Indiana CWD Surveillance, Response, and Management Plan: Learning to Live with CWD

Joe N. Caudell Ph.D., State Deer Project Leader
Publication Version – 4/16/2024

Chapter 1: Introduction and Executive Summary

The Indiana Department of Natural Resources (Indiana DNR) is charged with the "protection and management of all legally or publicly owned wild animals in Indiana" under state law (IC 14-22-1-1). The DNR and the Natural Resources Commission (NRC) manage white-tailed deer under this authority, setting seasons, regulations, bag limits, and management responses to various management challenges presented to the species and state wildlife. Chronic Wasting Disease (CWD) presents a unique challenge to wildlife agencies because of its epidemiology, challenges in detection, social effects, and potential impacts to deer populations. But to date, there have been no cost-effective methods found that will stop the spread of CWD or limit the growth of CWD indefinitely. Therefore, Indiana DNR's overall response method will be to work with hunters and other citizens to facilitate living with CWD on the landscape and determining what it means for future deer health and management in Indiana. If new methods come to light that are cost-effective that significantly limit the spread of the disease, stop the growth of the disease in the population, or can protect additional deer from being infected, then Indiana DNR will revisit its stance of learning to live with CWD.

Specifically, Indiana DNR will conduct routine surveillance with a goal of detecting the disease when it is in 3-5% of each of Indiana's county deer herds. Each time that CWD is detected, Indiana DNR will determine if it is in an *Expected Area* (i.e., near other CWD positive areas) versus an *Unexpected Area* (i.e., far from other CWD positive areas). Expected Areas and Unexpected Areas will be determined though computer modeling and past surveillance. Management of CWD is conducted on the basis of two designations: CWD Positive Areas and CWD Management Zones.

When CWD is detected in an Expected Area, either near another positive in Indiana or near a positive in a neighboring state, Indiana DNR will reassess the size of the CWD Positive Area to account for the additional detections. Additionally, the CWD Positive Area will continue to expand over time based on both routine surveillance and computer modeling based on the known rate of spread of CWD. These areas are permanently established and will never be removed unless significant advances are made in the management of CWD. Additional regulations in these permanent CWD Positive Areas include: 1) citizens will not be able to take a fawn from the CWD Positive Area to a rehabilitator located outside of the CWD Positive Area (*requires a new permanent Administrative Rule*), and 2) cervid farmers who are in areas where CWD is $\geq$ 5% or greater in the wild population can request a deer damage permit to remove wild cervids from their farm (*requires a change to Policy on the issuance of deer damage permits*).

When CWD is found in an *Unexpected Area*, Indiana DNR will establish an 18-month CWD Management Zone. The purpose of the 18-month response to CWD is to first assess the prevalence of CWD in the affected area and learn about the distribution of the disease on the landscape when it is first discovered in a new area. The second purpose is to remove CWD infected animals and lower deer densities in the affected areas. Thus, this portion of the response plan will be implemented immediately upon discovery of a CWD positive wild deer in an area of the state not previously known to have CWD (i.e., an *Unexpected Area* as defined in Chapter 3). The actions that comprise the 18-month response will only be implemented once in each new area, i.e., they will not be repeated if more CWD positive deer are detected later in that same area. The CWD Management Zone area will be an approximately 1-mile radius and include any intersecting townships. All actions will occur in that area unless otherwise specified. These actions for the management zone (and timeframe) include an immediate 18-month ban on feeding deer (*Provisional Rule required*); an assessment of deer density; enhanced surveillance of deer with a goal of estimating the apparent prevalence between 0.5 and 1%; various incentives for deer hunting and testing including a velvet hunt, extra buck privilege for hunters for every three antlerless deer tested, and a special late firearms season (*each of which will require a Provisional Rule*); and sharpshooting in a 1-mile radius of the initially detected CWD+ deer if needed (second winter after detection). The cost for the 18-month CWD Management Zone is estimated to be $30,000 to $40,000 for enhanced surveillance and $30,000 to $40,000 for sharpshooting (if required).

If a captive cervid within Indiana tests positive for CWD, Indiana DNR will work cooperatively with Indiana BOAH in a coordinated response. The overall response and surveillance will be affected by location of the farm and whether it is within an *Expected Area* or an *Unexpected Area*.

Because there is no effective method to remove CWD from the landscape once it becomes established, it should be considered a permanent condition and treated like other endemic deer diseases, such as epizootic hemorrhagic disease (EHD). However, there are steps that individual landowners can take to reduce the likelihood that CWD will become established on their private property. As such, Indiana DNR will provide guidance for hunters and landowners about these methods, which include 1) prohibiting the disposal of deer carcasses on their land (other than their own deer), 2) prohibiting the use of natural urine-based lures for deer hunting, 3) eliminating deer feeding and attractants on their property, 4) sampling all harvested deer for CWD, 5) reducing deer densities, and 6) reducing the age structure of deer. These recommendations will require no additional regulations from Indiana DNR.

Chapter 2. Statewide Surveillance Plan

Surveillance and Monitoring Goals

Surveillance for any disease is important so that Indiana DNR can understand where that disease is present on the landscape and the potential effects it may have on humans and domestic animals, as well as on the ecology of the species affected. In general, Indiana DNR's goal is 1) to be able to detect CWD throughout the state if it is in 3-5% of the deer herd and 2) to provide the opportunity for hunters to have their deer tested for CWD if they are concerned about the safety of consuming their deer or to understand the presence of CWD where they hunt or on land they own or manage (referred to as Hunter Service Testing in this document). To accomplish this Indiana DNR uses a combination of samples supplied by hunters who desire to have their own deer tested, processors, taxidermists, nonprofit organizations, and DNR staff who seek out samples from hunters, roadkill, and reported sick/dead deer for testing.

Sample Processing and Laboratory Testing

All samples and data are shipped or transported to a central location. Data are then entered into the Indiana DNR Wildlife Health Application. Samples with reliable data are then collated and shipped to a laboratory for immunohistochemistry (IHC) or enzyme-linked immunoassay (ELISA) analysis. Samples are presently submitted to either Purdue Animal Disease Diagnostic Laboratory (ADDL) or Wisconsin Veterinary Disease Laboratory (WVDL), depending upon the type of testing desired and available testing capacity at each laboratory.

Surveillance Methods

Surveillance objectives are established at the county level and are expressed in the number of points needed to achieve the desired CWD detectability (Jennelle et al. 2018) in a county, which is currently a minimum of 5%. Surveillance will consist of a four-pronged approach designed to monitor for CWD across the state. These four prongs are 1) adult buck samples collected through a statewide taxidermist incentive program, 2) statewide targeted collection of samples from deer reported as sick or dead (not roadkill), 3) voluntary testing of hunter harvested deer at head drop coolers (i.e., Hunter Service Testing), and 4) samples collected by DNR staff from hunters at check stations and road killed deer. Additionally, hunters can pay to submit their deer to have it tested directly at the Purdue ADDL.

The area targeted for surveillance is based on a combination of past surveillance results and the result of statewide risk analysis (McCallen 2021). The surveillance area will rotate annually to unsampled or under-sampled areas. Surveillance objectives will seek to reach a level of detectability such that CWD would be detected if it were present in 3-5% of the county population with 95% confidence (Jennelle et al. 2018). Progress toward this objective will be closely monitored to ensure the objective is met before the closing of deer season. All samples

collected within a county between Feb. 1 and Jan. 31 of the respective sampling year will be used to assess surveillance using a Bayesian weighted surveillance approach (Jennelle et al. 2018).

Before each sampling year, counties with high surveillance priority will be identified using the risk analysis (McCallen 2021) combined with historical surveillance data. Once an area is identified, Indiana DNR will develop a strategy to collect samples through a combination of staffed check stations, taxidermists, and/or road killed deer. This process will be repeated annually across the state until each county achieves the detectability objective.

Statewide Taxidermy Incentive Program

Detection of CWD in deer is typically highest in adult bucks in the Midwest, making them a high-quality sample for detecting the disease on the landscape (Samuel and Storm 2016, Jennelle et al. 2018). A surveillance program that tests a greater percentage of adult bucks can test fewer deer to reach the desired detectability level in the population (Jennelle et al. 2018). But collecting samples from adult bucks is often difficult because hunters will not allow their deer to be tested before giving them to a taxidermist for mounting. Therefore, we will work with taxidermists to collect samples from deer that are brought to them to be mounted.

Taxidermist incentive programs have been successful in other states, including Tennessee, North Carolina, New York, and Ohio (Ableman et al. 2019). These programs incentivize cooperating taxidermists by paying $5-20 per usable CWD sample. Payment values vary by state and can be adjusted based on deer age and county of origin. Samples are collected by agency personnel or shipped to an agency office where they are then submitted for testing. The cooperating taxidermists are then issued payment for their samples submitted. In 2021, Indiana DNR piloted a taxidermist incentive program and Buchanan-Schwanke and Caudell (2022) found this to be a cost-effective technique. During the two-year pilot program from 2021-2023, samples cost an average of approximately $16 per point from taxidermist, compared to approximately $58 per point for Indiana DNR staff to work check stations (Caudell and Buchanan-Schwanke 2022).

Statewide Targeted Deer Sampling

Samples gathered from sick deer reports where the observer has reported clinical signs consistent with a CWD positive deer can provide a high-quality sample for surveillance (Jennelle et al. 2018) because deer with clinical signs of CWD may be detected by the public. Reports of sick deer are typically received via an online form (on.IN.gov/sickwildlife) that provides citizens with a quick and convenient way to report sick deer and other wildlife to agency biologists.

Agency biologists will continue to investigate suspected sick deer throughout the state. Upon report of a suspected sick or dead deer, biologists must assess the reported signs and decide whether a deer meets criteria necessary to warrant CWD testing. Potential advanced clinical signs of CWD infection include excessive salivation, thirst, or urination; emaciation; lack of

coordination; drooping posture; and lack of fear of humans. If a reported sick or dead deer exhibits all or some of these signs, a field visit may be scheduled and a CWD sample collected for laboratory testing.

Statewide Head Drop Coolers for Hunter Service Testing

Head-drop coolers provide a 24/7 sample submission method for hunters to submit their deer for testing. Coolers are chest freezers with regulators placed on them to keep contents cool or frozen. There are currently 23 coolers statewide at Fish & Wildlife areas (FWAs), State Fish Hatcheries, and National Wildlife Refuges. Hunters can use an online tool for locating a head-drop cooler. Each cooler provides hunters with simple instructions to ensure adequate data for each deer is collected.

Rotating DNR-staffed Check Stations

Staffed check stations are an effective method for collecting a lot of samples in a short period of time, and it is a method that Indiana DNR has relied on for many years. But it is one of the least cost-efficient methods that can be used for collecting large numbers of samples from hunter-harvested deer (Buchanan-Schwanke and Caudell 2022). Therefore, it should be used sparingly and in places where no other options exist.

In this method, wildlife biologists and technicians are present at processors or other places where hunters gather on opening weekend of firearms season. The high volume of hunters allows for many samples to be collected and provides an opportunity for wildlife biologists to interact with the public. Because of the time commitment and travel cost compared with the number of deer sampled, this method is relatively expensive when compared with the number of sample points collected. But it can still be useful to complete the sampling requirements for a county where samples have already been collected by a taxidermist or where no other options exist.

Hunter Submissions to a Diagnostic Laboratory

Hunters have the option to submit their CWD samples directly to Purdue ADDL for testing. This method requires the hunter to pay a small fee, and test results are provided to Indiana DNR for surveillance purposes.

Chapter 3. Response Plan to Initial Detection of CWD in Indiana

When a wild deer tests positive for CWD within the state of Indiana or in an adjacent state within 10 miles of the Indiana border, Indiana DNR will implement a series of actions in response to the detection. The order and implementation of these actions may vary based on sex and age of the positive deer, prevalence of the disease when detected, and landscape characteristics. Messaging, lab confirmation, sample investigation, and designation as a *CWD Positive Area* will be executed for all CWD detections within Indiana. The designation of an area as a *CWD Management Area* as described as part of the 18-month response plan will only be implemented in limited scenarios.

Initial Detection

Once a deer in Indiana has tested positive by the first laboratory (e.g., Purdue Animal Disease Diagnostic lab, Wisconsin Veterinary Diagnostic Laboratory, etc.), it will be considered a CWD suspect until confirmed by the USDA APHIS National Veterinary Services Laboratory (NVSL) in Ames, Iowa. This process eliminates the possibility of a false positive lab result, eliminating unnecessary response actions.

Lab Confirmation and Sample Investigation

When a wild deer tests positive for CWD in a county where CWD had not been previously detected in a wild deer, an immunohistochemistry (IHC) test will be conducted by the NVSL to confirm the positive result from the initial laboratory. When necessary, a tissue sample may be obtained from a CWD positive deer carcass to confirm the sample origin and/or origin of the deer being sampled. If the confirmatory IHC test provides a negative result, Indiana DNR will assume the initial test was a false positive, and no response actions will be implemented.

For confirmed positives, an investigation will be conducted by Indiana DNR to identify the exact location where the deer was harvested. Once the location is established, further investigation into the structure of the deer population and landscape characteristics will be conducted using trail camera surveys, aerial imagery, and/or hunter interviews. These same procedures may be followed for later CWD positive deer in the same county if the information is important to response or management actions.

Positives from Neighboring States

A confirmed, CWD positive deer detected within 10 miles of the Indiana border in a neighboring state will trigger the same sequence of events as a positive in an *Expected Area* (see below).

Determining if a CWD-Positive Sample is from an Expected or Unexpected Area

A CWD detection designated as coming from an *Expected Area* indicates the detection was located near an area with a known CWD positive herd, either within Indiana or within 10 miles of an adjacent state. An *Unexpected Area* designation indicates a positive CWD sample was detected in an area spatially distant from any known CWD positive herd.

At the time that a suspect CWD deer is found, computer modeling techniques will be used to determine if the CWD positive deer is inside or outside the expected area, as this will affect the overall response (research from Federal Grant # F20AF10944-00 W-48-R-04 Mitigating Spread of Chronic Wasting Disease through an Ecological Trap; Jennelle et al. 2014). The designation of the sample coming from an *Expected Area,* or an *Unexpected Area* will influence the response actions.

Effect of the Sex of Positive Deer and Estimated Residency on Plan Implementation

Management actions should be targeted in areas where positive deer are residents through most of the year. However, during the deer hunting season, a large portion of antlered deer move across the landscape seeking antlerless deer for mating. This makes it difficult to determine where the antlered deer is resident during the remaining portion of the year. Therefore, for deer taken during hunting season, the CWD Management Zone (see below) **will only be applied to CWD positives from antlerless deer or antlered deer that are determined to be residents of the area from which they were taken** (e.g., from trail camera photos or local knowledge). If an adult buck tests positive for CWD, the area where the buck was harvested will be the target of additional surveillance in upcoming years but will not result in the immediate implementation of the CWD Management Zone or designation as a CWD Positive Area from an *Unexpected Area*. The CWD Management Zone will be applied to any deer from an *Unexpected Area* that tests positive outside of the hunting season.

CWD Positive Area

Upon NVSL confirmation of the positive CWD test in areas where CWD is modeled or expected to exist (i.e., an *Expected Area*), DNR will establish a **CWD Positive Area**. This area will be **permanent**, will expand as the disease continues to be found, and will expand based on computer modeling based on the growth of CWD across the landscape. Regulations related to the management of CWD will apply to all **counties** within this CWD Positive Area (Chapter 4).

CWD Management Zone

Upon NVSL confirmation of the positive CWD test of an antlerless deer from an *Unexpected Area* or an antlered deer determined to be a resident of the site, a **CWD Management Zone** will be established within a radius of 1 mile of the positive deer's location and will include all townships that significantly intersect this radius A township that only includes a tiny portion touching the radius may be excluded from the zone. This CWD Management Zone will last 18

months. Regulations related to the management of CWD will apply to all **townships** within this CWD Management Zone (Chapter 5).

Communication

Information about the detection of a CWD positive wild deer will be shared with the public based on pre-established procedures. Transparency is essential to maintaining an informed public, eliciting public input and trust, and garnering support for agency response (Decker et al. 2016, Stinchcomb et al. 2022). Details of the communications can be found in the CWD Communication Plan.

Chapter 4. Management Plan for CWD Positive Areas

Immediately after the detection of a CWD positive wild deer, regulatory actions will be taken to reduce human-assisted movement of the disease to areas outside of the CWD Positive Areas, and tools will be made available to land managers in these areas affected by CWD. The CWD Positive Areas will be spatially applied at the **county level**. Regulatory efforts will include:

- Modeling of CWD confirmed detections and expansion of CWD Positive Areas
- Restrictions on the movement of fawns to rehabilitation facilities outside of CWD Positive Areas
- Provision of deer disease permits for cervid farms within CWD Positive Areas

Modeling the Spread of CWD

A limitation on CWD management efforts creates difficulty in detecting the disease in a wild population. Given the current capacity to test hunter harvested deer, it will be nearly impossible to detect CWD until it is established in the population and at an elevated prevalence (i.e., greater than 1%; Belsare et al. 2021). Therefore, the first detection of CWD inside Indiana will likely NOT be the first CWD positive deer in the state and at that point it is likely the disease will have been in the infected area for at least 10 years (Belsare et al. 2021).

When CWD is found, it will likely be detected close to the epicenter of the disease, where it has been the present the longest period and is at the highest prevalence. We also know that disease dynamics and detectability rates can be used to estimate the distance the CWD infection extends from this core area based on the prevalence and size of the core disease hotspot. Understanding the extent of a CWD infection is important for expanding CWD Positive Area regulations (i.e., restrictions on fawn movement to rehabilitators and disease permits for cervid farms). Therefore, Indiana DNR will use modeling (e.g., agent-based model or linear-growth model) designed for the midwestern landscape to estimate the extend of CWD infections affecting Indiana (see research from Federal Grant # F20AF10944-00 W-48-R-04 Mitigating Spread of Chronic Wasting Disease through an Ecological Trap; Jennelle et al. 2014; Belsare and Stewart 2020). After CWD is detected inside or within 10 miles of Indiana's borders, all available information will be incorporated into the appropriate model to estimate the likely expanse and prevalence of the infected area. Model inputs will include land cover data for the infected county(s), deer density estimates, hunter harvest rates, CWD detection locations, and the apparent prevalence of the core hotspot.

The output from the model will be used to establish and expand CWD Positive Areas. CWD Positive Areas will be expanded to include the entire county. This will allow Indiana DNR to establish regulations to limit the potential human-assisted movement of a CWD infected fawn or hunter-harvested deer carcass to a different region of the state and thus reduce chances of creating new hotspots. The logic is to be proactive with the establishment and expansion of these CWD Positive Areas using the model instead of taking a reactive approach in which the preventive measures are not implemented until a CWD positive deer is found.

Restrictions on the Movement of Fawns to Rehabilitation Facilities

Currently, Indiana Administrative Code prohibits the possession of fawns without a wildlife rehabilitation permit. Regulations on the movement of fawns to rehabilitation facilities will be implemented for counties contained within the CWD Positive Areas. The intention of these regulations will be to reduce human assisted movement of CWD prions out of the infected area in potentially infected deer. Moving a fawn from an infected area to a rehabilitation facility outside of the CWD Positive Area could lead to the introduction of CWD to a new area of the state and must be avoided. But at the same time, the public desires these services to avoid the suffering of injured or abandoned fawns. Therefore, no fawn will be permitted to be transported from within a CWD Positive Area to a county not contained in the CWD Positive Area. Fawns may still be rehabilitated if they are not moved outside of the CWD Positive Area.

Permits for Deer Damage for Disease Management Purposes

To afford cervid farm managers a tool to prevent CWD from spreading from wild cervids to captive cervids within CWD Positive Areas, deer disease permits will be available for cervid farmers who farm CWD-susceptible species. Deer disease permits will only be valid outside the hunting season. Permit holders will be required to submit a CWD sample from all deer taken on a deer disease permit to Indiana DNR. Permits will be issued only in specific locations within the CWD Positive Areas where the apparent prevalence is estimated or modelled to be $\geq$ 5%.

Chapter 5. Plan for CWD Management Zones

Indiana DNR will establish an 18-month CWD Management Zone when CWD is found outside areas predicted by modeling. The purpose of the 18-month response to CWD is to first assess the prevalence of CWD in the affected area and learn about the distribution of the disease in the landscape when it is first discovered in a new area. The secondary purpose of the response is to remove CWD infected animals and lower deer densities in the affected areas. Thus, this portion of the response plan will be implemented immediately upon discovery of a CWD positive wild deer in area of the state not previously known to have CWD (i.e., an *Unexpected Area* as defined in Chapter 3). The actions that comprise the 18-month response will only be implemented once in each new area and will not be repeated as more CWD positive deer are detected later in that same area. The CWD Management Zone area will be an approximately 1-mile radius and any intersecting townships. All actions will occur in that area unless otherwise specified. These actions for the management zone (and timeframe) are:

- An immediate 18-month ban on feeding deer
- Assessment of deer density
- Enhanced surveillance of deer with a goal of estimating the apparent prevalence between 0.5 and 1%.
- Incentive-based deer hunting
    - Velvet hunt
    - Extra buck privilege for hunters for every 3 antlerless deer tested
    - A special late firearms hunting season
- Sharpshooting in a 1-mile radius of the initially detected CWD+ deer if needed (second winter after detection)

The radii, both 1 mile for sharpshooting and for other response measures, are based on average deer home range sizes in similar landscapes (Walter et al. 2009, DeYoung et al. 2011, Walter et al. 2018). The intense removal response within 1 mile is intended to target deer that live within the home range of the infected deer and were likely exposed to CWD by this deer. A 1-mile radius will be drawn around each initial detection to delineate the CWD Management Zones. Additional CWD detections within the CWD Management Zone, once established, will not result in an expansion of the CWD Management Zone.

The less intense management actions applied within the townships that intersect the 1-mile radius are intended to target secondary infections of the disease within the annual movement range of a buck, which is one of the primary ways CWD is spread to other groups of deer. It is also to assess if the positive is the core of the affected area. The precise boundaries of this zone will be determined based upon townships and/or easily delineated boundaries (i.e., roads, waterways, or other easily observable physical features or governmental boundaries).

The 18-month period is to allow hunters the opportunity to intensely harvest bucks and other deer from the targeted area before removal by sharpshooters during the winter after the deer

season. This focused and broad hybrid approach is imperative to responding to the location where Indiana DNR knows CWD is, while also looking nearby for other points of infection.

Deer Feeding Ban

Immediately upon the confirmation of the first CWD case in a new hotspot, an 18-month ban on feeding deer will be imposed for all counties included in the CWD Management Zone (all townships intersecting a 1-mile radius of a CWD+ deer). This ban will be temporary and will apply to foods, salt, minerals, grain, or any other subsidy distributed for consumption by white-tailed deer. The intent of this ban will be to temporarily halt artificial congregations of deer to slow transmission rates until sharpshooting and increased hunter harvest can be applied to manage the prevalence of CWD.

Assessment of Population Density in the CWD Management Zone

During the first winter after the detection of a CWD positive deer, the population density in the CWD Management Zone (all townships within a 1-mile radius of the CWD+ deer) will be measured through aerial flights and/or remote cameras.

Enhanced Surveillance

Enhanced surveillance will be conducted during the deer hunting season immediately after the detection of CWD. The surveillance goal will be to test a random sample of hunter harvested deer so that CWD will be detected if prevalence is at or above 0.5% in yearling males within the townships intersected by the 1-mile radius created around the positive deer. Sample weights based on sex, age, and collection method will be used to assess surveillance efforts (Jennelle et al. 2018). At least 100 adult antlerless deer will be included in the sample tested.

Enhanced surveillance will be accomplished through a targeted messaging campaign to reach local hunters thereby increasing participation in free CWD testing. Head drop-off cooler(s) will be placed in the enhanced surveillance area at DNR-owned properties, other state properties, a mobile check station, and/or community buildings. A minimum of one staffed check station will operate each day during the hunting seasons within the CWD Management Zone. Deer processors and taxidermists in and around the CWD Management Zone will be contracted to collect samples from. Deer disease check stations will also be staffed at cooperating deer processors during opening weekend of firearms season. Indiana DNR messaging will encourage hunter participation in voluntary sampling using news releases, media interviews, social media posts, local advertising, and direct emails as indicated in the CWD Communication Plan. Additionally, when a hunter checks in a deer within a county that contains a township designated as part of the CWD Management Zone, they will be prompted by the electronic game check system to provide the exact location where they harvested their deer. If the deer was taken within

an enhanced surveillance area, the hunter will be encouraged via a computer-generated email to submit a voluntary CWD sample from their deer.

In rural areas of Indiana where deer harvest is substantial, hunter harvested deer should provide a sample large enough to detect CWD prevalence as low as 0.5%. However, in urban and suburban areas where deer harvest is typically low, alternative surveillance methods may be adopted to supplement hunter harvest sampling. Because of high human densities in urban and suburban communities, deer displaying clinical signs of CWD should have a greater likelihood of being observed. Indiana DNR will respond to reports of sick deer in these areas and raise public awareness of sick deer through media campaigns. Because deer-vehicle collision rates are also typically higher in developed areas, roadkill deer may also provide a supplemental sample of deer for CWD testing. If necessary, cooperative agreements with state and municipal entities will be pursued to obtain a sample of roadkill deer.

Under some circumstances, further activities may be necessary to satisfy enhanced surveillance objectives. When applied, these activities will be conducted on a small scale, using the deer's location to identify portions of the enhanced surveillance area where voluntary sampling has been insufficient. These activities may include but are not limited to mandatory sampling at a staffed check station during the special late antlerless season and/or sharpshooting.

Assessment and Consequences of CWD Prevalence

CWD prevalence will be assessed using various hunter harvest seasons and incentives to reach a particular sampling goal.

- After the enhanced surveillance period ends, if apparent prevalence is above 1%, no additional active management action (i.e., sharpshooting) should be taken by Indiana DNR at the conclusion of the 18-month period. To calculate apparent prevalence in that localized population, it is likely that 100-200 samples from adult antlerless deer and resident adult bucks will need to be collected in the CWD management area. However, the actual number of samples needed will also be based on the localized density of deer in the management zone.
- If sufficient samples are collected, and CWD is detected below a prevalence of 1%, sharpshooting will occur immediately after the conclusion of the hunting season in the affected area.
- If the surveillance goal of 0.5% detection rate is achieved, and CWD is not detected, no further actions will be required, and the ban on feeding and baiting can be discontinued or allowed to expire.
- If insufficient samples are collected to achieve the 0.5% detection goal and/or the samples do not consist of at least 100 antlerless deer (depending upon the local density of deer), then sharpshooting will commence to complete the assessment of apparent prevalence.
    - If CWD is detected below a prevalence of 1%, a one-time sharpshooting event will occur after the sampling goal is reached to eliminate CWD on the landscape.

Sharpshooting will commence after the conclusion of the hunting season and conclude no later than April 15. The goal of sharpshooting will be to reduce the population within the 1-mile radius of the detection to 30-40% of the pre-hunt population.

- If the surveillance goal of 0.5% detection rate is achieved, the 100 antlerless deer goal is met, and CWD is not detected, no further actions will be required, and the ban on feeding and baiting can be discontinued or allowed to expire.

Increases in the Localized Bag Limit

Additional antlerless deer will be made available by increasing the local bag limit within the CWD Management Zone.

Early Season Velvet Hunt

A velvet hunt is a special antlered-only hunt that occurs during late summer when deer are in velvet. The purpose of this season will be to test resident adult antlered deer within the CWD Management Zone prior to dispersal. The velvet hunt will include all legal archery and firearms equipment; will occur for nine days; and will be the last full week of August and the weekend prior to the last full week. All deer harvested during this period must be presented to the DNR or a partnering taxidermist for CWD testing. Firearms, archery equipment, muzzleloaders, and other equipment may be used for this hunt. The velvet hunt will not count against the one-buck bag limit.

Special Late Deer Firearm Season

The special late deer firearms season will be in effect from December 26 through the first weekend in January (i.e., ending concurrently with archery season).

Incentives

A free license or privilege to harvest an additional antlered deer that is 2.5 years or older will be given to hunters within the CWD Management Zone if the following conditions are met:

- A total of three antlerless deer $\geq$ 1.5 years old or older that are presented to the Indiana DNR or participating processor for CWD testing. Antlerless fawns can be harvested and submitted for testing but will only count for ½ of an adult antlerless deer.
- There is no limit on the number of extra antlered licenses that can be earned.
- The extra antlered license(s) can be used any portion of the state and is valid in the year it was earned as well as the entirety of the next deer hunting season.

Sharpshooting

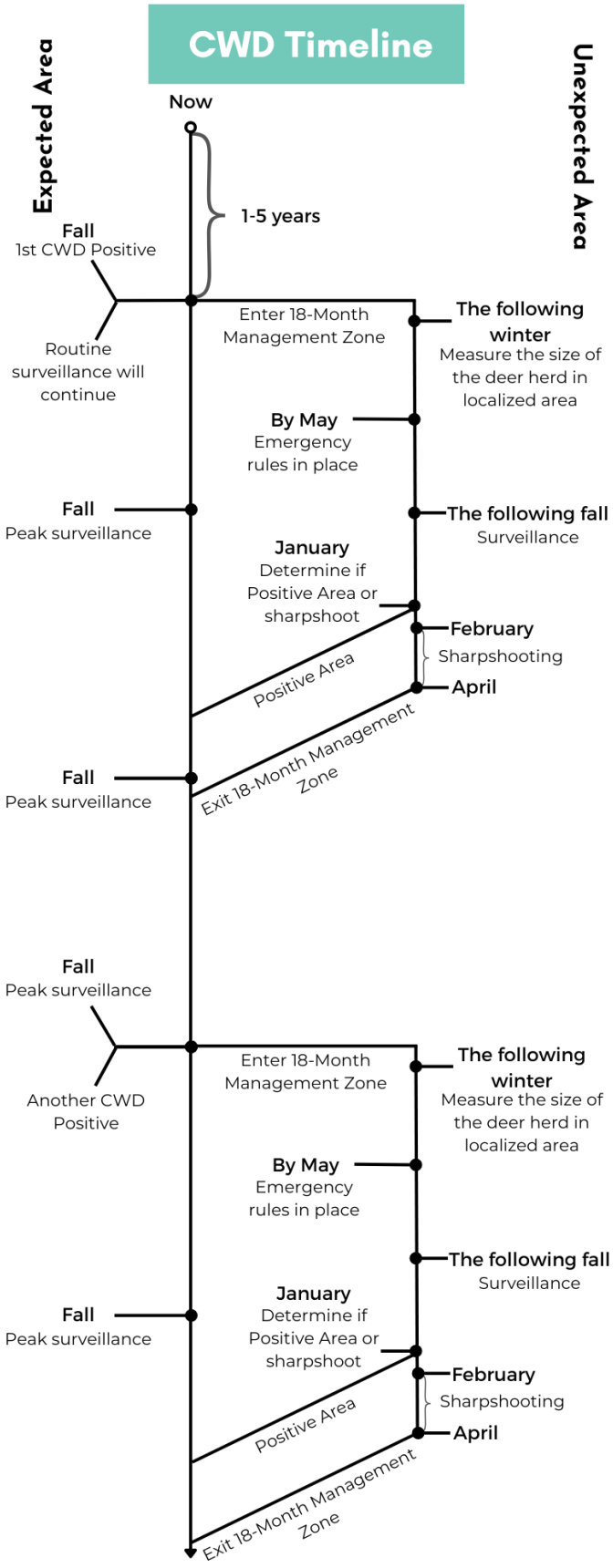
Sharpshooting will be conducted during the second winter after the detection of CWD (assuming the detection is from a sample collected during the deer hunting season) and within a 1-mile radius of where the first CWD+ deer is detected. Sharpshooting will only be conducted if the apparent prevalence is below 1% or if insufficient samples are submitted by the public to detect the disease at a 1% prevalence level. If hunters do not provide sufficient deer to detect the disease at a 1% prevalence, then sharpshooting would occur, not only to reduce the prevalence of the disease, but also to obtain enough samples to determine prevalence.

Sharpshooting activities will be conducted by USDA APHIS Wildlife Services on properties where access is granted by private landowners (i.e., by landowner permission only). This sharpshooting activity is intended to be additive to the deer harvest. At the end of the management period, the total reduction in deer herd should result in a $\leq$ 70% reduction in the population with a target of a 40-60% reduction in the herd (total harvest + sharpshooting).

Exit Strategy for the 18-month CWD Management Zone

At the conclusion of the 18-month period, the area will either:

- Return to normal deer management for that given county if no additional CWD+ deer were detected.
- Be designated as a permanent CWD Positive Area if CWD was detected at levels $\geq$ 1%.
- If additional positives were detected during the 18-month period, but detection levels were < 1%, conduct routine surveillance of that area the next year using deer processors and taxidermists with a targeted goal of 1% to assess the growth of CWD in the area. Continued surveillance plans for this area will depend upon additional low-level detections.


CWD Timeline
Expected Area
Unexpected Area
Now
1-5 years
Fall
1st CWD Positive
Routine surveillance will continue
Enter 18-Month Management Zone
The following winter
Measure the size of the deer herd in localized area
By May
Emergency rules in place
Fall
Peak surveillance
The following fall
Surveillance
January
Determine if Positive Area or sharpshoot
February
Sharpshooting
April
Positive Area
Exit 18-Month Management Zone
Fall
Peak surveillance
Fall
Peak surveillance
Another CWD Positive
Enter 18-Month Management Zone
The following winter
Measure the size of the deer herd in localized area
By May
Emergency rules in place
The following fall
Surveillance
Fall
Peak surveillance
January
Determine if Positive Area or sharpshoot
February
Sharpshooting
April
Positive Area
Exit 18-Month Management Zone

Chapter 6. Management Plan for Wild Deer Outside of CWD Positive Captive Cervid Facilities

If a captive cervid within Indiana tests positive for CWD, Indiana DNR will work cooperatively with Indiana BOAH in a coordinated response. Indiana DNR will conduct enhanced surveillance as described for the CWD Management Zone during the hunting season after this detection. Enhanced surveillance will be conducted in townships within a 1-mile radius of where the CWD positive captive cervid was penned or had been penned during the 24 months before detection.

Further investigation will be conducted to evaluate the potential for escape of CWD to wild deer near the facility to determine whether further management actions are appropriate. Localized culling (i.e., within a 1-mile radius) may be used if there is evidence that cervids had escaped from the CWD positive facility before or after CWD was detected in it. If a CWD positive wild deer is detected close to a CWD positive captive cervid facility, then response actions will be implemented in response to the detection of CWD in wild deer.

Chapter 7. Living With CWD: Best Management Practices for Land Managers and Property Owners

Statewide management of wildlife resources is difficult because there is a wide range of hunting culture tendencies, permanent forest cover, row crops, and deer population dynamics. Indiana DNR manages deer at the county scale using numerous metrics generated through data collection by staff, hunters, and cooperating agencies, and sets regulations to achieve management objectives in each county. However, landowners are encouraged to set additional property-specific rules that build upon regulations set by Indiana DNR. For instance, landowners may wish to limit doe harvest if the deer population is low, or limit harvest of young bucks if more adult bucks are desired on their property. Property rules cannot supersede state regulations but can be additional to state regulations. For instance, it is only legal to deer hunt with a rifle during an open firearms season established by Indiana DNR. That season cannot be lengthened by landowner property-use rules, but a landowner could prohibit use of rifles on their property if desired.

Indiana DNR encourages landowners concerned about CWD to set property-specific rules to reduce the chance of CWD introduction to their property. Below is a suite of Best Management Practices (BMP) recommendations that Indiana DNR has developed to assist landowners in reducing CWD introduction risk on their property. These rules, if implemented by a landowner, build upon current state regulations using AFWA recommendations for managing risk with CWD.

Prohibit Surface Disposal of Deer Carcasses

Prions accumulate in infected deer but are concentrated in nervous system tissue such as the brain and spinal cord. Movement of deer carcasses can also lead to prion movement and pose a risk of introducing the disease to a new area.

Prohibiting the disposal of deer or other cervid (elk, mule deer, moose, etc.) parts on your property may reduce the risk of CWD introduction to the deer herd on your property. If you live in an area known to have CWD in the deer population, carcass disposal is also important for reducing prion contamination of the environment. In either case, the best disposal method for all discarded deer carcass parts is at a landfill, after double bagging the carcass parts in a durable trash bag. Disposing of carcass parts underground is also a viable disposal method that reduces risk of prion contamination of topsoil.

Prohibit Use of Natural Urine Based Lures

Deer infected with CWD shed infectious prions through bodily fluids, like urine. The deer urine industry has developed some safeguards to reduce the risk of distributing deer urine contaminated with CWD prions, such as herd certification programs and deer urine tests. While these may be helpful in reducing the risk of prion contamination, none of this can eliminate this

risk. Therefore, prohibiting the use of natural urine-based lures is recommended to reduce the risk of CWD prion introduction to the population. Synthetic-based lures can be used in place of natural urine-based lures if hunting lure use is necessary.

Eliminate Deer Feeding

Artificially concentrating animals, such as white-tailed deer, creates a higher likelihood that infectious pathogens can be passed from one animal to another. Practices such as supplemental feeding or mineral licks placed for deer concentrate deer feeding, urination, and defecation into a focused area where saliva, urine, and feces have a high likelihood of passing CWD prions from one deer to another.

It is recommended that all supplemental feeding programs or mineral licks be eliminated, to reduce the risk of deer spreading CWD through these communal feeding locations. If mineral licks are already established on your property, dig up contaminated soil and dispose of it in a landfill.

Sample and Test all Harvested Deer

Surveillance for CWD infected deer allows DNR and land managers to monitor the distribution and prevalence of the disease and make appropriate management decisions based on this information. It is recommended that land managers have all adult deer harvested on their property tested for CWD. Information on CWD testing can be found at on.IN.gov/cwd.

Reduce Deer Density

In areas that are affected by CWD, reducing deer density and age structure are practices that may decrease CWD transmission rates or otherwise make herds more resilient to CWD infection (Belsare et al. 2021, Mysterud et al. 2021, Storm et al 2013). Initially, harvest pressure should be very high (i.e., 60-70% of the localized population) to reduce populations to the targeted goal. Once the desired population goal is achieved, an annual harvest of 35-40% will be required to maintain the population level at the desired level (Blossey et al. 2024).

To achieve the initial goal and maintenance goal will require a large amount of hunting effort that will mostly likely require additional late-winter removals to supplement hunter harvest by using all deer bag limits afforded to the hunters who access the property. To reduce deer densities, the majority of harvest should be focused on does. For the first few years, this will likely require doubling or even tripling your annual doe harvest, depending on current harvest strategies. To have the most significant impact on CWD infection rates, the density of deer should be dropped to the lowest socially acceptable level. This will vary by property as different hunter groups will have varying expectations for deer populations.

Once deer densities are at their lowest tolerable level, annual harvest of the doe population will be required to maintain a low density. The goal should be to annually harvest approximately 35% of the doe population that use the property. Localized populations can be estimated through a technique called conventional distance sampling. This technique uses game cameras placed randomly around a property, uses standardized techniques to count and measure the distance of the deer from the camera, and then uses statistical methods to create an estimate from those sightings. If populations begin to increase, then increase annual doe harvest. If population densities continue to decrease, then decrease annual doe harvest. The Indiana DNR Deer Program can assist with information on how to create a population estimate for a property.

Alternatively, the Indiana DNR Deer Program is currently working on developing population estimates for the entire state. These population estimates will be available publicly once they are created and these estimates can be used to create population targets and serve as a guide for the number of deer that can be removed.

Reduce the Age Structure of the Deer Population

Adult deer and even more specifically, bucks, are the most likely group to be infected in a population (Jennelle et al. 2014). It is advised that these older individuals be targeted for removal in an effort to slow down transmission rates.

This may be accomplished by removing all bucks that are $\geq$ 2.5 years old. This strategy will leave yearling bucks to breed does, reducing the transmission rate of CWD during breeding. The objective should be to decrease the age of the buck population as much as possible and target the oldest does in the population when possible.

These harvest strategies may be accomplished through hunter harvest. Additionally, the use of deer disease permits in late winter will help facilitate the targeted removal of adult bucks from bachelor groups when they are on a feeding pattern and susceptible to removal.

Chapter 8. Fiscal Considerations and Expenditures

Expenditures on CWD surveillance and related management activities will vary by year but should be considered as layers of expenses upon a base annual budget. Routine annual surveillance as described in Chapter 2 will be considered a permanent annual expense. This expense is not expected to fluctuate greatly. This baseline budget is described below, with additional communications expenses incorporated to account for routine public engagement work.

Historical Surveillance Costs

Budgeting costs of surveillance expenditures is based expenditures from 2018-2020 using an Indiana DNR-staffed check station. Approximate annual total expenses (both collection and laboratory testing) for CWD ranged from $167,000 to $195,000 for an average expenditure of $181,600 per year, with the approximate cost per sample ranging from $178 (for 939 samples) to $215 (for 912 samples) for an approximate average expenditure of $198 per sample. The approximate average cost of collecting the sample was approximately $181. This three-year price per sample will be used to extrapolate all sampling costs below for both routine and enhanced surveillance.

Buchanan-Schwanke and Caudell (2022) estimated costs based on using the point system to determine the number of deer needed for testing. They found that during the two-year taxidermy pilot program from 2021-2023, samples cost an average of approximately $16 per point from a taxidermist, compared to approximately $58 per point for Indiana DNR staff to work check stations (Caudell and Buchanan-Schwanke 2022). Therefore, using a taxidermy/processor collection system as the primary method of collection will be far more cost effective for routine and enhanced surveillance purposes, and overall surveillance cost will be lower and greater testing can occur throughout the entire state on a regular basis using the complete four-pronged approach outlined in Chapter 4.

Enhanced Surveillance Expenses

After detection of CWD in an area in which CWD is not expected, enhanced surveillance will be conducted in all townships within a 1-mile radius of the initial CWD+ deer. Using Indiana DNR-staffed check stations as the primary method of collection, the projected expense to test deer to a 1% confidence level will be approximately $30,000 (2020 costs; assuming 198 sample points in an area roughly 314 mi^2) + any enhanced travel expenses or setup costs. These costs could be further reduced using taxidermists and processors. The total cost for a similar project in Franklin County in 2016 to test for bovine tuberculosis in one 10-mile radius was approximately $140,000.

Sharpshooting Expenses

Current projections for a single three-month period of sharpshooting for a 1-mile radius is estimated to be $25,000 (2020 costs). Adjustments should be made for inflation in subsequent years.

Literature Cited

Ableman, A., Hynes, K., Schuler, K., & Martin, A. (2019). Partnering with Taxidermists for Improved Chronic Wasting Disease Surveillance. *Animals*, *9*(12), 1113.

Belsare, A. V., and C. Stewart. (2020). OvCWD: An agent-based modeling framework for informing chronic wasting disease management in white-tailed deer populations. Ecological Solutions and Evidence, 1, e12017 https://doi.org/10.1002/2688-8319.12017

Belsare, A. V., Millspaugh, J. J., Mason, J. R., Sumners, J., Viljugrein, H., & Mysterud, A. (2021). Getting in Front of Chronic Wasting Disease: Model-Informed Proactive Approach for Managing an Emerging Wildlife Disease. *Frontiers in Veterinary Science*, *7*, 1154.

Blossey, B., D. Hare, and D. M. Waller. 2024. Where have all the flowers gone? A call for federal leadership in deer management in the United States. Frontiers in Conservation Science 5:1382132. doi: 10.3389/fcosc.2024.1382132

Buchanan-Schwanke, J., and J. N. Caudell. 2022. The Cost Effectiveness of Establishing a Taxidermist Program Versus the Use of Check Stations in the Collection of Chronic Wasting Disease (CWD) Samples in Indiana. 2022 Indiana White-tailed Deer Report. Indiana Department of Natural Resources, Bloomington, Indiana.

Caudell, J. N. & O. D. L. Vaught, editors. (2020). 2019 Indiana White-tailed Deer Report. Indiana Department of Natural Resources. Bloomington, Indiana.

Decker, D., C. Smith, A. Forstchen, D. Hare, E. Pomenranz, C. Doyle-Chapitman, K. Schuler, and J. Organ. 2016. Governance principles for wildlife conservation in the 21st century. Conservation Letters 9:290-295.

DeYoung, R. W., Miller, K. V., & Hewitt, D. (2011). White-tailed deer behavior. *Biology and management of white-tailed deer*, 311-351.

Gillin, C. M., & Mawdsley, J. R. (2018). AFWA technical report on best management practices for surveillance, management and control of chronic wasting disease. Association of Fish and Wildlife Agencies.

Jennelle, C. S., Henaux, V., Wasserberg, G., Thiagarajan, B., Rolley, R. E., & Samuel, M. D. (2014). Transmission of chronic wasting disease in Wisconsin white-tailed deer: implications for disease spread and management. *PLoS One*, *9*(3), e91043.

Jennelle, C. S., Walsh, D. P., Samuel, M. D., Osnas, E. E., Rolley, R., Langenberg, J., ... & Heisey, D. M. (2018). Applying a Bayesian weighted surveillance approach to detect chronic wasting disease in white-tailed deer. *Journal of Applied Ecology*, *55*(6), 2944-2953.

McCallen, E. 2020. Regional CWD risk assessment for the Midwest. Pages 102-105 *in* Boggess, C.M., and O.D.L. Vaught, editors. 2020 Indiana White-tailed Deer Report. Indiana Department of Natural Resources, Bloomington, Indiana.

Mysterud, A., Benestad, S. L., Rolandsen, C. M., & Våge, J. (2020). Policy implications of an expanded chronic wasting disease universe. *Journal of Applied Ecology*.

Stinchcomb, T. R., Z. Ma, R. K. Swihart, J. N. Caudell. 2022. Expanding and evaluating public satisfaction with wildlife governance: insights from deer management in Indiana, USA. Environmental Management: https://doi.org/10.1007/s00267-022-01698-5

Storm, D. J., Samuel, M. D., Rolley, R. E., Shelton, P., Keuler, N. S., Richards, B. J., & Van Deelen, T. R. (2013). Deer density and disease prevalence influence transmission of chronic wasting disease in white-tailed deer. *Ecosphere*, *4*(1), 1-14.

Walter, W. D., VerCauteren, K. C., Campa, H., Clark, W. R., Fischer, J. W., Hygnstrom, S. E., ... & Winterstein, S. R. (2009). Regional assessment on influence of landscape configuration and connectivity on range size of white-tailed deer. *Landscape Ecology*, *24*(10), 1405-1420.

Walter, W. D., Evans, T. S., Stainbrook, D., Wallingford, B. D., Rosenberry, C. S., & Diefenbach, D. R. (2018). Heterogeneity of a landscape influences size of home range in a North American cervid. *Scientific reports*, *8*(1), 1-9.