$ for nothing. DNR are educated fools-can't control CWD killing deer in center CWD- must go beyond boundaries--work-toward center.	MW	-3
A big waste of money by the DNR	MW	-3
A waste of time. This disease has been around for years. We have better testing. Test what we eat and let the herd be.	MW	-3
Millions of dollars wasted. DNR reputation disputed, hunters upset. Unethical practices by DNR. Loss of family tradition. Basically P.O.	MW	-3
32 million tax dollars wasted by the DNR	MW	-3
A lot of wasted money and time.	MW	-3
Waste	MW	-3
waste of money	MW	-3
Waste of time and money and too many deer killed	MW	-3
It's a waste of money	MW	-3
Concern but not enough of an issue for the exorbitant amount of money being spent to fight a natural disease that ultimately cannot be beaten. Herd control eradication is impossible of the disease or deer.	MW	-1
No worry	NW	3
It has been out west for 30 years or better it does not make any difference to me.	NW	0
No worry. I think it has been around forever.	NW	0
Not worried.	NW	99
No problem	NW	0

Thought or Image	Theme Code	Feeling Response (+/-)
Doesn't bother me at all.	NW	0
No big deal-yet.	NW	0
I don't think it is a real problem	NW	3
It is not an issue with me!	NW	-2
Not worried about it. It has been here for years.	NW	0
I don't think it is a problem.	NW	3
It doesn't matter.	NW	0
No problem.	NW	1
No effect.	NW	2
No big deal.	NW	0
I do not have a problem with the disease. It is a deer health issue. Not a food safety issue. It has been here for years and out west. The DNR had their first meeting in Mt. Horeb they made the mistake of saying if your not part of the solution your part of the problem and if you don't shoot deer on your land we are coming on your land and shooting what we need.	NW	3
I do not worry about it.	NW	-3
Not worried much.	NW	0
I don't care about CWD.	NW	-3
I don't believe it will effect me.	NW	2
Does not scare me.	NW	0
I enjoy the great outdoors CWD has not changed my hunting interest in any way	NW	0
Doesn't make an impact towards me or my hunting.	NW	0
Will not harm me.	NW	-3
Not a big threat.	NW	2
No big deal! No body is dying from this. Once people start dropping then I may get concerned.	NW	0
There is NO harm to humans.	NW	3
Not worry about it- nature will take care of it.	NW	0
CWD has been out west for over 15 years with NO negative effect. The state of WI should NOT spend another penny on CWD. \$30 million, what a joke WI is to other states.	NW	-3
Nothing/not worried.	NW	0
Little risk!	NW	-1

Thought or Image	Theme Code	Feeling Response (+/-)
It's an animal disease that does not worry me. I have eaten meat that tested positive it hasn't killed me yet.	NW	0
I used to live in Colorado where CWD was a big scare in the early 80's but did not see any affect on animals or humans so I do not worry about it very much. If I shot a healthy animal, I got ahead and eat it.	NW	0
It does not bother me.	NW	0
Don't worry about it. Too much publicity.	NW	-2
Non issue	NW	0
Not worried. I butcher my own deer.	NW	2
Not worried, its been here for a long time.	NW	0
Nothing really	NW	0
Does not bother me	NW	0
No concern whatsoever.	NW	3
Not worried.	NW	0
Doesn't affect my desire or motivation to hunt in DEZ of consume meat.	NW	0
Not to worry about it, car accidents kill you a lot sooner.	NW	0
It's here. I'm not worried as long as we can test the deer for consumption.	NW	1
Much ado about nothing.	NW	-1
Doesn't matter	NW	0
No problem. It's a buncho-----	NW	99
Not a big worry because it is not harmful to humans physically and it been around for years.	NW	0
NO BIG DEAL!!!	NW	0
It has been around for at least 20 years no concern. A nine day season.	NW	3
Not a big concern! Just don't eat brain tissue.	NW	2
What is the big deal about it?	NW	0
Does not bother me. As long as they keep testing in the DEZ area.	NW	2
CWD is NOT a contagious disease and it has been in deer in Wisconsin and elsewhere forever. Someday scientists, biologists and the DNR will come to this conclusion and the eradication plan will come to an end.	NW	99
Not influenced by the thought at all.	NW	3

Thought or Image	Theme Code	Feeling Response (+/-)
I feel my health is not at risk.	NW	2
It doesn't matter.	NW	-3
I am not concerned about it because I believe it has always been around and will continue to be.	NW	0
It is not a problem.	NW	0
I do not believe CWD is an epidemic that will wipe out the deer here nor do I believe there is a chance to eradicate the disease or stop it from slowly spreading throughout the state.	NW	-1
Not a concern to me at all. I've always loved venison and will continue to eat it.	NW	3
I have not seen where this is such a problem as you say. I have never seen a sick deer and have hunted for 28 years same farm and now can't even get 1 deer.	NW	-2
It's a joke! Its what' the insurance companies want. There will be a wolf population in southern WI if the DNR has their way.	O	-1
I don't believe in the disease.	O	0
It's a lost cause.	O	3
Won't get rid of it but you have no where to put carcasses so it goes in the ditches back through the ground and up plant water and it is back again, everything will smell it and taste it . How are you ever going to get rid of it if we don't' do it all?	O	3
Big joke.	O	3
Economic costs	O	-1
(WASTE)	O	3
Full time to "get er done" in all states (midwest and west).	O	99
CWD significantly undermined the value of the animal. Eradication is a very poor choice of words. Try herd reduction zone.	O	-3
I hope it doesn't transfer to other kinds of animals-we need to get on the land to hunt- I see many animals on land I can't hunt.	O	0
Too many deer cuz too few predators.	O	-3
Containment.	O	2
Iowa County	O	-1
Conspiracy.	O	-2
Deer are extremely adaptable.	O	3
Ignorance	O	-2

<u>Thought or Image</u>	<u>Theme Code</u>	<u>Feeling Response (+/-)</u>
It is a joke.	0	-3
Insurance companies.	0	2
Poaching	0	-3
CWD-Can't waste deer.	0	0
The spread of it!	0	2
Risk low with young deer.	0	1
Greed.	0	-1
Illness.	0	-1
Bull----.	0	-3
Dead deer.	0	99
The concentration of deer are on private lands that very select few can hunt.	0	-3
Total bullshit.	0	-2
Sickness.	0	99
Insurance companies.	0	-3
A lot less deer, makes hunting very much harder.	0	-2
It's a joke!	0	-3
Sickness.	0	-1
To be aware of it.	0	0
Joke	0	-3
Screwup	0	0
Nothing.	0	99
Killing deer.	0	-2
Insurance scam.	0	-2
State wide	0	-1
Spread of disease.	0	99
CWD zone maps.	0	0
What a bunch of crap.	0	-3
Fearmonger	0	-2
Human cancer.	0	-3
Department of Agriculture f***up	0	-3

<u>Thought or Image</u>	<u>Theme Code</u>	<u>Feeling Response (+/-)</u>
I think it's a big problem that so many hunters feed deer minerals, etc. Lets go back to basics.	0	3
Bullshit	0	0
A bunch of shit.	0	-3
I wish more private land owners were willing to allow hunting because public areas are to overcrowded.	0	-2
Too many deer in a small area where no one can hunt them. Private land owners that never allow any hunting and places like Blue Mounds State Park need to be opened up.	0	-3
A joke.	0	-2
Deer	0	0
I personally believe we bought the disease (deer farms)	0	-1
The CWD positive deer I shot a couple years ago.	0	-1
Deer farms. Please get them banned if you hope to avoid CWD throughout the state.	0	-3
Trouble in the future, especially for our youth.	0	-2
Anger	0	-3
The deer lack selenium in diet.	0	0
I was very surprised when a large 4 1/2 year old 8 point buck tested positive for CWD. I shot the buck Nov 7th with a bow.	0	-2
Balancing.	0	1
Anger.	0	-3
Bullshit.	0	-2
Less deer, less deer ticks!	0	2
Why us?	0	-2
the need to open more private land for public use for hunting. Too many deer are going to private or leased land and not being hunted.	0	-3
Hoax	0	0