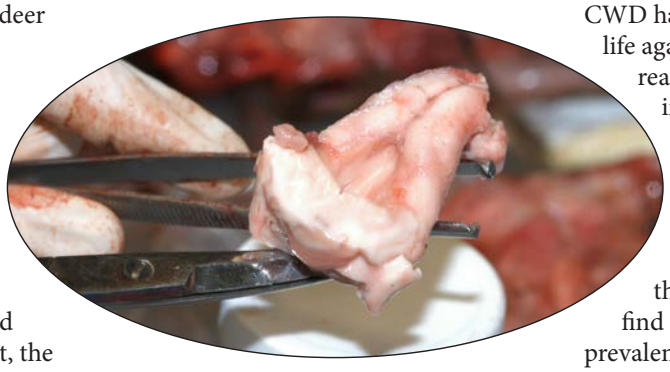
Can We Manage Deer Populations to COMBAT CWD?

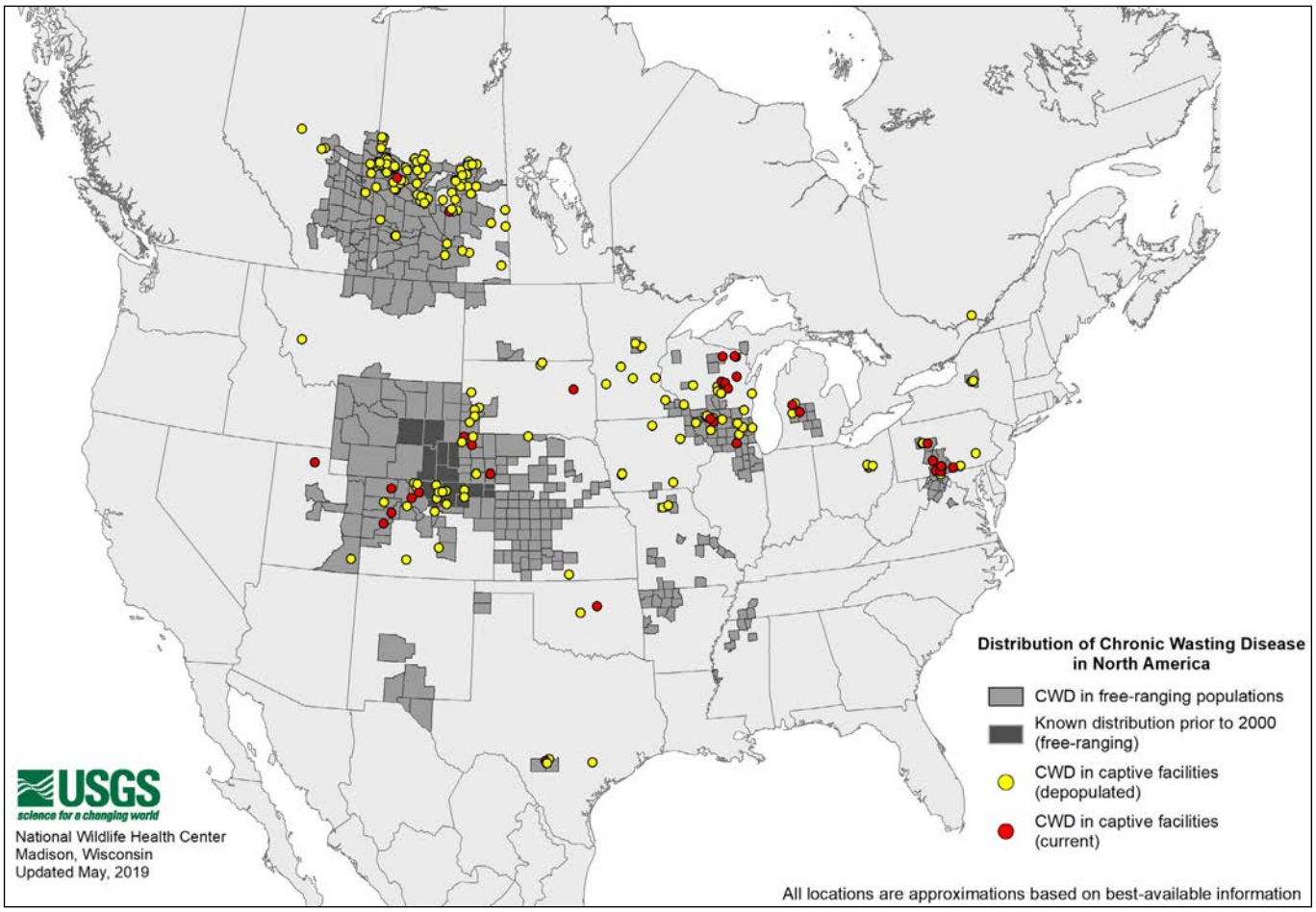
By Jim Heffelfinger

By now chronic wasting disease (CWD) does not need any introduction among deer enthusiasts. Much has been written about the basic knowledge of this disease of the deer family. Discovered in the 1960s, it smoldered in the scientific literature and in discussions among deer biologists and hunters until late 1990s when it flared up to raging national discussion for a decade before dying down again. After a decade or so of focused research, monitoring and management actions to control it, the general consensus seemed to be that it was a disease with no cure, but with no evidence of being a human health hazard or something limiting deer abundance. As interest waned and funding dried up, monitoring was downscaled and we knew less about its occurrence on the landscape.



The base of the brain, where the spinal cord attaches, can be used to test for CWD.

Recently the national discussion about CWD has been stoked and fanned to life again by new information and new reasons why we should all be paying attention. The disease didn't seem to care if we were paying any attention as it continued to grow in prevalence (percent of the population infected) and in geographic area. It is true, the more we look, the more we find it, but the spread and increased prevalence of this disease is not solely because of the increased surveillance for it.



Distribution of CWD in North American as of May 2019.
Map courtesy of Bryan Richards, USGS National Wildlife Health Center.

LIKE A BAD MOVIE

The recent reference to deer zombies infected with CWD in the media is neither accurate nor appropriate, but it was successful in sparking a much-needed discussion about the seriousness of this disease. Some of the confusion, and connection to zombies, is the fact this disease is caused by misfolded proteins called prions (PREE-ons) that cause deer brains to deteriorate. There has also been much media coverage recently about CWD being caused by *Spiroplasma* bacteria and therefore curable. Overwhelming scientific evidence indicates CWD is caused by prions, a conclusion accepted by the vast majority of scientists working with CWD, including the wildlife veterinarians for 24 western wildlife agencies.

This is a deer disease no animal has ever survived and to which there is no complete immunity. Deer generally die within 2-3 years of being infected. Some infected animals will not test positive for almost 2 years, but shed infectious prions 7-11 months before showing any physical signs of the disease. The presence of infectious prions in urine, feces, and saliva means deer can shed infectious material in numerous ways.

A lot of animals in small areas (high density in the wild or crowded in captivity) greatly enhances the transmission from one animal to another, but since the infectious prions persist for years in the soil, that means the animals don't have to be in the same place at the same time to be infected. All this makes it very difficult to understand and combat this disease.

Infected animals may migrate long distances or may be loaded into a trailer and moved thousands of miles away. Human movement of infected animals can rapidly spread the disease long distances; so much so that it is often joked that CWD spreads at the rate of about 55MPH. Some new discoveries, especially in captive facilities, can be traced back to the movement of animals from a known infected area.

Today we know of CWD infecting white-tailed deer, mule deer, elk, moose, red deer, Sika deer, and caribou/reindeer in 26 states, 3 Canadian provinces and in Norway, Finland, Sweden, and South Korea. Dead animals can be tested for the disease by looking at the lymph nodes or the base of the brain. Being able to test live animals would be extremely useful for a variety of reasons, but currently it is not as sensitive as testing dead animals. Live animal testing involves a tonsil biopsy (collecting a small amount of tonsil tissue from living deer), lymph node biopsy, or rectal biopsy (use your imagination), but these tests only detect 63-80% of the positives in areas of relatively high prevalence.

Photo: Dr. Terry Kreeger

In the final stages of CWD, deer waste away, drool, and are disoriented as their brain deteriorates.

Thankfully, there is no evidence CWD can infect humans, but wildlife and human health officials worry about it breeching the deer-human barrier through consumption of the deer we harvest. Currently that does not appear to be likely, but the greater the geographic distribution and the higher the prevalence rate, the better the chances of human exposure. Even without any evidence that CWD is a human health hazard, prion-caused diseases have jumped to new species in the past so it would seem like a very good idea to minimize human exposure to the infectious material that causes CWD.

MORE PRIONS IN MORE PLACES

The prevalence rate of CWD in mature bucks in at least one Wyoming game management unit has reached as high as 40%. This means the chance of your buck being infected in those areas is literally almost a coin toss. Research and management experience in the last decade show that CWD negatively affects overall deer abundance when prevalence is higher than 20% of the population, but even lower prevalence can impact the rate of reproduction and survival in more subtle ways. In a Wyoming mule deer study, where CWD prevalence rates averaged 43% for males and 18% females, annual survival rate of CWD-positive deer was 32% while those with no CWD detected had a 76% survival rate. This much difference in annual survival means the percent of animals that have CWD can influence whether the population increases or decreases. Modeling that population indicated that it would decline 21% with those survival rates, but in the absence of CWD it would not decline at all. We now are realizing that CWD can be a population-limiting disease with a potential to cause dramatic declines under the right conditions.

More disturbing than the prevalence rate is the upward trend and geographic spread to new areas. The percent of the population testing positive in some units in Wyoming and Colorado has increased 2- to 10-fold since the early 2000s. About 70% of Wyoming's deer hunt areas are positive for CWD. More than half of Colorado's deer herds are also infected, as are one-third of that state's elk herds. Four of Colorado's five largest mule deer herds are infected with CWD. Remember this is the state with the largest mule deer and elk populations in the country. Colorado Parks and Wildlife has good information from various deer management units that strongly indicates units managed for an older age structure, more bucks on the landscape, and higher buck:doe ratios had the largest increase in prevalence over the last 15 years, while those managed for higher buck harvest remained stable or declined. This makes sense because we know disease spreads faster in higher density populations because of more interaction between deer, a higher concentration of infectious agents in the environment, and we also know this disease is more common in mature bucks.

Most people agree that if we can keep CWD from spreading and becoming more common in the wild we should, but it's sobering to think about what that really means. The reality is that fewer

Photo: Dr. Tom Thorne

Deer with CWD generally don't live more than 2-3 years after being infected, but can pass infectious prions in their urine, saliva, and feces which can stay in the soil for long periods before infecting other deer.

deer on the landscape, a younger age structure, and lower buck:doe ratios are the conditions that probably minimize the spread of CWD.

We will always need to know more about the disease and, toward that end, bills have been introduced in Congress to provide more funding for needed research on factors influencing CWD transmission. However, we cannot wait around perpetually calling for more funding and more information before we try to do something while the disease continues to spread and increase in prevalence. If we don't get a handle on the disease before it starts to affect deer abundance over large areas we may never be able to put it back in the box.

Photo: Photo by Dr. Mateus-Pinilla and Novakofski research laboratory.

Lymph nodes, from inside the neck of dead deer, are the preferred tissue used in testing for CWD.

DAMAGE MANAGEMENT

Some have suggested that more predators, specifically wolves, will reduce prevalence of CWD when they pick off the sick deer in the population. Theoretically this makes sense because predators, especially chasing predators, will take the most vulnerable first. Despite much social support for the notion wolves will solve the CWD problem, the scientific community has tried to support it with mixed results. In one modeling exercise the authors concluded that predators eliminated CWD in their computer-simulated population. A few other studies failed to provide evidence lion predation helped control CWD at all. Part of the predator cleansing argument says predators will also clean up the CWD-infected carcasses to reduce infectious material on the landscape. The problem is, research has shown that infectious prions are present in canid feces for at least 3 days after they feed on a carcass. One has to wonder about the impact of packs of wolves dropping thousands of prion-laden turds (PLTs) all over the landscape. There is no evidence that predation is influencing the rate of spread or prevalence of CWD anywhere at this time. This is another case where we need to lead with the science and be cautious of attractive stories about wolves as saviors.

Eradication is not feasible because of CWD's wide geographic distribution and infectious characteristics, but there may be ways to manage deer populations through well-designed management programs so hunters can be the agents of meaningful CWD management at the population level. State wildlife agencies have a responsibility to manage our big game herds in a sustainable way for future generations. The Western Association of Fish and Wildlife Agencies (WAFWA) represents 24 state and provincial wildlife agencies across western North America. Wildlife veterinarians representing these agencies published a document last year titled "Recommendations for Adaptive Management of Chronic Wasting Disease in the West" to suggest practices to suppress and assess CWD. Colorado Parks and Wildlife has been researching and managing herds with CWD for decades, and this year, increased its CWD management efforts with a "Chronic Wasting Disease Response Plan." This plan was based partially on the WAFWA recommendations and developed with full engagement of the public and the nation's leading CWD experts.

As unpalatable as some management options seem, we have to decide soon if we are going to fight the disease or pretend it's not a problem. The Colorado plan calls for a change in management when prevalence exceeds 5% in adult (2+ years old) males. A hard look at the data shows that is the level at which prevalence seems to start increasing exponentially and becomes hard to get under control with any kind of management action. When CWD prevalence exceeds 5% in adult males, the plan offers several options to manage CWD at the deer population level: 1) reduce deer density, 2) reduce buck:doe ratios, 3) change age structure to more younger bucks, 4) targeting hotspots identified in the surveillance program, and 5) removing sources of deer concentration.

Nearly 3 of every 4 deer units in Colorado is above the management range for buck:doe ratio that was established with public input. Many of these herds are also over the 5% prevalence threshold and thus qualify for CWD management. Regardless of prevalence, these herds should see an increase in buck harvest to bring them in line with buck:doe ratio objectives anyway, but being over 5% compels managers to reduce buck:doe ratios to the lower end of the agreed upon range. Obviously, all herds should be managed so prevalence rate never gets to the 5% level, which for Colorado, triggers management action. Colorado is leading in this regard but other states with high rates of CWD infection are also looking seriously at deer management changes to fight the spread and prevalence of CWD.

KEEP IT OUT, KEEP IT LOCAL, KEEP IT LOW

Some researchers have been quoted in the media saying it is inevitable that CWD will jump the species barrier and infect humans. It is not inevitable, but the nature of prion diseases gives us plenty of reasons to take that scenario

Photo: Joe Brochu

Hunters are the most effective tool for monitoring and managing CWD.

seriously. The catastrophic cascade of events that will unfold if CWD jumps the species barrier into humans will have a profound effect on all wildlife conservation as we know it. Short term desires for mature bucks and high buck:doe ratios are less important than human health and long term persistence and abundance of our important deer herds.

We are not getting rid of CWD, but that doesn't mean we are powerless to keep it out of new areas, slow or stop the spread, and keep prevalence rates low or even reduce them. Some of the recommendations to manage CWD carry with them some uncertainty and they may not have undeniable proof of their effectiveness, but that should not be used as an excuse to do nothing. First and foremost, if the option is available to you, get your harvested animal tested. Monitoring the disease is a fundamental necessity. The Centers for Disease Control and Prevention (CDC) recommends not eating a CWD-positive deer, but ultimately that is a personal choice. Some people argue that tens of thousands of CWD-positive deer have been eaten in CO and WY without a problem and others point out that every infected deer eaten offers a chance for you to be the first. Informed choices are always better than the alternative and testing gives you the opportunity to make that decision.

The most important thing hunters can do is to learn about CWD and the serious threat it poses to deer populations. If your state or province doesn't have CWD, you don't want it. In an attempt to limit or slow the spread of CWD, 41 states have some sort of ban on importation of hunter-harvested carcasses or parts. These regulations are a tangible way hunters can help to avoid spreading the disease because bringing a CWD-positive deer carcass or head into a state without CWD obviously spreads infectious prions into a new area.

Likewise, since we know infectious prions occur in urine, how can we be sure urine-based scents collected from a large group of captive deer don't contain CWD-causing prions? Although urine-based scents have never been shown to infect any animal with CWD, it would seem prudent to not be collecting urine from thousands of captive deer and squirting it out all over the rest of the continent.

Hunters remain the most effective tool to manage the spread and prevalence of CWD, but it will take some sacrifice just as did the very first game laws. Hunters need to show that we are the leading stewards of the resource by setting aside our personal desires for how we want our favorite deer population to be managed and supporting efforts to manage CWD. This will require supporting recommendations and regulations set by wildlife and disease experts as they try innovative things to contain and minimize prevalence. Some of these recommendations may run counter to the social desires of some regarding buck age structure, buck:doe ratios, and deer density. No one said conservation was easy.

Hunters have always supported conservation practices that were necessary to assure the sustainability of our natural resources, but we have tough choices ahead as we move to come to grips with the latest CWD information. As hunters, we must understand the seriousness of this disease and be willing to support what needs to be done to preserve our heritage and our leadership role in conserving wild animals in wild places for future generations.

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