

Tools for Coordination: A multi-state chronic wasting disease human dimensions data collection guide

Megan Callahan^{1*}, Alex McInturff^{2*}, Melia DeVivo³

¹ University of Washington, School of Environmental and Forest Sciences. Seattle, Washington 98195

² US Geological Survey Washington Cooperative Fish and Wildlife Research Unit, University of Washington, School of Environmental and Forest Sciences, Seattle, Washington 98195

³ Washington Department of Fish and Wildlife

*corresponding authors (mcallaha@uw.edu, amcintur@uw.edu); authors contributed equally

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1) Background and Rationale

Chronic wasting disease (CWD) ranks among the most consequential wildlife management challenges in North America. The disease is a fatal, incurable prion infection of cervids, including deer (*Odocoileus* spp.), elk (*Cervus* spp.), and moose (*Alces alces*), with a long incubation period, persistence in soil and other environmental reservoirs, and no proven means of eradication once it establishes (Gillin and Mawdsley 2018; Haley & Hoover 2015). It has now been detected in wild cervids across dozens of states and several Canadian provinces, and it continues to spread (McClure & Powell 2024; Mori et al. 2024). The disease has proved exceedingly challenging to manage, and agencies have responded with a range of approaches, including surveillance, harvest management, carcass transport and disposal rules, incentives to participate in specific management actions, targeted hunting regimes and restrictions on baiting and feeding (Callahan et al. 2025). Despite these dedicated efforts, the disease continues to cross state and national borders, with Washington, California, and British Columbia reporting their first detections in the last few years.

The human dimensions of the disease and its management have made the disease even more challenging to manage, but they have received comparatively less attention than epidemiology from scientists and managers. Two decades of experience have shown that successful interventions rely on understanding and responding to these human dimensions (Heberlein, 2010; Callahan, in review). Specifically, ecological and epidemiological models perform best when the public understands the disease, supports the managing agency, and complies with recommended practices; case after case has demonstrated that strategies built on biology alone fall short of their goals (Heberlein 2004; Miller & Vaske 2023; Bhattarai et al. 2024).

Cervid species are often wide-ranging or migratory, and regularly transmit CWD across state and national boundaries, further complicating management efforts. In the USA, cervids are a public trust resource that are managed separately by each state (Thompson et al. 2023). When CWD is carried across borders through the natural movement of animals or through human-assisted transport of carcasses and contaminated materials, it is difficult to track the disease or coordinate its management across jurisdictions (Mori et al. 2024; Schwabenlander et al. 2024). Contributing to this is the novelty of the disease, the differing experiences of different jurisdictions in managing it, and the influence of one jurisdiction's decisions on management outcomes in neighboring jurisdictions (Whetten et al. 2025). While some states and provinces have managed established infections for decades, others have only recently detected the disease, and some states have yet to do

so but share a border with infected jurisdictions. Some wildlife agencies have years of longitudinal data on hunters to draw from, while others may rely on the judgment of a small number of staff. In short, there are significant barriers in coordinating disease management in both space and time.

In a recent literature review, Callahan et al. (in review) identified three gaps that can improve the coordination and execution of the human dimensions of CWD (CWD HD) management. The first concerns coordination across boundaries. Most human dimensions research on CWD asks similar questions of similar populations, chiefly hunters, in separate jurisdictions, without a shared instrument or a common design that allows findings to be readily compared or combined. Coordinated, multi-jurisdiction research is common in other fields, where it increases sample sizes, strengthens the validity of findings, and allows for comparison across populations, but such efforts are rare in CWD management (Dusdal & Powell 2021; Pickering & Fox 2022). The second gap concerns change over time. Public perceptions, trust, and behavior shift as people grow familiar with the disease and its management, yet most CWD HD studies rely on snapshots taken during periods of high attention, especially during the interval just after detection (Vaske & Miller 2018; Holland et al. 2020). As a result, CWD managers are left to make decisions in a changing social environment using static data. Tracking change over time effectively is challenging, and it requires longitudinal instruments designed from the outset to be repeated and compared over years (Ployhart & Vandenberg 2010). The third gap concerns scale. Because surveys dominate the methods of CWD HD, the individual has been the primary unit of analysis. This scale is valuable, but it can also obscure the group norms, trust relationships, information sources, and social contexts that shape whether management succeeds (Manfredo et al. 2017).

The purpose of this project is to respond to these three gaps. The first objective of this project was to convene CWD managers from multiple states in the US West and the province of British Columbia, Canada, to co-develop a modular survey instrument for understanding the human dimensions of CWD. Through multiple short meetings and a two-day workshop, this group produced a comprehensive instrument that can coordinate research across jurisdictional boundaries. Such an instrument is also foundational for ongoing, longitudinal studies of the human dimensions of the disease. The second goal of the project was to ensure that the survey was place-specific. To do so, we developed a decision guide that allows local managers to tailor the modular survey to their specific needs and challenges. Finally, the third goal of this project was to lay a common foundation for education and outreach, and we conducted a parallel investigation of messaging tools and approaches that is described in a separate report.

2) Collaborative Process

The project was funded by an United States Department of Agriculture Animal and Plant Health Inspection Service (APHIS) grant (Award Number AP24WSNWRC00C050). The project convened CWD managers from wildlife agencies from across the North American West in a single working group (Table 1). Over roughly four months, the working group met at monthly intervals to discuss the project's scope, goals, and products. These meetings also saw discussions about each jurisdiction's priorities, and allowed for planning of a two-day workshop in May 2025. During this time, the working group developed a shared statement of purpose that was foundational to the formal products to be developed.

The working group drew participants from Washington, Oregon, Utah, Nevada, British Columbia, California, and Saskatchewan, with regional coordination provided by the Western Association of Fish and Wildlife Agencies (Table 1). Participation grew between the two convenings as additional important personnel were recruited, and the May workshop included staff from state and provincial wildlife agencies, veterinarians and wildlife health specialists, and the university researchers leading the work. The breadth and roles of the attendees were critical to project success. The products that came out of this working group carry additional authority because agency staff who manage CWD in their respective jurisdictions created and shaped the survey instrument and decision guide. The range of jurisdictions ensured that the instrument reflects the full span of management contexts, from places where CWD is long-established to areas where it has not been detected.

Table 1. The regions, representatives, and CWD status of participating agencies

Location	Agency	Represented by	Year of 1 st CWD detection
Washington	Washington Dept of Fish and Wildlife	Melia DeVivo, Hunter Westacott	2024
Oregon	Oregon Dept of Fish and Wildlife	Collin Gillin, Ashley Reeder	Not detected
Utah	Utah Division of Wildlife Resources	Ginger Stout, Matt Bartley	2002
Nevada	Nevada Dept of Wildlife	Nate LaHue	Not detected
British Columbia	Ministry of Water, Land, and Resource Stewardship	Cait Nelson	2024
Saskatchewan	Ministry of Environment	Ruth Aschim	1996
Arizona	Arizona Game and Fish Department	Anne Justice-Allen	Not detected
California	California Dept of Fish and Wildlife	Brandon Munk, Alex Heeren, Julia	2025

		Sizek, Liberty Wood	
Coordination	Western Association of Fish And Wildlife Agencies	Noelle Thompson	
Research Leadership	USGS Washington Cooperative Fish and Wildlife Research Unit, University of Washington	Meggie Callahan, Alex McInturff	

In meetings leading up to the May workshop, the Washington research team briefed the group to past research efforts based in Washington and other states (Callahan et al., 2025; Callahan et al., in review). Several priorities emerged in response to the introduced research and ongoing state needs and priorities that shaped the direction of the May workshop and its products. Participants placed high value on a decision tree that could keep the instrument useful as CWD statuses change, since a tool built only for present conditions would age quickly. Agencies with small human dimensions programs described the effort as a way to expand a capacity they could not build alone, particularly around education and outreach. The group also discussed the inherent tension between developing a consistent instrument, messaging, and the need for flexibility to accommodate differing agencies' laws, and local contexts.

These meetings also raised other important questions that would inform the workshop. Oregon, for example, noted that roughly a fifth of the sampled public was unable to say what CWD is, and staff at check stations were encountering hunters who had never heard of the disease despite considerable investment in media. Participants were interested in how a survey could reach hunters who hunt out of state, how to capture where animals travel and what becomes of carcasses after harvest, and how to motivate hunters to engage with a disease whose effects feel distant from the hunt itself. These concerns helped define and refine the topics the survey would need to measure and the design problems the group would have to solve.

Between the May workshop, the Washington research team circulated a draft survey and a short form soliciting each jurisdiction's desired elements, so that the workshop opened with a shared starting point and initial rounds of feedback and input. This draft survey drew from the ongoing meetings and Washington's previously published survey instrument (Callahan et al. 2025).

The May workshop was conducted over two full days by video conference and was structured to move from shared understanding to concrete survey questions (see Agenda in Appendix A and notes in Appendix B). The Washington research team acted as facilitators and opened with ground rules that set the terms of mutually respectful

collaboration. The first day of the workshop built a foundation for the goals and products of the project. After the Washington team presented the prior survey and the current project, followed by an extended period for questions, the group then worked through an individual breakdown by jurisdiction, in which each agency described what they knew about its own public, how they knew it, and what they most wanted to learn. This exercise made the group's uneven starting points explicit. For example, California had surveyed deer-tag holders annually since 2019, before and after detection, while British Columbia had never fielded a formal survey and had no mandatory harvest reporting. Washington had moved from having almost no systematic knowledge of its hunters to having detailed survey results, but it still lacked information on hunters who operate outside the state system. The afternoon focused on topical blocks, in which the group examined the candidate domains of the survey one at a time, including topics like carcass management and movement, sampling, knowledge, trust, risk perception, values, and the question of which populations the instrument should address.

Day two produced draft questions that would form the survey instrument. Working in topic groups, participants wrote and revised survey items in three successive rounds, sharing results after each so the full group could react. The rounds covered sampling, management and tradeoffs, knowledge, risk perception, trust, information, and cross-boundary movement. The workshop closed with a discussion of implementation that reached the decision tree, survey format, distribution, data analysis, and the timeline to a final product. The specific design decisions that came out of these two days, and the reasoning behind them, are the subject of Section 3.

While the workshop produced outputs, the structure of the workshop itself is also a transferable result. We suggest that convening agencies at different points along the disease's arc, giving each room to describe its own situation before turning to shared questions, and then building a common instrument through iterative rounds against a circulated draft, is a workable method for reaching agreement on coordinated measurement. This method directly addresses the coordination problems this project is designed to respond to, and it may apply to other diseases and other cross-boundary questions in wildlife management.

3) Survey Design Decisions

Before describing the formal products of the workshop, we will first describe a set of decisions and logic about how to develop the survey itself. This logic reflects the judgment and deliberation of the working group, and merits a separate record as these underlying decisions do not explicitly appear in the survey itself. This section records the principles the group settled on, organized by the problem each was meant to solve, in the hope that

an agency adapting the instrument can tell which choices are foundational and which might be adaptable to local context.

Taxa. Several decisions concerned the survey's scope. The group agreed early to speak of cervids rather than of deer and elk, so that a single instrument could serve jurisdictions managing different species. Species-specific questions were included to identify which species were being hunted. Additionally, questions could be modified (as discussed in the decision tree document) depending on specific concerns of different jurisdictions. Where a species-specific concern mattered to a jurisdiction, it was put in an optional block rather than in the common questions.

Knowledge. A second set of decisions concerned the measurement of both self-reported knowledge, and knowledge evaluated objectively via the survey. The group chose two different formats (True/False and Multiple Choice) to work independently at the discretion of the managing agency, or to be combined and add complementary information. The group chose to force responses on knowledge items rather than offer a "maybe" option. The reasoning was twofold. Allowing a middle option lets respondents avoid committing, which yields little the agency can act on. Forcing a choice, by contrast, allows results to be sorted into meaningful tiers, and reduces the noise introduced when a respondent who does not know an answer selects a hedged answer. However, the group did include a "I do not know" category to reduce the likelihood of "lucky guessing" and highlight the actual knowledge (or lack of knowledge) of the sampled population. Recognizing that large sample surveys can also play a role in educating the public, the group also decided to avoid building knowledge items around the visible signs of CWD. Many infected animals show no outward signs, and a survey that trains hunters to look for a wasting, stumbling animal has the potential to teach a heuristic that will fail them in practice. The instrument instead directs attention to the fact that testing is the only reliable way to know whether an animal is infected.

Management. A third set of decisions concerned how the survey handles management. The group reframed management questions away from binary support and opposition, and toward tolerance and tradeoff. Rather than asking whether a respondent supports a given action, the instrument asks what a respondent would be willing to accept if it produced a specified outcome. Binary measures of support and opposition tend to reproduce predictable positions, with hunters favoring hunter-led strategies and opposing bans and agency-led removals. Agencies can already anticipate these results, and the data add little to understanding or practice. Framing in terms of tradeoff reveals the terms on which a respondent might accept a contested action, and it identifies the tradeoffs a respondent

will not make. This kind of information is much more actionable when it comes to needs to target education toward the actions where acceptance is reachable.

Trust. A further set of decisions concerned trust, which the Washington survey had shown to be central. The group decided that the instrument should disaggregate trust along two axes. The first axis distinguishes the technical staff of an agency – such as the biologists and field personnel a hunter might encounter -- from the decision makers, including the leadership and commissions that set policy. The second axis distinguishes the local or regional office from the state headquarters. The prior survey findings in Washington indicated more trust in local and regional staff than in senior leadership and commissions. Therefore, the group decided that a survey that asks only about trust in "the agency" collapses a difference an agency can act on, since it bears directly on who should be the visible messenger. The group also asked critical questions regarding what an agency does with a finding of distrust. Simply establishing that hunters do not trust an agency offers little direction. British Columbia voiced that their interest in framing trust questions centered on how distrust might be resolved. This interest points toward findings an agency can turn into action, rather than toward a diagnosis it can only confirm.

Survey design. The ordering of sections was itself treated as a design decision. The group placed the risk perception block after the management and tradeoff block. Risk perception measures whether a respondent regards CWD as a genuine threat to cervid populations, to human health, to hunting opportunity, or to the regional economy. Those perceptions can create cognitive biases that condition how the same respondent answers questions about what they would tolerate. Placed in the other order, the potential management responses are given without biasing context. The group organized risk perception questions into four categories, distinguishing ecological risk, hunting-opportunity risk, public health and safety risk, and economic risk, while noting that these categories overlap and that a respondent's economic and hunting-opportunity concerns can be difficult to separate.

Another set of decisions concerned the conditions under which the survey is administered. The group agreed the instrument should be confidential but not anonymous. The distinction is that responses are protected but respondents can be re-contacted, making a longitudinal design possible, since tracking change over time requires the ability to follow the same individuals or households. The group recognized the cost of this choice, since a survey that is not anonymous may see lower participation, and it judged the capacity for follow-up worth that cost. The group also worked through the timeframe that knowledge and experience questions should reference, settling toward a respondent's most recent hunting experience rather than a fixed window, while noting the complication that in some

jurisdictions the same hunter may not draw a tag every year, so that "most recent" can reach back several seasons.

Finally, the group decided that the survey is primarily a tool for gathering information, not a vehicle for delivering it. The temptation to use survey items to educate respondents, to embed the correct answer in the question, was named and set aside, on the grounds that a survey written to teach cannot also measure what its respondents know. Where the group judged that respondents would benefit from information about CWD, it placed that information after the knowledge items or at the end of the instrument, so that measurement and education remain separate and the knowledge block records a genuine baseline. Future users of this survey should preserve this quality when adapting it.

4) Products

The project produced three products: a master survey built from modular blocks (Appendix C), a decision tree that guides an agency to the blocks it needs (Appendix D), and the documented workflow that lets both be deployed and maintained over time (this report). This section describes briefly how the pieces fit together and how an agency is meant to move through them.

The survey is organized as topic blocks rather than as a single fixed questionnaire, covering knowledge, information sources, management and tradeoffs, sampling, risk perception, trust, cross-boundary movement, and demographics. Some of these form a core that is meant to stay constant across every deployment to yield answers that can be compared across years and geographies. In addition to the core questions are optional blocks. For example, a state that permits baiting will want questions on restrictions that a state prohibiting the practice does not need; a jurisdiction without detected CWD will word its questions differently from one managing an established infection; a province concerned with caribou will want species-specific items that would not apply elsewhere. An agency can add the blocks as needed to the core questions or omit those that do not apply.

The decision tree guides the selection of blocks. It routes an agency through its own circumstances, its CWD status, its regulations, the management questions it faces, and the populations it can reach, and points it to the core blocks and the optional blocks its situation warrants. The group judged the tree necessary for two other uses. The first use is for future adopters encountering the instrument for the first time. The second use is for internal approval, since a tree that shows how a survey was assembled and why each block is present is a useful thing to place before the decision makers.

In short, the workshop took a tested foundation and revised it through the judgment of agency staff who manage CWD across multiple jurisdictions, working the questions block

by block over two days. The instrument an agency downloads therefore carries two kinds of authority at once, the empirical grounding of a survey developed through established social-science methods and the practical grounding of a survey shaped by the people who will use it. This combination offers the products of this workshop a special appeal. A researcher's instrument that no agency helped build would struggle for legitimacy, and an agency instrument assembled without methodological foundation could struggle for validity. Through the co-production process employed here, this survey draws from both.

5) Deployment

The modular survey was designed to be deployed by various agency staff under ordinary working conditions rather than by a research team with dedicated infrastructure. The survey requires roughly fifteen minutes to complete, can be deployed online through Qualtrics, and will, ideally, reach respondents through the hunter and license lists each agency maintains. This ease of deployment was a specific design goal of the workshop to ensure the survey is accessible to a range of practitioners.

Analysis of survey results is a task that each participating agency will have to navigate. However, the project provides a documented workflow and can provide a basic script in R that performs summaries. These summaries alone can provide highly useful and actionable information to agencies. The project's products do not provide full analytic support, which fell outside the scope of this funding. An agency with an analyst on staff can extend the script to address its own questions. A jurisdiction planning to deploy the survey should know at the outset that the tool delivers a ready instrument and a starting point for analysis, and that turning results into tailored education and outreach is work the agency will need to plan for.

The survey instrument and other products are not without limitations. The first limitation is the sampling frame. Because the survey reaches respondents through license and hunter lists, it reaches the people those lists contain, and it misses the people they do not. Hunters who buy no license in the state, hunters who travel from out of state, Tribal hunters, other constituents like taxidermists and meat processors, and landowners who are not hunters are important to consider but more difficult to reach. Furthermore, some agencies do not maintain identifiable license databases, and those that do may have interruptions over time with changing vendors, staff, or data storage solutions. The second is the cost of the confidential, but not anonymous, design. The decision to keep respondents identifiable so that the same people can be re-contacted in later survey waves, carries a participation cost, because some hunters are less willing to answer a survey they cannot complete anonymously. If an agency does not plan to use the survey longitudinally, they should consider making it fully anonymous. The third is sampling bias.

Even with incentives provided, a survey of hunters who chose to respond evaluates the more engaged portion of the hunting public. The perceptions of more disengaged individuals, whom the workshop identified as a consequential audience, will always be difficult to capture. The results should be interpreted with that asymmetry in mind.

6) Longitudinal and Cross-Boundary Use

The survey was designed to be run more than once and in more than one place. This design is intended to respond to some of the limitations of past CWD research, where snapshots of places and times are the norm. By contrast, surveying the same jurisdiction measured across years, and different jurisdictions measured against one another can provide valuable points for comparison and help ensure consistent actionable data are collected across boundaries.

For both multi-jurisdictional and longitudinal purposes, maintaining the core elements of the survey is essential, so that these core questions can be compared. If a core knowledge item is reworded between survey waves, a shift in responses could reflect a shift in what hunters know or a shift in what the question asked, and the two cannot be separated after the fact. We recommend that the core blocks are held fixed across waves, and that any modification to the instrument are documented, and each deployed version is recorded so that a later wave can be compared against an earlier one with the differences between them known. The same logic applies to comparing results across jurisdictions, which also requires maintaining consistency in the core questions. This survey approach would also demand maintaining reliable metadata around churn, participation and harvest rates, and hunting site selection.

The workshop did raise questions and concerns about comparing results across boundaries. The most consequential concerns how respondents are linked across borders at all. A hunter who lives in one jurisdiction and hunts in another appears, from each agency's list, as a different kind of respondent, and yet there is not an easy way to track such individuals, even with the survey instrument we created. However, two paths were discussed. Respondents might identify their own movement, reporting where they live and where they hunt, which is simple to implement, but depends entirely on what people are willing to disclose. Second, agencies could share data in a way that connects records across jurisdictions, which is more powerful. However, this approach is much more challenging to implement and raises questions of agreement, privacy, and law that vary by state and province and were beyond what this project could settle. The instrument captures the raw material either way, since it asks where a respondent lives and where they hunt, and what becomes possible with that material depends on arrangements the participating agencies have yet to build.

7) Next Steps

The project produced an instrument, a decision tree, and convened a working group. The material generated across the two workshop days has been compiled into a consolidated draft of the master survey (Appendix C). The decision tree and the accompanying workflow (Appendix D) can be provided to states where an agency that took no part in the workshop can select the blocks its situation calls for and produce results. The R script and its documentation are being readied so that a jurisdiction can move from collected responses to basic summaries on its own. The value of the tool depends on it functioning at arm's length from the people who made it.

The most important next steps belong to the agencies that choose to use the products we provide here. The survey can become a source of knowledge only when an agency deploys it, and the coordinated regional comparisons the project was convened to make possible depends on more than one jurisdiction doing so. The longitudinal and cross-boundary work the instrument was built to support requires repeated deployment, version control, and comparison across jurisdictions on the shared core. These products are available now and require only that agencies commit to using them over time. The fuller cross-boundary vision requires more coordination, since linking a hunter's responses across the jurisdictions they travel through depends on data-sharing and identification arrangements the working group identified but did not resolve. The project's fourth objective, a review of communication research from the COVID-19 pandemic, was conducted separately and is reported on its own; its findings feed back into how the survey's education and outreach questions are framed.

What the project demonstrates is that agencies sitting at very different points along the arc of a spreading disease, managing different species under different laws with uneven capacity, can agree on a common way to measure the human dimensions of that disease. The survey instrument and decision guide are the most visible products, but the working group and the method that produced it may prove the most important. CWD is not the last wildlife health problem that will cross boundaries, and the practice of convening the relevant jurisdictions, giving each room to describe its own situation, and building a shared instrument from a tested foundation is a practice that can be applied again. The survey now passes from the group that designed it to the agencies that will decide what it becomes.

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Appendix A: Working Group Meeting Agendas

CWD Human Dimensions Survey Meeting Agenda

Goal: The overall goal of the meeting is to discuss the CWD human dimensions survey proposal and to understand your goals and expectations for the project.

Time: Friday January 17, 2025, 1-2pm PST, Zoom

Meeting Schedule:

I. Introductions	Brief introductions, all participants
II. Project summary	A very brief (~5 mins) overview of the project a. Goals b. Past projects c. Upcoming steps
III. Expectations and goals	Understanding your expectations and goals for the project
IV. Questions	General questions regarding the project
V. Logistics	Logistics regarding future meetings and updates a. Update meetings b. Larger in-person/Zoom workshop

CWD Human Dimensions Survey Workshop Agenda

Time: Wednesday May 14th and Thursday May 15th, 8am-4pm PDT (9am-5pm MDT), Zoom

Meeting Schedule:

DAY 1 (May 14, 2025)

I. Introductions	8:00-8:45am PDT (9:00-9:45am MDT)	Brief introductions, major concerns/questions and what you are looking to get out of the workshop, (<i>all participants</i>).
II. Presentation and Q&A on past survey and current project	8:45-10:00am PDT (9:45-11:00am MDT)	~30mins: Presentation on current multi-jurisdiction project and expectations, presentation on previous Washington State survey design and implementation. (<i>WA delegation</i>). ~45mins: Q&A about past or current project, goals (<i>all participants</i>).
III. Break	10:00-10:15am PDT (11:00-11:15am MDT)	Break
IV. Individual State and Province breakdown	10:15am-12:00pm PDT (11:15am-1:00pm MDT)	Status of knowledge: how do you know what you know, what information do you have about your public, needs and concerns about CWD for each state/province, (<i>all participants</i>).
V. Lunch	12:00-1:00pm PDT (1:00pm-2:00pm MDT)	Lunch
VI. Topic of Interest Blocks	1:00-4:00pm PDT (2:00-5:00pm MDT)	Half an hour blocks of topics of interest (e.g., knowledge, trust, values, management, risk perceptions, attitudes), (<i>all participants</i>). Break included.

DAY 2 (May 15, 2025)

I. Day 1 Recap	8:00-8:45am PDT (9:00-9:45am MDT)	Quick recap of previous day (<i>moderators</i>), open discussion (<i>all participants</i>).
II. Build-your own questions part 1	8:45-10:00am PDT (9:45-11:00am MDT)	Using the survey draft, revise, duplicate, and create questions based on each state/province priority (<i>all participants, in topic groups</i>).
III. Question sharing (part 1)	10:00-10:15am PDT (11:00-11:15am MDT)	Share results of part 1 of build your own questions (<i>all participants, in topic groups</i>).
IV. Break	10:15-10:30am PDT (11:15-11:30am MDT)	Break
V. Build-your own questions part 2	10:30am-11:30pm PDT (11:15am-1:00pm MDT)	Using the survey draft, revise, duplicate, and create questions based on each state/province priority (<i>all participants, in topic groups</i>).
VI. Question sharing (part 2)	11:30am-12:00pm PDT (12:30pm-1:00pm MDT)	Share results of part 2 of build your own questions, (<i>all participants, in topic groups</i>).
VII. Lunch	12:00-1:00pm PDT (1:00pm-2:00pm MDT)	Lunch
VIII. Build your own questions part 3	1:00-2:00pm PDT (2:00-3:00pm MDT)	Using the survey draft, revise, duplicate, and create questions based on each state/province priority (<i>all participants, in topic groups</i>).

IX. Question sharing (part 3)	2:00pm-2:30pm PDT (3:00pm-3:30pm MDT)	Share results of part 3 of build your own questions, <i>(all participants, in topic groups)</i> .
X. Implementation and wrap up	2:30-4:00 pm PDT (3:30-5:00 pm MDT)	Discussion about implementation (decision tree, survey format). Future actions based on findings. Wrap-up discussion, <i>(all participants)</i> .

Appendix B: Workshop meeting notes

Meeting Notes: Multi-State CWD HD Survey Meeting #1

January 17, 2025

Goal: The overall goal of the meeting is to discuss the CWD human dimensions survey proposal and to understand your goals and expectations for the project.

I. Introductions

In attendance –

- Ginger Stout and Matt Bartley from Utah,
- Ruth Aschim from Saskatchewan,
- Colin Gillin from Oregon
- Melia DeVivo and Hunter Westacott from Washington
- Noelle Thompson, WAFWA
- Alex McInturff USGS/UW
- Meggie Callahan from UW

II. Project Summary

- Brief overview of human dimensions survey previously run in Washington State.
- Objectives for the current project (as laid out in funding grant):
 - **Objective 1: Establish a collaborative process** across states/provinces to coordinate research, education, and outreach on the human dimensions of CWD.
 - **Objective 2: Develop a master survey** that provides the foundation for a multi-year longitudinal survey across multiple states/provinces to evaluate resident hunter knowledge and perceptions of CWD, management strategy support, agency trust, and avenues for education and outreach.
 - **Objective 3: Co-produce a decision tree** with state agencies for application of the survey and education and outreach materials to reflect the context and needs of each state/province.
- Potential upcoming steps:
 - This meeting
 - Form on desired survey elements
 - Survey draft
 - Workshop (in-person or online)
 - Additional drafts and final version
- Notes about cross-state/country information from presentation/summary:
 - Some respondents are getting their information from other states - exciting opportunity to compare results from across states with different CWD statuses
 - WA has a lot of hunters that hunt out of state - key to know what they know and where they're getting information
 - Synchronization and coordination is beneficial as people traffic across state lines - key to be able to collaborate

III. Expectations and Goals

- Decision tree is especially valuable as CWD statuses shift
- Utah is very excited - only 2-3 people working on it, so this expands support and ideas, especially around education/outreach. Education/outreach has been limited so far. Getting new ideas on how to reach people and what works is “gold”
- Having a mass effort and consistent message across states will be valuable - though flexibility is important, as states with different statuses will have different experiences and needs
- Questions from OR: who do you contact, and how? But critically, whether they know anything? This is a massive question for agencies that is rarely addressed. Only 20% know what CWD is, but they are the ones who get sampled and provide data. OR spent a lot of money on media around CWD, but when you go to a check station, 9/10 people do not know about CWD. Lots of confusion among those who have heard of it
- Potential bias among respondents - how to get a broader respondent population? Tie to getting a hunting license?
- Want to know about location: How far people go, what do they do with the carcass after? Inter-state, inter-country movement.
- Carcass disposal—Do you process your own/take it to someone?

IV. Questions

- How are we going to connect respondents across states? I.e., data sharing agreements? Or self-identification?
- How do we motivate hunters to care about this, when it’s such an indirect thing to their hunting experience?
- What management tools would hunters deem acceptable? (discussed in call) - in WA responses were predictable (i.e., hunter led, oppose restrictions, etc.). How do we go a step further? I.e., even though there is opposition to restrictions, WA is moving forward. So how do we ask the question: is there a way to implement this where it’s more easily accepted, or what do you need to know to make it more acceptable? How to bring hunters on board with contentious management actions?
- What is geographic scale of this? (Answered in call)
- Carcass disposal - how do hunters process meat, who does it
- How to deal with internal contradictions - e.g., want hunting opportunity and decreasing the spread - how to learn about those motivations and understandings?

V. Logistics

- Project team will...
 - Share current survey draft
 - Share notes
 - Google form about goals and expectations
- Big meeting/workshop
 - Pushed back until we have draft of survey available - some time in spring

- Could piggyback on another meeting - e.g. WAFWA meeting over the summer in June in Utah. Also deer and elk workshop in BC.
- Preference for in-person if possible, but timing could be tough
- Timeline-wise—May not be able to do it in June
- Poll: Dates, locations, restrictions (do any have any travel restrictions)

CWD Human Dimensions Survey Workshop Notes

Time: Wednesday May 14th and 15th, 8am-4pm PDT (9am-5pm MDT)

DAY 1

I. Introductions 8:00-8:45am PDT (9:00-9:45am MDT)

Brief introductions, major concerns/questions and what you are looking to get out of the workshop, (*all participants*).

- Meggie Callahan (UW), Melia DeVivio (WDFW), Hunter Westacott (WDFW), Alex McInturff (USGS and UW), Alex Heeren (CDFW), Julia Sizek (CDFW), Brandon Munk (CDFW), Liberty Wood (CDFW), Nate LaHue (Nevada Department of Wildlife), Ginger Stout (UDWR), Matt Bartley (UDWR), Noelle Thompson (WAFWA – Western Association of Fish and Wildlife Agencies), Anne Justice-Allen (AZGFD - WAFWA), Cait Nelson (BC Wildlife Bio), Colin Gillin (ODFW), Ashley Reeder (ODFW)

II. Presentation and Q&A on past survey and current project 8:45-10:00am PDT (9:45-11:00am MDT)

~30mins: Presentation on current multi-jurisdiction project and expectations, presentation on previous Washington State survey design and implementation. (*WA delegation*).

~45mins: Q&A about past or current project, goals (*all participants*).

- Grant name: Tools for coordination-Developing an approach to the human dimensions of CWD across state and national boundaries
- Grant provided 1 year of funding
- **Goal:** Create survey blocks that can be used for multiple states/provinces as well as decision tree to guide use. This can be used to allow for consistency across state/provinces in data and can be adjusted to be used for multiple years
- **Objective 1:** Establish a collaborative process
- **Objective 2:** Develop a master survey
- **Objective 3:** Co-produce a decision tree.
- Won't be building a whole new survey from scratch. A starting block was sent out.
 - Can improve current modules and add missing modules
- Probably can't make a specific survey for each state/province. Can't include hyper-specific issues for certain states/provinces
- Will create something to allow for coordination and collaboration: overlaps, differences, cross-boundary information
- Will inform issues such as:
 - What do people know about CWD and CWD management?
 - How worried are people about CWD and what worries them?
 - Where are they getting their info?
 - What management would people support/not support?
 - How much do people trust or not trust the agency?
 - Where are people hunting and what is happening to the carcass?

- Who makes up the hunting population?
- Prior to compiling the survey, they:
 - Systematic review of CWD HD literature.
 - Interviews to identify knowledge, perspectives, and concerns.
 - Sent out a statewide survey, big game hunters in Washington, online, was incentivized.
 - Age had a large impact on people's responses.
 - People want to get their info from WDFW
 - Respondents supported increased hunting opportunities and hunter-led strategies.
 - Respondents did not support bans and agency-led strategies (e.g., agency-led deer and elk removals).
- How the survey information can be used by the department:
 - Needed baseline information from the public (prior to detection)
 - Helped solidify management strategies moving forward and how to communicate it to the public.
 - Led to doing more public outreach.
 - Realized outreach materials lacked specific information. (Added more pages to the big game pamphlet this year as well as call out on cover)
 - Strategically place check stations to increase participation
 - Purchased ad space in other agencies pamphlets to reach more people (across state and provinces).
- For future: send out surveys online and paper
- For other states that aren't involved in these meetings/processes: will be sharing the tool with everyone.
- Long term: would love to have multiple states send out survey and then come together to compare results
- Survey can be used in states that haven't detected CWD by just adjusting wording
- How do we message to get public to respond in a positive way to increase participation/ownership? (this is step two)
- Right now, focused on hunters for survey, hunting community is changing. Need to keep that in mind.
- How to reach people outside of the agency system?
 - Communities, tribes

III. Break 10:00-10:15am PDT (11:00-11:15am MDT)

IV. Individual State and Province breakdown 10:15am-12:00pm PDT (11:15am-1:00pm MDT)

Status of knowledge: how do you know what you know, what information do you have about your public, needs and concerns about CWD for each state/province, (*all participants*).

Oregon

- What information do you have about your public/constituents?
 - Feelings and general knowledge about CWD
 - Unsure how-to ID CWD
 - People would prefer to stop at check stations as a sampling location
 - Not enough check stations
 - No one thought that ODFW is responsible for controlling CWD
- How are you getting that information?
 - Small survey in spring of last year
- What would you like to know more about? (What things are you hoping to be included in a survey)
 - Best way to inform people about management actions and how to gauge their response

California

- What information do you have about your public/constituents?
 - Ask about awareness, concern, where they are getting into, willingness to participate in check stations
- How are you getting that information?
 - Survey starting in 2019, every year for those who purchase deer tags
 - Surveys both before and after detection
 - Mini surveys with meat processors across the state
- What would you like to know more about? (What things are you hoping to be included in a survey)
 - Individuals (hunters) not participating in the surveys
 - Hunters that only hunt out of state
 - Tribes- survey tool probably won't be the best tool
 - Want to increase sampling, work with other agencies.
 - Awareness of regulations

BC

- What information do you have about your public/constituents?
 - Not much
- How are you getting that information?
 - Never done formal survey, no mandatory reporting for harvest
 - Collaborative working groups – short survey within this
- What would you like to know more about? (What things are you hoping to be included in a survey)

- How to frame communication and outreach in a way that is more effective
- How are people consuming that information?
- General public survey would be helpful
- How to frame questions that will best inform us

Utah

- What information do you have about your public/constituents?
 - Public is not very familiar with CWD
 - Public not always willing to give samples
- How are you getting that information?
 - Marketing outreach is educational focus
 - Surveys
 - Informal survey questions at check stations
- What would you like to know more about? (What things are you hoping to be included in a survey)
 - How to get information out
 - Cross-state information
 - Options for management
 - How to improve hunters submitting samples.
 - What are the sacrifices hunters are willing to make?

WDFW

- What information do you have about your public/constituents?
 - Before the survey- nothing. Still in the dark on those who aren't state hunters
- How are you getting that information?
 - Survey
- What would you like to know more about? (What things are you hoping to be included in a survey)
 - Capturing information from those who aren't state hunters and tribal hunters
 - Reaching landowners that aren't necessarily hunters
 - Incorporate questions to get to a better understanding of what would make hunters support rules and submit samples

Nevada

- What information do you have about your public/constituents?
 - Seems to be leaning towards trophy hunting
- How are you getting that information?
 - Surveys
- What would you like to know more about? (What things are you hoping to be included in a survey)

- What compromises are the public willing to make?
- Does the public understand it?
- What would make the public more supportive?

Discussion

- What about shorter, more frequent surveys?
- Incentives only go so far
- Mandatory survey in order to purchase tag?
- Add link to broader survey

V. Lunch 12:00-1:00pm PDT (1:00pm-2:00pm MDT) Lunch

VI. Topic of Interest Blocks 1:00-4:00pm PDT (2:00-5:00pm MDT)

Half an hour blocks of topics of interest (e.g., knowledge, trust, values, management, risk perceptions, attitudes), (*all participants*). Break included.

1. Cross boundary—what is most important to know (carcass management? Information? Regulation knowledge?)
 - Carcass management is very important – understanding how hunters are processing and disposing
 - Regional data would be helpful (California is very large example)
 - How to do this with a standardized survey that will be used across multiple states?
 - Key info: Area they live and area they are hunting
 - A map of a broader region (PNW) that people can mark?
 - Regulations ironed out regarding carcasses (transport and disposal)
 - Want to know if people can access info and how they are accessing it. Do it in a way that is more actionable.
 - Phrasing it: “Would you be willing to debone your carcass in the field to help prevent the spread?”
2. Tradeoffs (If people understand the tradeoffs and what they would be willing to trade)
 - Well established form of questions to ask in a survey
 - Will help educate the public on what the tradeoffs are.
 - Good to identify tradeoffs that hunters aren’t willing to make. Can target education.
3. Sampling (how much do people know, how to improve sampling?)
 - Barriers and benefits of sampling and not submitting samples
 - Where are they accessing information about sampling
 - Are people interested in training?
 - What technique is easiest for them to collect samples?
 - People don’t understand why they need to submit samples.
 - Check stations are best source for WDFW but costly

- Awareness is difficult
 - Mandatory works but didn't win over people
4. Hunters vs. non-hunters, who should be included? (Perhaps get into demographics questions? What demographic knowledge are we interested in?)
 - If doing non-hunters, that is a separate set of questions. Also, how would we send out the survey to them? Probably have the same issue with tribes
 - Probably beyond the scope to include non-hunters and tribes
 - For now, focus on hunters.
 5. Who is responsible for prevention/management (maybe get into agency trust?)
 - Trust part can be done separate by each agency
 - Question can provide good insight but then what do you do with that information? Other than direction of outreach
 6. Knowledge (what do people know about CWD and CWD management?)
 - Can be interesting to look at where they are getting their info and how much knowledge they have
 - Difference of knowing something in your head and knowing something in practice
 - People might not tune in to info (i.e. podcasts) produced by agencies
 - Will education even work if you know that the hunters don't care?
 - Tracking if knowledge has changed? If outreach has helped.
 7. Risk perceptions?
 - Important to know if it is a motivational factor
 - How does it affect behavior?
 - Two ways to look at it: Risk to themselves and risk to the population
 - Emotional factor: might be hard to convince people this is an issue because they think wildlife is cute and want to see it
 8. Do we want to include anything about trust levels?
 - Important in survey in Washington
 - Important to distinguish between the different sections: Commission, biologists, senior leaders
 - For BC: frame questions on how to resolve the lack of trust. Actionable outcome.
 - We already know that people don't trust us. What would we do with that info?
 9. Values
 - Pushback on the Washington survey on value questions
 - Could use slider
 - Understanding values drives understanding behaviors

Notes:

- Find balance between in not giving to much information in the survey and using it as a tool to figure out what information needs to go out in the future
- Should the survey be anonymous?
 - Confidential but not anonymous (Utah, Oregon)
 - If not anonymous, could lead to less participation

DAY 2

Day 1 Recap Quick recap of previous day (*moderators*), open discussion (*all participants*).

- Do we think everyone will implement the survey and what will that look like? How would we share information?

Build-your own questions part 1

Question sharing (part 1) Share results of part 1 of build your own questions (*all participants, in topic groups*).

Sampling (see [google doc](#) for full questions)

- Option 1: ask about sampling techniques. 3 checkboxes
- If they had submitted sample, more info about that
- Info on people's experience submitting sample in strongly agree to strongly disagree
- Barriers to submitting a sample
- Optional question about "any other comments"
- Turn around time for samples. Not something under our control so not adding that as a question. (BC has more control of turnaround time)
 - Can put the question in as a rate your experience question
- Asking questions not just about deer and elk. Reframed it to say cervids.
- Might want to ask about the home tests
 - It is not approved so don't want to spread the idea of it
- What is the scope of time we are asking about?
 - Not doing multiple surveys in one year. Time frame would depend on how often you are giving out the survey.
 - Might get challenging for the rate your experience questions if the timeframe is over multiple years
 - More value to get snapshot in time of when you put out survey by asking about most recent experience
 - Most recent could be several years prior depending on state. Some states it is not common for the same person to get tags every year
- Who is our sample of hunters?

Management and Trade-offs (see [google doc](#) for full questions)

- Survey is a tool to collect information and not as much for education
- Goal to reframe previous questions with "what would you be willing to tolerate if it led to improvement of xyz"
- Blend of specific and general management practice questions. Broke it up by values

Build-your own questions part 2

Lunch

Question sharing (part 2) Share results of part 2 of build your own questions, (*all participants, in topic groups*).

Knowledge (see [google doc](#) for full questions)

- Moved away from true/false/maybe true/maybe false. Went towards mixed multiple choice or true or false.
 - Opted to not add answer options like “unsure” or “maybe” in order to force people to answer. Trying to eliminate lucky guessing.
 - Let’s you group results into knowledgeable, not knowledgeable, somewhat knowledgeable
- Tried to get away from messaging about signs of CWD because a lot of infected animals don’t look sick
 - Getting to the point that testing is the only definitive way to know if an animal is infected
- Try to stay with testing their baseline knowledge and not focusing on educating the hunters
- After knowledge portion, have a small info section about CWD before you go into the other sections
- Maybe a one-page pdf about CWD at the end of the survey
- To many questions?
 - Haven’t fully assessed google docs list for where it can be cut down

Risk Perception (see [google doc](#) for full questions)

- Focused on the broad categories of ecological risk, hunting opportunity risk, public health/safety risk, and economic risk
 - Difficult for some of them not to overlap
- Lots of overlap with the management and tradeoff category
- Format is “not at all concerned” to “extremely concerned”
- This category should come before the management/tradeoff category
- Trade off questions is saying it’s a consequence of CWD. Risk perception asks if they believe these are risks/consequences
- Answers to risk perception will help better inform why they are answering tradeoff questions a certain way.
 - Or can we just infer why they answered the tradeoff questions how they did
- Risk questions might be an alternative to some of the tradeoff questions for some jurisdictions
- What would we do with this information?
 - Benefit for marketing

Build your own questions part 3

Question sharing (part 3) Share results of part 3 of build your own questions, *(all participants, in topic groups)*.

Trust (see [google doc](#) for full questions)

- A lot of overlap with information
- Questions are geared towards trying to understand the trust level and how we build trust
 - Multiple choice questions
- Asking the questions in a way specifically related to CWD
- Do hunters know the difference between trust with a biologist and trust with a manager?
 - Change question from management to biologists?
 - Should we call them “decision makers” and “technical experts.” Or “someone in my local office” versus “state office, headquarters, agency, or upper management”
 - Can inform who should be the face of the marketing

Information (where do they get their information) (see [google doc](#) for full questions)

- Might want to alternate information and trust into one category
- Questions on where they get their info AND how informed they feel they are
- Add a question about if they have access to the information you need?
- If we know which groups people get their info from, the agency can participate in the outlets

Cross-boundary (see [google doc](#) for full questions)

Implementation and wrap up Discussion about implementation (decision tree, survey format). Future actions based on findings. Wrap-up discussion, *(all participants)*.

Topics of Discussion

- How will the survey be distributed?
- Demographics- any specific ones are more interested in?
 - What type of hunter they are?
 - How long they’ve been hunting?
 - How many states they hunt in?
 - Getting to how invested they are in hunting
- Decision Tree- how do we want the survey to look/do we want to have specific questions to compare across jurisdictions?
 - Maybe allow the questions to be more flexible to help the survey go through the approval process
 - Decision tree might not be very valuable to this group but might be useful for future versions/others wanting to use the survey
 - General categories and within those more specific questions added at your own preference.
 - “If you want this type of information, add this block”
 - Would be helpful to bring to decision makers in getting the survey approved
- How to use the survey?

- What is the intent of this survey? Is it a template that people can change based on their area or are we keeping it the same in order to compare results.
- Use: next step of the process. I.e. messaging and education
- Would be nice if it is done annually if staffing allows. Could also align it with wildlife management plans.
- Use it as a consistent form of information gathering from the public
- Compare notes of what's working and what's not working across different states
- Initial push multimode to see which type gets most results. Might not have the budget for that
- Can integrate some of the survey into existing processes
- Are there certain blocks that we want standardization or is it okay to have some variation across states?
 - Core would be same
 - Can we do minor modifications but keep general structure stable or are states going to be okaying general blocks then take the questions they want
 - Concerned that individual agencies might change it via chain of command
- Data analysis
 - What are you looking for?
 - What have you done before?
 - What has been helpful/what will be helpful?
 - Data analysis component is not in this grant
 - Shoot for some r-script to do the basics with this grant?
 - Document the process you use
- Information about CWD- should we put a write up about CWD (at the end, before, other questions)
- Temporal aspect of survey
- Timeline to get final product?
 - Grant runs through the end of August
 - Next steps are to take this workshop's work and compile it to send out to the group
 - After that, get feedback about the questions

Appendix C: Modular Survey Instrument

Note: This survey is available in Qualtrics upon request to the report authors

Block #0: Introduction and Study Description

Welcome to our survey!

Consent form

Study purpose:

The purpose of this research is to better understand public perceptions of chronic wasting disease (CWD) management.

Risks and Benefits:

There are no known risks should you choose to participate in this study. You may withdraw from the study at any point.

Study Description:

You will be asked about your thoughts on CWD and management activities relating to CWD. Results from this survey will be used by the [State/Province Agency] to aid in management and outreach activities.

Confidentiality:

You will remain anonymous. All survey responses will remain strictly confidential

Contact Information:

If you have any questions or desire further information with respect to this study you may contact _____.

Participant Consent:

Participation in this study is optional. If you choose to be involved in this study you may withdraw at any time without any consequences of any kind. **By completing this questionnaire, you are consenting to participate in this research.**

Some questions in this survey refer to *cervids*. Cervids are species in the deer family which include species such as white-tailed deer, black-tailed deer, mule deer, elk, moose, reindeer, and caribou.

Question Block #1: Location and Travel

1. Which of the following cervid species do you hunt (Please select all that apply)
 - ☐ White-tailed deer
 - ☐ Black-tailed deer
 - ☐ Mule deer
 - ☐ Elk
 - ☐ Moose
 - ☐ Caribou
 - ☐ Other non-native cervid species (e.g., fallow deer, Coues deer, sika deer)
 - ☐ None of the above
2. Do you primarily reside in [State/Province]?
 - A. Yes (*If yes, go to #3*)
 - B. No (*If no, go to Question Block #2*)
3. (*If "yes" in #2*) Which county do you reside in?
 - A. [*Drop down menu with map of state/counties alongside dropdown menu*]
4. For your most recent cervid (deer, elk, moose, caribou) hunt in [State/Province] which county did you hunt in?
 - A. [*Drop down menu with map of state/counties alongside dropdown menu*]
5. Do you hunt cervids in other states or provinces? (Please select all that apply)
 - A. [*List states/provinces of interest*]
 - B. For first state/province selected (e.g., California)
 1. How often do you hunt here?
 - a. Rarely (Once or twice)
 - b. Occasionally (Once every few years)
 - c. Frequently (Every year/Almost every year)
 - C. For second state/province selected (e.g., Oregon)
 1. How often do you hunt here?
 - a. Rarely (Once or twice)
 - b. Occasionally (Once every few years)
 - c. Frequently (Every year/Almost every year)
 - D. [*Continue for all states/provinces selected in 5A*]

We are exploring people's awareness and knowledge about Chronic Wasting Disease (CWD), Please answer the following questions regarding your awareness of and opinions regarding CWD...

Question Block #2: Knowledge (Multiple Choice)

1. Have you heard of CWD?
 - a. Yes (*If yes, continue to question 2*)

b. No (*If no, skip this block and question block #3*)

2. What causes CWD?

- a. Bacteria
- b. Prion (misfolded protein)
- c. Fungus
- d. Virus
- e. Other _____
- f. I do not know

3. How long has it been in [State/Province]

- a. Less than 1 year
- b. Over 1 year
- c. It has not been detected in [State/Province]
- d. I do not know

4. How can cervids be infected? (Select all that apply)

- a. The environment (ie, soil, water, plants)
- b. Saliva/direct contact with other cervids
- c. Products containing cervid urine
- d. I do not know

5. How can you tell for sure that a cervid has CWD? (Select all that apply)

- a. You can see its ribs
- b. It died near a river or other water source
- c. It has an unsteady gait
- d. It has a swollen tongue
- e. There is no way to tell for sure from visual signs alone
- f. I do not know

Please select whether you believe the following statements to be True or False. If you do not know, please select “I do not know.”

Question Block #3: Knowledge (True and False)

1. Humans can be infected by CWD

- a. True
- b. False
- c. I do not know

2. Livestock can be infected by CWD

- a. True
- b. False
- c. I do not know

3. There is no known cure for CWD

- a. True
- b. False
- c. I do not know

4. CWD has been found in every US state
 - a. True
 - b. False
 - c. I do not know
5. CWD can survive in the environment for several years
 - a. True
 - b. False
 - c. I do not know

Question Block #4: Information

1. Where do you get your information regarding CWD? (Please select all that apply)
 - a. I have not searched for or received any information on CWD
 - b. Family and Friends
 - c. [State/Province Agency]
 - d. Hunting organizations (Optional: Please let us know which ones_____)
 - e. Public media (e.g., newspapers, social media, podcasts)
 - f. Academic sources (e.g., universities, academic papers)
 - g. Other state or province agencies (Optional: Please let us know which ones_____)
 - h. Other (Please specify_____)
2. (*If respondents selected option c*): Which specific [State/Province Agency] sources do you use to get your information on CWD? (Please select all that apply)
 - a. [State/Province Agency] hunting regulations pamphlet/guide/digest
 - b. [State/Province Agency] website
 - c. [State/Province Agency] news releases
 - d. [State/Province Agency] public meetings
 - e. [State/Province Agency] emails
 - f. [State/Province Agency] employees (e.g., regional or private lands biologist, check station staff)
 - g. [State/Province Agency] social media (e.g., Facebook, Instagram, Twitter, YouTube)
 - h. Other (Please specify _____)
3. (*If respondents selected option e*): Which specific public media sources do you use to get your information on CWD? (Please select all that apply)
 - a. Online social media (Facebook, Instagram, etc.)
 - b. Newspapers (Optional: Please let us know which ones_____)
 - c. Podcasts (Optional: Please let us know which ones_____)
 - d. Radio news reports
 - e. Magazines/books
 - f. TV shows (Optional: Please let us know which ones_____)
 - g. YouTube (Optional: Please let us know which ones_____)
 - h. Online hunting forums (Optional: Please let us know which ones_____)
 - i. Other (Please specify_____)
4. Please select how much you agree or disagree with the following statements about whether or not you feel as though you are fully informed about CWD information:

I feel as though I am fully informed about...	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
What an animal looks like with CWD	☐	☐	☐	☐	☐
The locations of CWD occurrences in [State/Province]	☐	☐	☐	☐	☐
How many animals have tested positive for CWD in [State/Province]	☐	☐	☐	☐	☐
CWD testing locations and rules	☐	☐	☐	☐	☐
Current CWD management/prevention strategies in [State/Province]	☐	☐	☐	☐	☐
Precautions hunters should take because of CWD	☐	☐	☐	☐	☐
Where to get accurate information about CWD	☐	☐	☐	☐	☐

Question Block #5: Management

- Please indicate if you oppose or support the following management practices if they lead to slowing the spread of CWD in [State/Province], protecting the long-term health of cervid populations, and protecting future hunting opportunities.

	Strongly oppose	Oppose	Support	Strongly support
Agency-led strategies for targeted removal of animals (e.g., employee sharpshooters)	☐	☐	☐	☐
Recruiting hunters for targeted removal of animals outside of normal hunting seasons	☐	☐	☐	☐
Increasing harvest limits/permits in units (e.g., special hunts, increased bag limits)	☐	☐	☐	☐
Longer hunting seasons	☐	☐	☐	☐
Shifting hunting season timing (e.g., into rut)	☐	☐	☐	☐
Targeting specific age or sex classes for harvest (e.g., antler point restrictions, antlerless harvest, earn-a-buck program)	☐	☐	☐	☐
Increasing/implementing landowner tags	☐	☐	☐	☐

Enacting/increasing carcass transport restrictions (e.g., whole carcasses wouldn't be able to leave a specified area surrounding detection)	☐	☐	☐	☐
Enacting/increasing carcass disposal regulations (e.g., carcass parts would be required to be disposed of at a landfill or other sanctioned disposal location)	☐	☐	☐	☐
Banning/restricting baiting, the use of mineral licks, or other attractants for the purpose of hunting	☐	☐	☐	☐
Banning/restricting feeding	☐	☐	☐	☐
Mandatory testing	☐	☐	☐	☐
Agency-led efforts to lethally remove urban deer (e.g., deer that are not commonly exposed to hunting) to reduce CWD spread	☐	☐	☐	☐
I do not want the agency to take action on CWD that could affect current hunting opportunities	☐	☐	☐	☐

Question Block #6: CWD Sampling

1. Which of the following CWD sampling opportunities have you heard of or used in [State/Province]?

	<u>I have submitted a CWD sample using this method</u>	<u>I have heard of this CWD sampling method, but have not submitted a sample using this method</u>	<u>I have not heard of this CWD sampling method</u>
Hunter check station	☐	☐	☐
Sample drop off at designated kiosk/station	☐	☐	☐
Mail-in sample	☐	☐	☐
Roadkill salvage program sampling	☐	☐	☐
By appointment with [State/Province Agency] staff	☐	☐	☐
Participating meat processor/taxidermist	☐	☐	☐
Commercial test produced by private company (This is not an official test and has not been validated)	☐	☐	☐

Other (Please specify_____)	☐	☐	☐
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2. (If “I have submitted a CWD sample using this method” was selected for any answer): In a previous question you mentioned you have submitted samples for CWD testing. Please indicate if you agree or disagree with the following statements regarding your motivation for submitting a sample.

	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I wanted to contribute to wildlife management	☐	☐	☐	☐	☐
Testing the game was recommended or mandated by a fish and wildlife agency	☐	☐	☐	☐	☐
I am worried about CWD risks to myself/my family	☐	☐	☐	☐	☐
I am worried about CWD risks to wildlife populations	☐	☐	☐	☐	☐
I am worried about CWD impacting future hunting opportunities	☐	☐	☐	☐	☐
Other? (Please specify_____)	☐	☐	☐	☐	☐

3. Did you submit a CWD sample during the [20XX-20XX] hunting season?
- Yes (If yes, go to question #4)
 - No (If no, go to question #5)

4. Please rate your experience submitting a CWD sample in [20XX-20XX hunting season]. If you did not encounter a particular experience, please select “Neither agree nor disagree.”

	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Submitting the sample(s) was an easy process	☐	☐	☐	☐	☐
The test results were available in a timely manner	☐	☐	☐	☐	☐
The sampling location (check station, drop off location, etc.) was in a convenient location	☐	☐	☐	☐	☐

I learned more about CWD during the sampling process	☒	☒	☒	☒	☒
I had a positive experience with [State/Province Agency] staff during the sampling process	☒	☒	☒	☒	☒
Other (Please specify_____)	☒	☒	☒	☒	☒

5. What are your biggest barriers to submitting a CWD sample? (Please select all that apply)

- a. I do not think there are barriers to submitting a sample
- b. I do not know how to submit a sample
- c. Hunter check stations or drop off locations are not in a convenient location
- d. It takes too long to submit a sample
- e. I want to keep my deer/elk intact so I do not want to give a sample
- f. I am too tired or busy after hunting
- g. Hunter check stations or drop off locations are not open when I hunt
- h. Hunter check stations or drop off locations are not a good use of government

time/money

- i. I am not worried about consuming meat from a CWD positive animal
- j. I feel the chance of harvesting a CWD positive animal is low
- k. Other (Please specify_____)

Question Block #7: Risk Perceptions

Please select how concerned you are by the following statements regarding CWD

Because of CWD, how concerned are you about...	Not at all concerned	A little concerned	Somewhat concerned	Very concerned	Extremely concerned
The effect on the health of individual animals in [State/Province]	☒	☒	☒	☒	☒
Not having enough quality/desirable cervids left to hunt in [State/Province]?	☒	☒	☒	☒	☒
Contracting or becoming ill from CWD?	☒	☒	☒	☒	☒
Loss of secure and reliable access to meat?	☒	☒	☒	☒	☒
Infection of domestic animals and livestock with CWD?	☒	☒	☒	☒	☒

Question Block #8: Trust

1. How strongly do you agree or disagree that [State/Province Agency] ...

	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Listens to hunters' concerns	☐	☐	☐	☐	☐
Can be trusted to make decisions about big game management	☐	☐	☐	☐	☐
Is open and honest to the public about their actions and what they say	☐	☐	☐	☐	☐
Follows the best science available	☐	☐	☐	☐	☐
Has managers and biologists who are well-trained for their jobs	☐	☐	☐	☐	☐
Has an appropriate plan for CWD in [State/Province]	☐	☐	☐	☐	☐
Has made a reasonable effort to educate the public about CWD	☐	☐	☐	☐	☐
Has taken appropriate actions to prevent the introduction of CWD	☐	☐	☐	☐	☐
Provides enough information for me to decide what actions I should take regarding CWD	☐	☐	☐	☐	☐

2. Indicate whether or not you trust CWD information coming from the following sources

	I trust this source	Unsure	I do not trust this source
Federal government	☐	☐	☐
State/provincial government wildlife agency (e.g., Wildlife Commission, Wildlife Director, policy makers)	☐	☐	☐
Local wildlife biologists	☐	☐	☐
Podcasts/influencers	☐	☐	☐

Hunting organizations	☒	☒	☒
Universities/researchers	☒	☒	☒

3. Who needs to be involved to make CWD decisions that you would trust? (Please select all that apply)

- a. State/provincial government agency commissioners, wildlife directors, and/or policy makers
- b. Local wildlife biologists
- c. First Nations/Tribes/Indigenous groups
- d. Non-governmental organization/hunting organizations (e.g., Backcountry Hunters & Anglers, Rocky Mountain Elk Foundation)
- e. Public health organizations (e.g., Centers for Disease Control and Prevention (CDC), local health jurisdictions)
- f. Captive cervid farmers
- g. Departments of Agriculture
- h. Hunters/Hunting community
- i. Other (Please specify_____)

Question Block #9: Values

Listed below are statements about the relationship between humans and the environment. For each one, please indicate whether you strongly disagree, mildly disagree, neither agree nor disagree, mildly agree, or strongly agree with it.

	Strongly Disagree	Mildly disagree	Neither agree nor disagree	Mildly agree	Strongly agree
Humans are severely abusing the environment	☒	☒	☒	☒	☒
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	☒	☒	☒	☒	☒
The so-called "ecological crisis" facing humankind has been greatly exaggerated.	☒	☒	☒	☒	☒
If things continue on their present course, we will soon experience a major ecological catastrophe.	☒	☒	☒	☒	☒
The earth is like a spaceship with limited room and resources.	☒	☒	☒	☒	☒

Question Block #10 Demographics and Additional Information on Hunting:

In this final section we'd like to ask you a few questions about yourself and how you hunt. Please remember everything is completely confidential and results will only be reported anonymously as part of a larger group.

1. Age

[Drop down menu from 18-100]

2. Sex:

- a. Male
- b. Female
- c. Other
- d. Prefer not to answer

3. What activities do you participate in? (Please select all that apply)

- a. Hunting
- b. Fishing
- c. Wildlife viewing/watching
- d. Wildlife rehabilitation
- e. Ranching/farming
- f. Outdoor recreation (hiking, camping, boating, etc.)
- g. Commercial meat processing
- h. Taxidermy
- i. Other(Please specify _____)

4. Do you hunt on...(Please select all that apply)

- a. State public land
- b. Federal public land
- c. Residential private land
- d. Commercial private land
- e. Tribal land

5. What type of big game hunter are you? (Please select all that apply)

- a. Archery
- b. Modern firearm
- c. Muzzleloader
- d. Other _____

6. Do you process the meat yourself or take it to a meat processor? (Please select all that apply)

- a. I process it myself
- b. I take it to a meat processor
- c. Other _____

7. How do you dispose of inedible parts? (Please select all that apply)

- a. Leave in the field
- b. Burial
- c. Landfill
- d. Incineration
- e. Compost
- f. High-pressure alkaline hydrolysis
- g. Centralized carcass disposal (carcass pits)
- h. Rendering

8. Have you used a taxidermist for cervid species?

- a. Yes
- b. No

9. (*If yes to #8*) When do you use a taxidermist for your cervid species? (Please select all that apply)

- a. Every or almost every season I hunt locally
- b. Special occasions (e.g., large antlered buck, first harvest)
- c. When I travel out of state
- d. I've only used a taxidermist 1-2 times

9. Are you a member of a hunting group?

- a. Yes (Optional: Please tell us which one(s)) _____
- b. No

Appendix D: Decision Guide

CWD HD Survey Workflow

The goal of this workflow is to provide additional information to help facilitate the selection of which blocks are necessary and applicable for a survey. We identified 10 different blocks (location and travel, knowledge (multiple choice), knowledge (true and false), information, management, sampling, risk perceptions, trust, values, and demographics and additional hunting information). These blocks may each be included or excluded depending on the overall goal of the survey. Within each block, questions may be altered to fit the specific requirements of the state/province. Effort was made to ensure that questions covered a broad range of applicable goals, but specific state/province regulations may necessitate removal or addition of some choices.

To select which blocks to include, please refer to the following information below. A table is provided with a brief description of each block. Blocks are categorized by Primary (strongly suggested) and Secondary (optional). It is suggested that all the primary blocks be included in each survey.

Additionally, more detailed information about each block is provided including the constructs measured, the purpose of the block, when it should be included/excluded, common modifications, the information produced from the block, and some additional notes.

Block	Primary (Strongly suggested)	Secondary (Optional)	Primary Purpose
Location and Travel	✓		Identify interstate hunting behavior
Knowledge (Multiple choice)		✓	Measure CWD understanding (e.g., biology, transmission, testing)
Knowledge (True and False)		✓	Measure CWD understanding (e.g., biology, transmission, testing)
Information	✓		Identify information sources and preferences
Management	✓		Assess support for and acceptance of management activities
Sampling	✓		Understand sampling behaviors, motivations, and barriers
Risk Perceptions		✓	Assess perceived susceptibility, severity, and concern about CWD and its impacts.
Trust		✓	Evaluate trust in wildlife agencies, biologists, and other organizations involved in management.
Values		✓	Measure underlying wildlife values that influence attitudes and behaviors.
Demographics and Additional Information on Hunting	✓		Characterize the resident population and support subgroup analyses.

Question Block #1: Location and Travel

Constructs measured: Hunting behavior, geographic context, hunting mobility, potential exposure to differing CWD management jurisdictions.

Purpose: This block characterizes hunters' geographical context through identifying where they reside, where they hunt, what species they hunt, and how frequently they hunt in areas outside of their own state/province. This block can help to standardize and share information across different agencies as it can identify how many and how often hunters are traveling to different jurisdictions.

When to include:

- To characterize geographic distribution of hunters.
- Examine hunter behavior across jurisdictions.
- Identify species being hunted.

When to exclude:

- The study is focused solely on resident hunters (though information obtained from this block may be of use to other states/provinces).

Common modifications:

- Counties may be changed to hunting zones or other geographical determinants.

Information produced: This block aims to produce information related to the species hunted, the geographic distribution of hunting activity both in-state/province and outside of the resident area. The data produced will help identify regional trends within the state/province where hunters are located. In addition, the information obtained can be used to identify from which areas meat may be entering into the resident jurisdiction, what other jurisdictions residents may be obtaining information from, and can provide information to other jurisdictions about hunter travel.

Question Block #2: Knowledge (Multiple Choice)

Constructs measured: Knowledge of CWD, disease biology, transmission, detection, disease status.

Purpose: This block measures respondents' knowledge of CWD, specifically in relation to the biology of the disease, the local disease status, the transmission of the disease, and the detection of the disease.

When to include:

- To assess baseline CWD knowledge.
- When comparing across years or pre and post an educational program or outreach intervention.

When to exclude:

- Knowledge is not a primary research objective.
- Other knowledge questions are preferred.

Common modifications:

- Update any new CWD information.
- Additional information can be added in a post-section paragraph that explains the correct responses for the questions and provides the respondent more information about CWD. Such a paragraph would be especially useful for informing those who did not know about CWD, so they may have some baseline knowledge before they are asked questions regarding management preferences.

Information produced: This block can provide a knowledge score that can be used to compare across demographic and information variables. The data can help to identify common misconceptions about CWD and can indicate uncertainty (through the "I don't know" responses). Knowledge is a useful variable in predicting attitudes, perceptions, and behaviors.

Notes: This section can be used in conjunction with the following knowledge (True or False) section as they do address different questions of knowledge, or one can be used by itself if there is a preferred format or if certain information is of more use.

Question Block #3: Knowledge (True and False)

Constructs measured: Knowledge of CWD, transmission, detection, environmental persistence, disease status.

Purpose: This block measures respondents' knowledge of CWD specifically in relation to the transmission of the disease, and the location. As opposed to the multiple choice knowledge questions, true/false questions reduce respondent burden, so may be used when wanting to limit the cognitive load and/or length of the survey.

When to include:

- To briefly assess CWD knowledge.
- When wanting a baseline understanding of CWD knowledge without overburdening respondents.

When to exclude:

- Knowledge is not a primary research objective.
- Other knowledge questions are preferred.

Common modifications:

- Update any new CWD information.
- Additional information can be added in a post-section paragraph that explains the correct responses for the questions and provides the respondent more information about CWD. Such a paragraph would be especially useful for informing those who did not know about CWD, so they may have some baseline knowledge before they are asked questions regarding management preferences.
- "I do not know" is often a measure of uncertainty, but can make up a large proportion of the responses. It can be removed to force a response (though then it may be measuring guessing as opposed to knowledge). Additionally, it could be replaced with "maybe true" and "maybe false" if the researchers want to see which way respondents are trending while still capturing some level of uncertainty.

Information produced: This block can provide a knowledge score that can be used to compare across demographic and information variables. The data will help to identify common misconceptions about CWD and can indicate uncertainty (though the "I don't know" responses). Knowledge is a useful variable in predicting attitudes, perceptions, and behaviors.

Notes: This section can be used in conjunction with the previous knowledge (Multiple Choice) section as they do address different questions of knowledge, or one can be used by itself if there is a preferred format or if certain information is of more use.

Question Block #4: Information

Constructs measured: Information-seeking behavior, preferred communication sources, exposure to CWD information, perceived knowledge of CWD management, testing, disease identification.

Purpose: This block examines where respondents obtain their information from regarding CWD and whether they believe they have enough information about different elements of CWD. The block looks at both broad information sources and allows for both qualitative and quantitative additional information about specific sources. The block aims to identify where respondents get information and their own perceived gaps in knowledge to help wildlife agencies evaluate communication effectiveness, identify preferred communication areas, and improve outreach strategies.

When to include:

- To identify commonly used information sources and for the development or evaluation of communication campaigns.
- To evaluate CWD communication and outreach efforts.
- To identify which topics need additional or different information.

When to exclude:

- Communication or outreach is not an objective or have been assessed through other sources.

Common modifications:

- Specific sources can be adjusted, (e.g., in the State/Province Agency section, depending on the type of information preferred by each State/Province).
- Could include a question on where do respondents *want* to get information.

Information produced: This block can provide data on how frequently different types of information sources are being used and identify preferred communication channels. It also can identify where perceived knowledge is lacking.

Question Block #5: Management

Constructs measured: Attitudes towards CWD management strategies, support for wildlife management interventions

Purpose: This block measures respondents' level of support for different CWD management strategies, with the specific stated goals of slowing the spread of CWD, protecting the long-term health of cervid populations, and protecting future hunting opportunities. This block can provide insight into acceptance of current and/or future management activities.

When to include:

- To evaluate hunter support for CWD management strategies.
- To compare the acceptability level of different management strategies.
- To compare support or opposition for management strategies across time.

When to exclude:

- Management preferences are not included in the survey.

Common modifications:

- Can remove/add management strategies if they are/are not applicable to a particular area (e.g., banning baiting may only be relevant in some states/provinces).
- “Neither oppose or support” or “I don’t know” could be added as a response to measure uncertainty.
- In the directions, could use only one of the stated goals (slowing the spread of CWD in [State/Province], protecting the long-term health of cervid populations, and protecting future hunting opportunities), or do a comparison question to see what respondents’ value most.

Information produced: This block can help indicate preferred management strategies and anticipate areas of conflict. It may be used to inform policy development and identify targets for further education/outreach.

Question Block #6: CWD Sampling

Constructs measured: Awareness of CWD sampling opportunities, participation in CWD sampling, motivations for and perceived barriers against submitting samples, experiences with the sample submission process.

Purpose: This block measures respondents' familiarity with current CWD sampling strategies, whether or not they have participated in any CWD sampling, and what were the factors that caused them to submit or not submit samples. It also looks at their experiences with the sampling process.

When to include:

- To evaluate participation in and knowledge of CWD surveillance programs.
- Assess hunter experiences with sample submission.
- To understand motivations for and against submitting samples.
- To inform improvements to CWD testing programs.

When to exclude:

- CWD sampling behavior is not relevant/of interest.

Common modifications:

- Sampling methods can be removed/inserted depending on the availability of each within a certain state/province.
- "Commercial test produced by private company (This is not an official test and has not been validated)" may be removed to not indicate to respondents this is a viable test.
- Barriers can be updated as new logistical or regulatory challenges arise.

Information produced: This block can help indicate awareness of different sampling methods as well as participation rates in those sampling strategies. It can highlight motivations for and barriers to submitting to help inform sampling strategies as well as education and outreach in the future. It can also help identify relative satisfaction in the sampling process and potential areas for improvement.

Question Block #7: Risk Perceptions

Constructs measured: Perceived risk, concern about CWD impacts on ecological health, human health, and recreation.

Purpose: This block measures respondents' perceived level of concern about the potential impacts of CWD across different factors. Understanding risk perceptions can help identify how respondents evaluate potential CWD consequences and how their behaviors may be affected.

When to include:

- To assess hunter concern about CWD.
- To use in conjunction with support for management strategies.
- To compare risk perceptions across different demographics/geographies.

When to exclude:

- Risk perception is not a category of interest.

Common modifications:

- Could add additional risk statements as interested (e.g. relating to economic impacts, other local impacts)

Information produced: This block can indicate how respondents perceive the consequences and severity of CWD. It also can show what respondents are most worried about and how worried they are. Risk perceptions are often a strong predictor of behavior (such as support for management activities).

Question Block #8: Trust

Constructs measured: Institutional trust, trust in information sources, trust in decision-making.

Purpose: This block measures respondents' trust in the overall agency generally and in CWD-specific situations. It also examines respondents' trust in information provided by different sources, as well as who should participate in CWD management.

When to include:

- To evaluate public confidence in wildlife agencies.
- To identify more/less trusted information sources.
- To use in conjunction with management support to help predict future behavior.
- To compare changes in institutional trust over time.

When to exclude:

- Trust is not a category of interest.
- Agency trust is not applicable.

Common modifications:

- In the analysis, it may be beneficial to separate statements about CWD from statements about trust in the agency in general as previous work has shown some slight differences.
- Additional sources of information (e.g., rehabilitators, meat processors) or parties involved in CWD decisions could be included.

Information produced: This block looks at different types of trust such as institutional trust, information source trust, and decision-making trust. It can produce institutional trust scores for wildlife agencies as well as trust ratings for different information sources. It can also highlight preferences for participation in CWD decision-making. Agencies can use this information to identify preferred messengers, improve engagement, and strengthen confidence in management actions.

Question Block #9: Values

Constructs measured: Environmental values (New Ecological Paradigm).

Purpose: This block measures respondents' underlying environmental values using an adapted version of the New Ecological Paradigm (NEP) scale. Specifically, the values look at the perceived relationship between humans and the natural environment.

When to include:

- To examine how environmental values may influence attitudes to CWD.
- To compare environmental values across different stakeholder groups.
- To use as explanatory variables.

When to exclude:

- Environmental values are not of interest.
- To reduce survey length.
- Another environmental values scale is preferred.
- There is concern about the reaction of respondents.

Common modifications:

- A different scale or a full version of the NEP may be used.

Information produced: Values are often thought to help shape perceptions and attitudes. As such, this block could provide information about why people differ in their perceptions of CWD as well as their support for management activities.

Notes: While not this exact question, a similar values scale was used in a previous survey and it deterred some respondents from taking the survey. The benefits of its inclusion should be considered to make sure they outweigh the risks (detering respondents).

Question Block #10 Demographics and Additional Information on Hunting:

Constructs measured: Demographic characteristics, hunting experience, behaviors that may relate to CWD transmission and exposure.

Purpose: This block collects demographic information and characterizes the respondents' hunting behaviors and experiences. Variables include hunting activities, land access, game processing, carcass disposal, taxidermy use, and hunting organization membership.

When to include:

- Describe the characteristics of survey respondents

When to exclude:

- Demographic information is not needed/has already been collected.

Common modifications:

- Additional variables could be included (e.g., education, income, ethnicity).
- Carcass processing can be updated to reflect local regulations.
- If interested, a “anything else you’d like to share?” box may be placed at the bottom for qualitative responses.

Information produced: This block can be used to describe the study population such as they demographic profile of the respondents and their hunting and post-hunting behaviors. These can be used as predictors, covariates, or grouping variables to help explain some of the variation across the previous blocks.