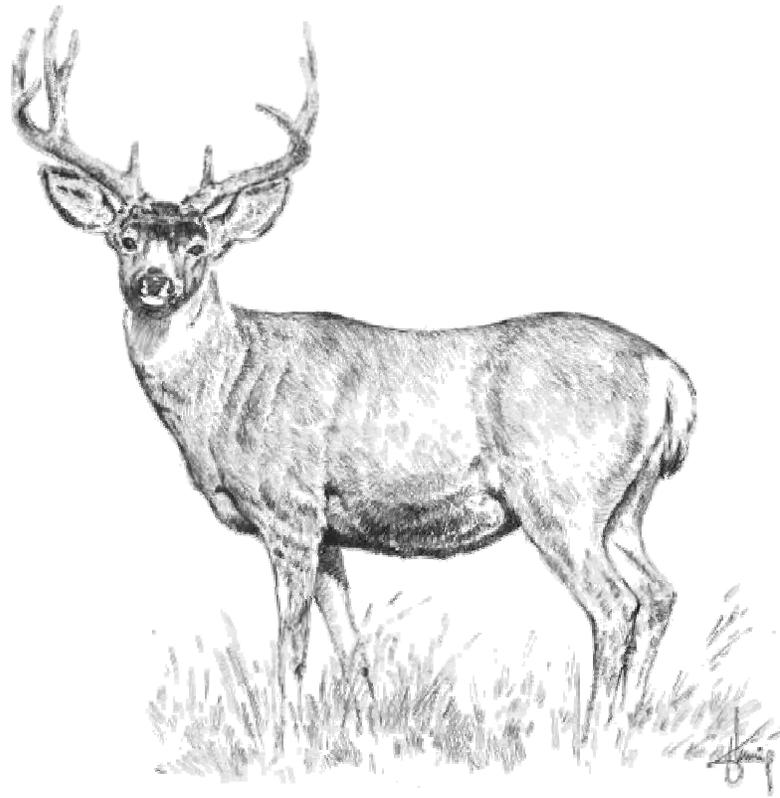


# CHRONIC WASTING DISEASE MANAGEMENT PLAN

TEXAS PARKS AND WILDLIFE DEPARTMENT  
AND  
TEXAS ANIMAL HEALTH COMMISSION

June 2012



The following management plan will serve to guide Texas Parks and Wildlife Department (TPWD) and Texas Animal Health Commission (TAHC) in addressing risks, developing management strategies, and protecting big game resources from Chronic Wasting Disease (CWD) in captive or free-ranging cervid populations. Both agencies recognize the need for full cooperation and partnership among government agencies, conservation organizations, private landowners, hunters, and the general public should CWD occur in Texas. CWD is a reportable disease and TAHC has authority for reporting and tracking this disease in alternative livestock, which includes elk, red deer and sika deer. TPWD has regulatory authority for free-ranging white-tailed deer and mule deer, and both agencies share regulatory authority over captive deer held under the authority of Deer Breeder Permits.

This management plan is intended to be dynamic; management strategies described within are likely to change as both the epidemiology and management of this disease become better understood through time. Specific response plans may be developed and incorporated into this plan following local or regional discoveries of CWD. Three major goals of this CWD management plan are:

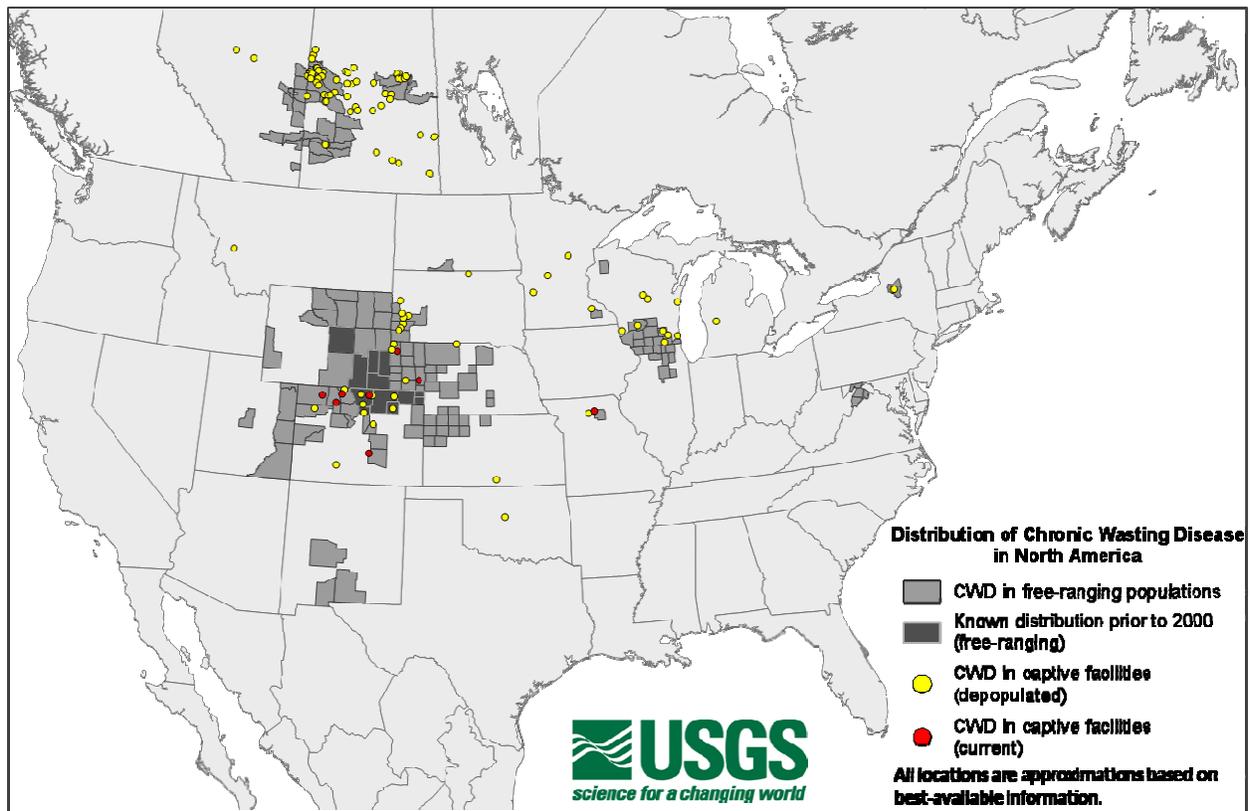
1. Minimize CWD risks to the wild and captive white-tailed deer, mule deer, and other susceptible species in Texas.
2. Establish and maintain support for prudent CWD management with hunters, landowners, and other stakeholders.
3. Minimize direct and indirect impacts of CWD to hunting, hunting related economies, and conservation in Texas.

## **BACKGROUND**

Chronic Wasting Disease is a fatal transmissible neurological disease in the family of infectious diseases known as transmissible spongiform encephalopathies (TSEs). Other TSEs include bovine spongiform encephalopathy (BSE) in cattle, scrapie in sheep, feline spongiform encephalopathy (FSE) in cats in Europe, and Creutzfeldt-Jakob disease (CJD) and a new variant (vCJD) in humans. CWD is neither bacterial nor viral, and is believed to be caused by a misfolded protein (“prion”) that replicates and infects other normal proteins (Fryer and McLean 2011). CWD is aptly named for the symptoms caused by the disease: appetite loss, weight loss (hence the name “wasting disease”), listlessness, excessive drooling, blank stares, decreased awareness, and behavioral changes (Williams 2005). Death of infected individuals is inevitable and is believed to often occur by increased predation or by aspiration pneumonia (CWD Alliance 2012). The diagnosis of the disease cannot be made by symptoms, since other toxic and neurological afflictions can cause the animal to exhibit similar symptoms. No USDA-approved live-animal test for CWD is available. Instead, immunohistochemistry (IHC) is used to diagnose CWD by measuring accumulations of CWD-associated prion protein (PrP<sup>CWD</sup>) in brain tissues (specifically in the obex of the medulla oblongata) or retropharyngeal lymph nodes. Incubation periods in naturally-exposed free-ranging deer are difficult to determine, but average incubation period is thought to be 2 to 4 years (Williams 2005). From the time clinical symptoms are recognized, death often occurs within several months (Williams and Miller 2002).

Captive-deer research recorded deaths of mule deer and white-tailed deer infected with CWD at 41 and 59 months, respectively (Miller and Wild 2004). The time it takes for animal to succumb to CWD varies based on method of exposure, intensity of exposure, and other external factors.

The origin of CWD is unknown, but it was first recognized in 1967 in captive mule deer in the Colorado Division of Wildlife captive wildlife research facility in Fort Collins, Colorado. This disease received little attention until it was discovered in free-ranging white-tailed deer in southern Wisconsin in early 2002. To date, CWD has been detected in free-ranging and/or captive cervids in 19 states and 2 Canadian provinces (Figure 1), but has not yet been detected in Texas. However, it is probable that CWD-infected deer have entered Texas considering the fact that the disease was detected in three of four mule deer harvested by New Mexico hunters within two miles north of Hudspeth County, Texas during the 2011-12 hunting season.



**Figure 1.** Distribution of CWD in North America, May 2012.

Despite considerable CWD research during the past several decades, much remains unknown about the disease. A progressive, fatal disease with no known immunity or treatment, CWD is known to occur via natural transmission in white-tailed deer, mule deer, black-tailed deer, red deer, sika deer, elk, and moose (Sohn et al. 2011, CWD Alliance 2012, Saunders et al. 2012). Transmission to other species including fallow deer, cattle, sheep, goats, mink, ferrets, squirrel

monkeys, voles, and mice has occurred experimentally via intracerebral inoculation (Saunders et al. 2012), but research indicates that CWD infection of livestock through natural pathways is unlikely (Sigurdson 2008). The discovery of multiple strains of CWD suggests potential for interspecies transmission (Belay et al. 2004, Barria et al. 2011), but it is important to note that CWD has not shown the ability to jump the species barrier to humans (Sandberg et al. 2010, Apostol et al. 2011).

## **TRANSMISSION**

There are two primary sources of exposure to CWD for uninfected deer: 1) CWD infected deer, and 2) CWD contaminated environment (Williams et al. 2002, Miller et al. 2004, Mathiason et al. 2009). It is believed that some TSE prions may appear spontaneously and sporadically, but there is no evidence of spontaneous CWD (Chesebro 2004). The presence of infected deer over time increases the number of infectious CWD prions in the environment. As CWD becomes established in an area, environmental contamination may become the primary source of exposure for uninfected deer. Conversely, in areas where CWD is not established, and where the environment is relatively uncontaminated, direct animal contact is considered the most likely source of transmission of CWD to uninfected deer. In early stages of infection, limiting the growth of environmental contamination through the reduction of infected individuals may offer some control in limiting disease prevalence and distribution (Wasserberg et al. 2009, Almberg et al. 2011). However, infected individuals on the landscape serve as a reservoir for prions which will be shed into the environment. Prions are shed from infected animals in saliva, urine, blood, soft-antler material, and feces (Gough et al. 2009, Mathiason et al. 2009, Saunders et al. 2012). There are no known management strategies to mitigate the risk of indirect transmission of CWD once an environment has been contaminated with infectious prions. This makes eradication of CWD very difficult, if not impossible in areas where CWD has been established for a long period before initial detection.

## **IMPLICATIONS OF CHRONIC WASTING DISEASE**

The number of states and provinces in which CWD has been discovered has steadily increased in the past decade, forcing many state and provincial wildlife agencies, hunters, and stakeholders to confront the myriad of consequences and implications this disease presents. Implications of CWD are often centered on the anticipated, or unknown potential impacts to wild cervid populations, most notably concerns for population declines resulting from infected herds. Other potential implications include concerns or impacts over human health and safety, economic losses related to CWD, hunter retention and recruitment, hunter participation, hunter displacement, public concern for the overall welfare of deer, lack of knowledge about CWD by hunters and non-hunters with potential to influence policy, acceptance of management strategies to address CWD, and general mistrust of state agencies to manage chronic wasting disease outbreaks. Disease eradication is expected to become less attainable as CWD becomes more established in a population, emphasizing the criticality of a sound CWD surveillance and response plan. Of course, disease prevention is the best approach to

protecting cervid populations and avoiding social and economic repercussions resulting from CWD or other wildlife diseases (Sleeman & Gillin 2012).

Initial news of the discovery of CWD in Texas, or subsequently a new area in Texas, could result in dissemination of speculative and unfounded information which may result in apathy toward CWD management among hunters, landowners, and other stakeholders, and possibly unnecessary panic among others. Dissemination of accurate and factual information regarding CWD is important to establish understanding among the various stakeholders of the magnitude of risks posed by CWD, and support for CWD management efforts (Stafford et al. 2006). With the extent of private lands in Texas, landowners and hunters will play a key role in helping TPWD and TAHC manage CWD. Failure to keep these groups and others informed with relevant facts could influence how they view disease management strategies (Vaske et al. 2006). Uninformed constituents could contribute to other serious implications associated with CWD including poor hunter recruitment and retention, hunter displacement, and unintentional spread of CWD through transportation of live deer or deer carcasses.

Survival rates of CWD infected deer are considerably less than uninfected deer (Miller et al. 2008). The prevalence of CWD exceeds 20% and even 50% in some deer populations in Wisconsin, Colorado, and Wyoming (Saunders et al. 2012). Prevalence rates documented in mule deer near Boulder, CO were 41% for adult males and 20% for adult females. Chronic wasting disease has been present in this herd since 1985 and has coincided with a 45% decline in mule deer abundance despite adequate habitat and no hunting (Miller et al. 2008). The South Converse Game Unit in Wyoming has prevalence rates exceeding 50% and that unit has seen an approximate 50% decline in mule deer populations (Wyoming Game and Fish Department 2012). While the majority of areas in North America have relatively low prevalence rates, only recently has CWD been detected in these areas. Because CWD spreads relatively slowly through wild populations and the environment (Conner et al. 2007), long-term implications on population stability and productivity are likely of greater concern than short-term population impacts.

Under many of the current scenarios where CWD occurs at low prevalence rates (< 10%) in relatively localized areas, hunter retention or displacement is not of great concern for those state agencies (Petchenik 2003, Gigliotti 2004, Miller 2004, Needham et al. 2007, Zimmer et al. 2012). However, an increase in prevalence rate or disease distribution, or findings indicating that CWD may be a human health risk, is expected to alter hunter behavior significantly (Needham et al. 2007, Vaske 2009, Zimmer 2012). Needham et al. (2007) found that casual hunters, those who are new to hunting or hunt occasionally, were most likely to quit hunting (61%). Loss of casual or new hunters over the long term would have serious implications on hunter recruitment and ultimately impacts on hunting license sales and conservation funding. Hunters seem to make decisions based on the severity of the potential risks. As risk increases, behaviors are likely to change. It is reasonable for TPWD to: 1) take proactive efforts to educate hunters about CWD using timely information, 2) develop plans that eliminate (if possible), or maintain CWD prevalence at low levels to limit its geographic extent, and 3) continue to monitor prevalence rates.

Potential economic implications from CWD include decreased hunting-license sales and displacement of hunters from CWD infected areas (J.M. Crum, West Virginia Division of Natural Resources, unpublished data). Obviously, this would impact rural towns and communities deriving economic benefit from big game hunting. Shifts in hunting locations could lead to reapportioning revenue to other areas of the state where CWD prevalence is not as high or where CWD has not been detected (Bishop 2004, Zimmer 2012).

Trust in state wildlife agencies among hunters and the public is an important factor in fostering support for management actions (Vaske et al. 2009). Lack of trust could increase perceptions of elevated risk, ultimately causing changes in behavior such as cessation of hunting or displacement of hunters to other areas. Many hunters are still concerned about potential health risks associated with CWD (Needham and Vaske 2008); although, CWD has not been found to cause human health concerns (World Health Organization 2000). Perceived risks by hunters may be in part a result of mixed messages communicated by state wildlife agencies; where on one hand the agency indicates there are no known human health hazards associated with CWD, but on the other hand advises hunters to take precautions when processing animals and perhaps advising hunters against consuming venison from animals in which CWD was subsequently detected (Needham and Vaske 2008). For the most part, hunters and the general public trust state wildlife agencies when it comes to managing CWD (Needham and Vaske 2008); however, specific management practices may be unpopular with hunters. Studies have indicated that hunters have been supportive of testing harvested animals for CWD and using hunters to reduce herds in CWD-endemic areas, while taking no action and allowing CWD to "run its natural course" were considered unacceptable.

## **DISEASE MANAGEMENT**

Many different strategies to combat CWD have been employed around the country with varying levels of success. For disease eradication, early detection of CWD infected animals is paramount. The time between introduction and detection of the disease is the most critical factor impacting an agency's ability to control and possibly eradicate the disease before it can become established. Once the environment becomes a reservoir for CWD prions, mitigating the spread of the disease may be the only reasonable course of action. Population reductions may help reduce the dispersion of infected deer to non-infected areas. Severe population reductions within a reasonable area around the index case would likely be most effective in scenarios where CWD appears to have been recently introduced and has not likely become established in the environment (Brown et al. 2005). However, severe culling efforts have been less popular in areas where CWD is well established, as hunters and the general public eventually grow weary from the intensive culling practices that continue indefinitely.

*Eradication Attempts* – New York discovered CWD in two different captive herds during routine CWD surveillance in 2005. They promptly initiated an intensive surveillance effort within 10 miles of the infected premises, and detected CWD in two free-ranging deer. It appears that removal of those two deer at least temporarily prevented further spread of CWD, as the

disease has not been detected in any additional deer despite intensive sampling through severe population reductions for the following five years (Brown et al. 2005). Intensive culling also appeared to work in a similar situation in Minnesota, where CWD was detected in a wild deer within three miles of an infected captive elk herd. Sharpshooters collected almost 1,200 deer within the “Disease Zone” during the winter of 2011, and hunters provided samples from 2,300 deer harvested during the following fall with no additional CWD detected. It seems that the introduction of CWD into free-ranging deer in Minnesota was detected very early and establishment of the disease was prevented.

Control Attempts – However, in areas of Wyoming, Colorado, and Wisconsin where CWD has been established for many years, eradication is an unrealistic management option. In these situations, major population reductions would not prevent animals from contracting CWD from the contaminated environment. In such situations, strategies to restrict or reduce the movements of free-ranging or captive cervids (and carcass parts) from CWD endemic areas may effectively reduce the spread of CWD. Some states partner with hunters to help monitor prevalence and distribution, as well as manage deer and elk populations to meet CWD-management objectives. Several states, including Wyoming, also employ other disease management strategies such as a ban on baiting, prohibiting unnatural (i.e., man-induced) movements of deer or carcasses, and general education efforts to encourage responsible actions by hunters and other stakeholders.

Outreach – A well designed outreach and education plan is a critical component of this CWD management plan to keep Texas hunters and citizenry informed and educated with the most recent information about CWD. Ensuring that current and accurate information is provided to hunters and other constituents is essential to facilitate understanding and compliance with management strategies designed to curtail disease expansion. Strategies designed to increase public awareness of CWD and the implications of CWD include:

- Network with natural resource professionals and encourage them to schedule CWD presentations with wildlife, hunting, or other conservation organizations and local civic groups.
- Develop and distribute information to relevant businesses (e.g., taxidermists, processors, feed stores) and local radio, newspaper, and television media. Information may be designed to focus on specific issues of importance to landowners, hunters, meat processors, taxidermists, veterinarians, rehabilitators, feed companies, feeder manufacturers, and operators of captive deer and elk facilities. This information should include:
  - basic history and understanding of CWD;
  - CWD distribution, and status of knowledge of the disease (e.g., epidemiology, transmission, clinical signs, population effects);
  - other CWD related issues and cautions (e.g., carcass handling, meat preparation and consumption, deer feeding); and
  - potential research and management actions.

- Develop and provide a website with a FAQ sheet and a process for submitting questions related to CWD.

## SURVEILLANCE EFFORTS

TPWD has received “Not Detected” test results for 26,556 CWD samples collected from wild deer populations from around the state since the 2002-03 hunting season (Table 1). The majority were collected from hunter-harvested deer, with 4,351 samples coming from potential trap sites associated with Trap, Transport, and Transplant (TTT) permits, and a portion being collected from deer killed by vehicles and deer exhibiting clinical symptoms. An additional 7,422 “Not Detected” test results have been submitted from permitted deer breeders striving to achieve or maintain Movement Qualified status, which requires “Not Detected” test results for at least 20% of all mortalities of breeder deer 16+ months of age. TPWD will continue with CWD surveillance; although, effort may be reduced in the absence of United States Department of Agriculture (USDA) funding that supported the program through August 2012. Continued surveillance is imperative in order to detect CWD soon after entry, which would provide multiple management options towards disease eradication before it becomes established within a population.

<b>Ecoregion</b>	<b>Wild Deer</b>	<b>Captive Deer</b>
Blackland Prairies	749	311
Cross Timbers and Prairies	3,105	1,017
Edwards Plateau	4,845	1,246
Gulf Prairies and Marshes	1,904	143
High Plains	175	88
Pineywoods	4,353	945
Post Oak Savannah	3,949	1,275
Rolling Plains	1,202	202
South Texas Plains	5,650	2,139
Trans Pecos, Mountains and Basins	624	56
<b>Grand Total</b>	<b>26,556</b>	<b>7,422</b>

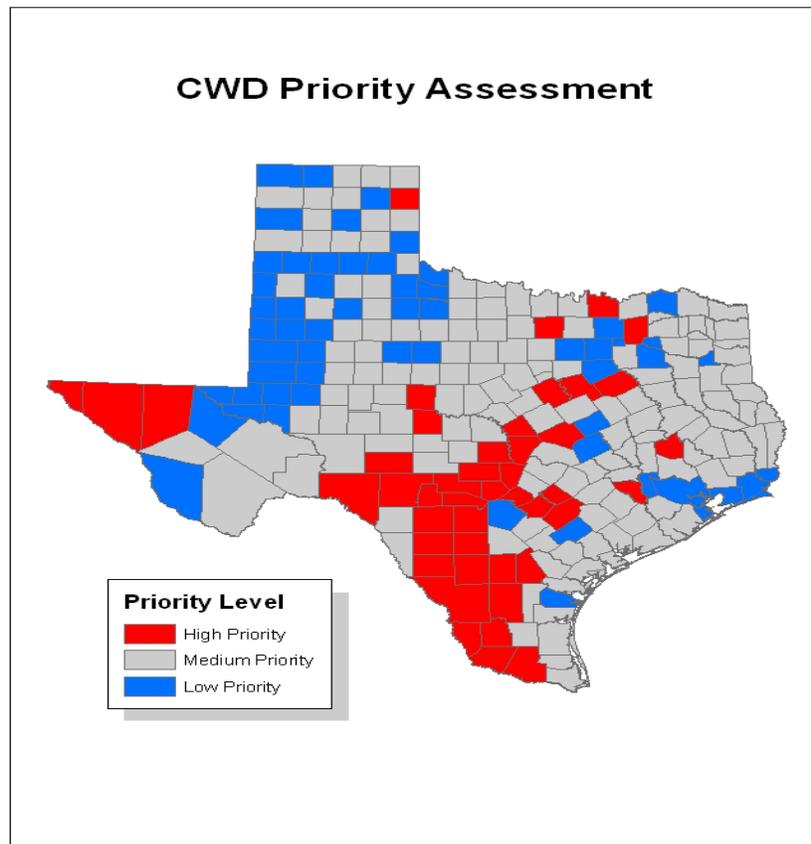
**Table 1.** CWD test results of "Not Detected" by ecoregion, 2002-2012.

The sampling strategy employed through the 2011-12 hunting season was designed to:

1. Collect and test CWD samples from hunter-killed and road-killed cervids (primarily white-tailed deer and mule deer) from seven of the ten ecological regions of Texas (as defined by Gould 1975), in effort to collect 459 samples per region annually. This quantity is statistically sufficient to detect CWD with 99% confidence if it exists in the ecoregion at a prevalence of at least 1%. Because of very low deer densities and deer harvest in some areas, the Blackland Prairies and Cross Timbers ecoregions are consolidated into a single monitoring unit, as are the High Plains and Trans Pecos ecoregions. TPWD has attempted to collect 175 samples from each of those monitoring units each year.

2. Collect samples from a broad geographic range, while maintaining concentrated efforts in Resource Management Units and ecoregions according to a priority matrix.

Sampling is stratified within each ecoregion based on a priority matrix that was designed in 2006. The priority matrix considers the following factors for each county in the state: estimated deer density, number of CWD samples taken, number of deer breeders, number of elk facilities/ranches, number of elk entries from out of state, and the proximity of a county to the Texas border. The data for each county are converted to a Z-score and the scores for each category are then ranked on a high, medium, or low priority. The priorities are ranked independently within each ecoregion. Figure 2 illustrates the 2006 ranking of each county within the priority matrix.



**Figure 2.** CWD priority assessment by county, 2006.

Additionally, since 2001, 1,048 white-tailed deer and two mule deer have been confiscated from 45 captive facilities and tested for both CWD and bovine tuberculosis. Those deer were either illegally imported into Texas, or were of unknown origin and were possessed illegally.

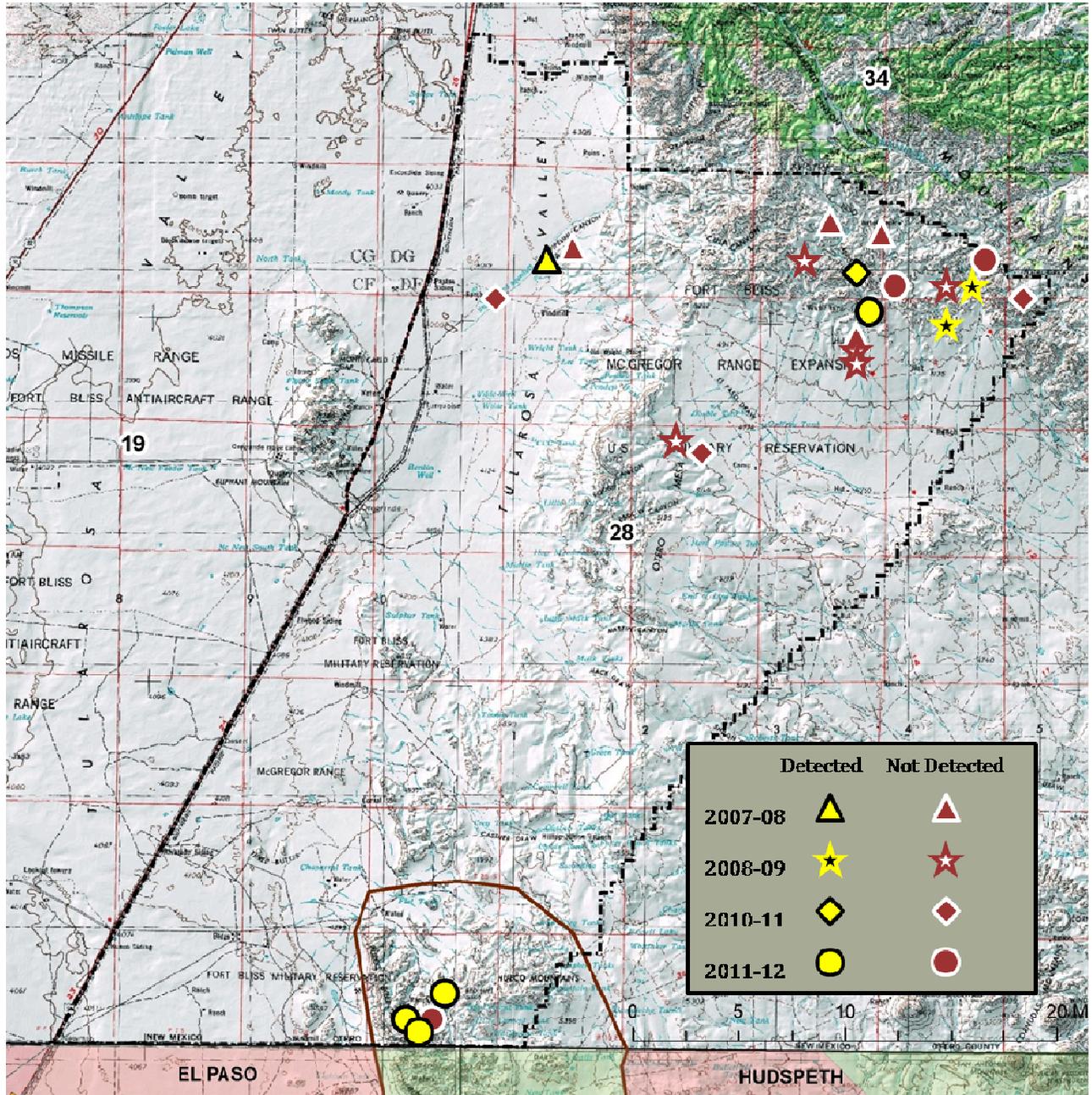
#### **RESPONSE PLAN - TRANS PECOS ECOREGION**

While CWD has not yet been detected in Texas, it is probable that CWD-infected deer have entered Texas since the disease was detected in three of four mule deer harvested by New

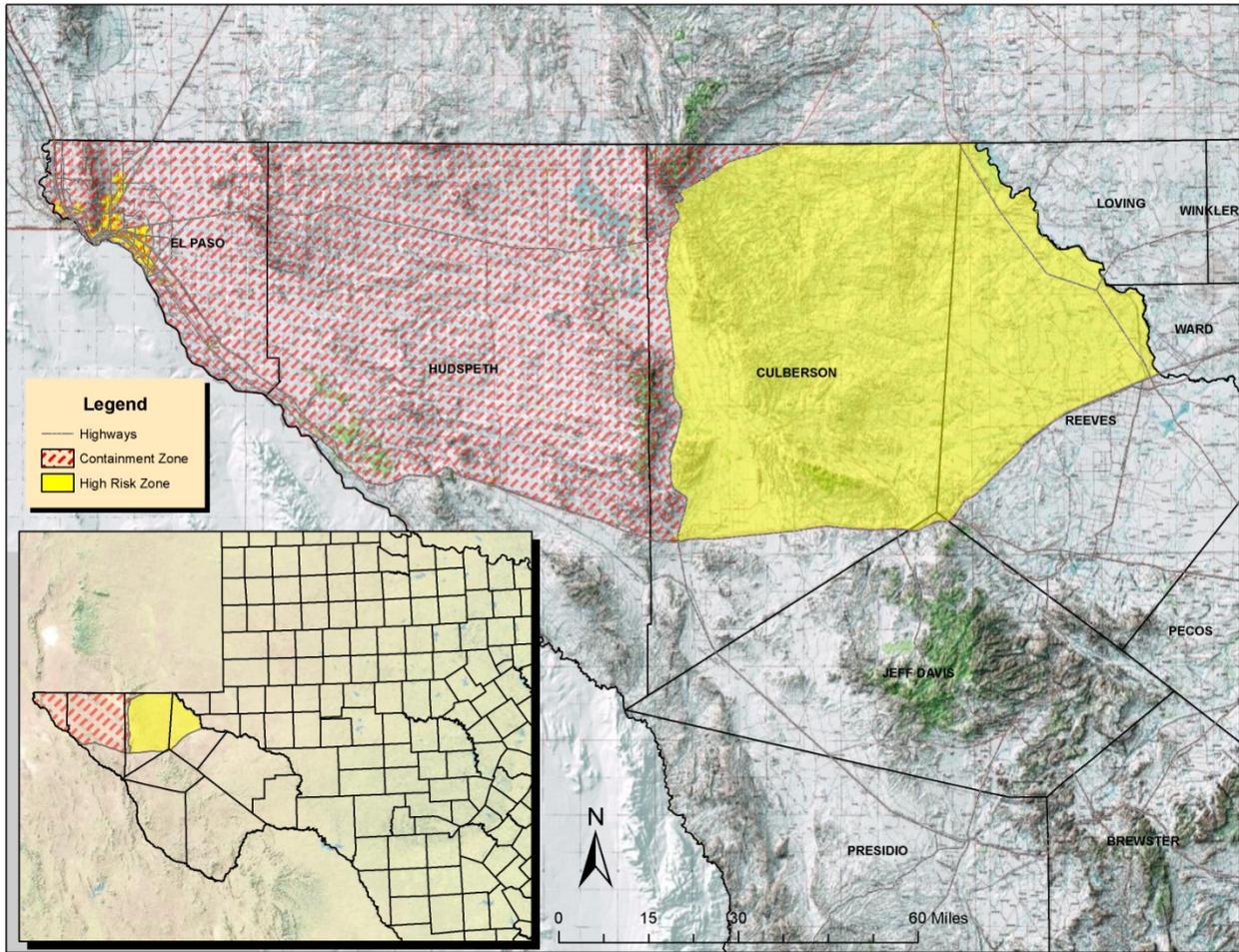
Mexico hunters within two miles north of Hudspeth County, Texas during the 2011-12 hunting season. In fact, CWD was detected in 8 of 23 deer harvested and sampled in the Hueco and Sacramento mountains of New Mexico since the 2007-08 hunting season (Figure 3). Few deer are harvested from the Texas side of the Hueco, Cornudas, and Guadalupe mountains each year, affecting TPWD's ability to conduct adequate CWD surveillance for that area. In order to: (1) minimize CWD risks to the wild and captive white-tailed deer, mule deer, and other susceptible species in Texas; (2) establish and maintain support for prudent CWD management with hunters, landowners, and other stakeholders; and (3) minimize direct and indirect impacts of CWD to hunting, hunting related economies, and conservation in Texas, it is important that we determine the geographic extent of the disease and the prevalence of the disease within the endemic zone. Obtaining that information will require cooperation with New Mexico Game and Fish Department.

Since neither wildlife nor diseases recognize political boundaries, management decisions should take biological boundaries into consideration. Texas is a large and diverse state, and the detection of CWD in a free-ranging deer population in northern Hudspeth County should not necessarily affect management decisions in the Pineywoods of east Texas, for example. Likewise, management decisions associated with the detection of CWD in the northern Hueco Mountains should not be delayed until the disease is detected within the state of Texas. Management decisions may vary depending on relative distance from locations where CWD has been detected. For example, management tools [e.g., Trap, Transport, and Transplant (TTT) Permit, Deer Management Permit (DMP), Deer Breeder Permits (DBP), etc.] should be restricted for operations in proximity to known CWD areas. Similarly, practices such as baiting and supplemental feeding, CWD-testing requirement for hunter-harvested deer, and carcass exports from a containment zone require careful consideration.

Since CWD was detected in three of four mule deer sampled in the Hueco Mountains and in one of three mule deer in the Sacramento Mountains during the 2011-12 hunting season, with no known recent deer imports, it may be reasonable to assume that CWD is well established in that population and in the environment, meaning eradication may be extremely difficult, if not impossible to attain. However, disease containment should be an attainable goal. A Containment Zone (CZ) and High Risk Zone (HRZ) were delineated with the intent to reasonably contain the disease within the existing deer population (Figure 4). Knowledge of deer population parameters and habitat types was instrumental in the delineation of the CZ and HRZ.



**Figure 3.** Approximate locations of CWD samples collected in Game Management Unit 28, New Mexico (2007-08 through 2011-12).



**Figure 4.** The recommended CWD Containment Zone (CZ) and High Risk Zone (HRZ), June 2012.

Additional surveillance may help justify future modifications to these zone delineations. The following management strategies are recommended for the respective risk zones, and may require Commission action:

- Containment Zone
  1. Increase sampling in an attempt to determine the geographic extent of the disease, and estimate disease prevalence where it occurs. Target sample size of 58 will be sufficient to detect CWD with 95% confidence if one in 20 deer are infected, for the population of inference (e.g., localized populations within the zone). Target sample size for the entire zone should be sufficient to detect CWD with 95% confidence if the disease exists at a prevalence of at least 1% throughout the zone (n=300). This sampling effort will likely span multiple years in this area of low deer density and light hunting pressure.
    - Harvest mule deer, elk, and other cervids in the Hueco, Cornudas, and Guadalupe mountains and surrounding areas including alfalfa fields in that

vicinity. TPWD staff will harvest animals only with permission and full cooperation of private landowners.

- Schedule routine highway surveillance, during which roadkills are sampled.
    - Solicit assistance from Texas Department of Transportation (TXDOT), Department of Public Safety (DPS), and/or county highway department and sheriff's office.
  - Establish mandatory check stations to sample hunter-harvested deer.
    - Recruit assistance from veterinarians, taxidermists, universities, etc.
2. Refuse Issuance of TTT or DMP permits.
  3. Prohibit the introduction of susceptible species into the wild. Introduction of susceptible species into herds actively participating in a CWD-herd-monitoring program with TAHC can be considered.
  4. Allow unnatural movement of captive white-tailed deer and all other susceptible cervids from herds that have achieved and maintained "5-year status" (i.e., TAHC Status of "Level C, Year 5" or higher).
  5. Any new Deer Breeder Permit shall permit zero (0) deer to be held within the permitted facility.
  6. Prohibit other management practices that allow confinement of wild deer.
- High Risk Zone
    1. Increase sampling in an attempt to detect CWD with 95% confidence if the disease exists within the zone at a prevalence of at least 1% (n=300). This sampling effort will likely span multiple years in this area of low deer density and light hunting pressure.
      - TPWD may harvest cervids in areas where other means of sample collection are inadequate, but only with permission and full cooperation of private landowners.
      - Schedule routine highway surveillance, during which roadkills are sampled.
        - Solicit assistance from TXDOT, DPS, and/or county highway department and sheriff's office.
      - Establish voluntary check stations to sample hunter-harvested deer.
        - Recruit assistance from veterinarians, taxidermists, universities, etc.
    2. Permitting TTT trap sites may be considered for sites on which at least 300 "Not Detected" CWD test results for white-tailed deer or mule deer (depending on the species to be detained under the permit) 16+ months of age have been submitted to TPWD. All test results must be for deer taken on the prospective trap site of contiguous land under one ownership. *This sample size is the*

*number of samples required to have 95% confidence that CWD would be detected in an infinite population where CWD prevalence is at least 1%.*

3. Permitting the confinement of wild deer may be considered for sites on which at least 300 “Not Detected” CWD test results for white-tailed deer or mule deer (depending on the species to be detained under the permit) 16+ months of age have been submitted to TPWD. All test results must be for deer taken on the prospective DMP site of contiguous land under one ownership. *This sample size is the number of samples required to have 95% confidence that CWD would be detected in an infinite population where CWD prevalence is at least 1%.*
4. Prohibit the introduction of susceptible species into the wild. Introduction of susceptible species into herds actively participating in a CWD-herd-monitoring program with TAHC can be considered.
5. Allow unnatural movement of captive white-tailed deer and all other susceptible cervids from herds that have achieved and maintained “5-year status” (i.e., TAHC Status of “Level C, Year 5” or higher).

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