Chronic Wasting Disease Risk Assessment for Mule Deer in Northeastern Montana, 2015

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Background and Justification:

Structured surveillance for chronic wasting disease (CWD) in Montana was initiated in 1998 and continued through 2011, ending with loss of federal funding in 2012. During that time period over 17,000 deer, elk and moose were tested for CWD. To date, the disease has not been detected in free-ranging wildlife in Montana. However, CWD continues to advance toward Montana's borders in areas where the disease exists in Alberta, Saskatchewan, North Dakota, South Dakota and Wyoming. In response to increasing likelihood of CWD entering the state, Montana Fish, Wildlife and Parks (MFWP) recently modified its CWD management plan for free-ranging wildlife. Part of that plan calls for renewed CWD surveillance in high risk areas of Montana. Russell et al. (2014) identified high risk areas for mule deer based on deer density and proximity to cases of CWD in adjacent states and provinces (Figure 1).

Two areas of concern were identified in northeastern Montana, one in the Sweet Grass Hills area (hunting district (HD) 401) and the other in the Milk River and Lodge Creek drainages (HD 600), (Figure 2). Recent information indicates that CWD was found in Alberta within 50 km of the Montana border, just north of these high risk deer populations. MFWP is in the process of preparing a CWD surveillance strategy for these hunting districts with the goal of detecting CWD at a 1% prevalence with 95% confidence. Surveillance will focus on mule deer and incorporate a weighted surveillance strategy based on demographic groups as outlined by Walsh and Miller (2010) and will follow the general guidelines proposed by Walsh and Otis (2012). Statewide surveillance will also be conducted testing symptomatic animals.

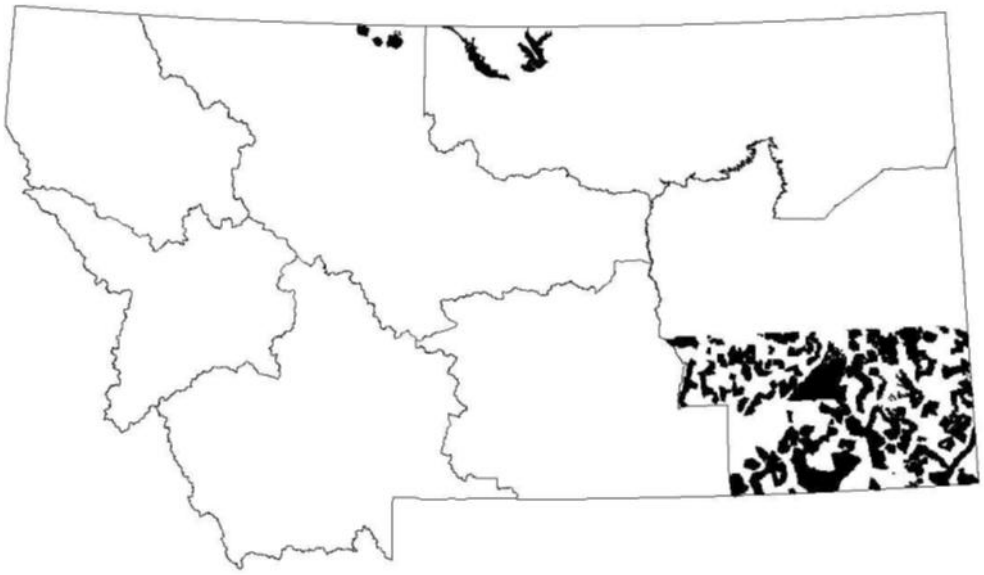
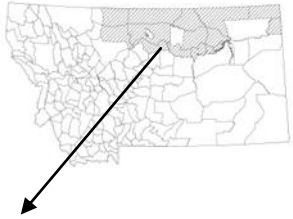


Figure 1. High risk areas for CWD as identified by Russell et al. (2014) based on predictions of winter habitat use and estimated mule deer densities.

Currently, there is little information regarding the movement and connectivity of mule deer populations in the high risk areas in Montana and CWD positive populations in Canada. Understanding mule deer movements in these areas will allow us to further quantify the risk of CWD moving into Montana, its ability to spread to other wildlife populations within the state, and refine both surveillance and management plans for the disease. Because CWD has yet to be detected in Montana, focusing efforts in high risk areas will provide the best chances for early detection and successful rapid response(s).

Many parcels of Service-owned land are within the high risk areas of northeastern Montana and others are situated in places where CWD could spread. Creedman Coulee and Lake Thibadeau NWRs are located in the high risk area of HD 600 and there are numerous Waterfowl Production Areas near the Alberta and Saskatchewan borders. A MFWP study of mule deer documented unexpectedly large movements of mule deer wintering near Glasgow to Saskatchewan in summer. Silbernagle (2010) documented mule deer in Saskatchewan using river valleys as movement corridors that could also serve as movement pathways for CWD.



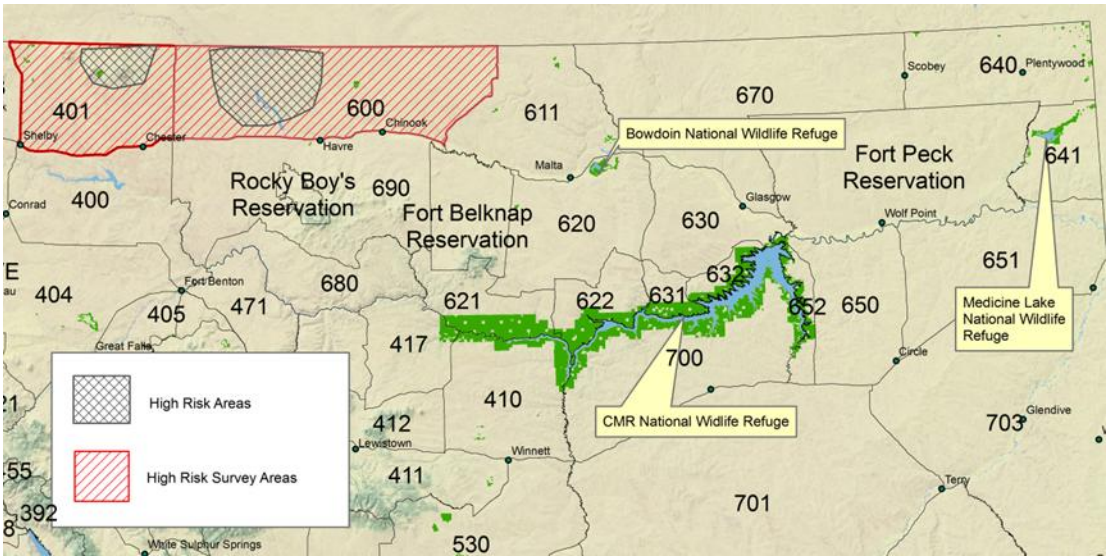


Figure 2. Areas identified as high risk for CWD occurrence by Russell et al. (2014) and the hunting districts proposed for mule deer research.

The high risk areas for mule deer in northeastern Montana are within the Milk River drainage that may serve as a corridor for CWD spread. Bowdoin NWR is located near the Milk River east of Malta. The Milk River flows into the Missouri River at the eastern boundary of the Charles M. Russell NWR (CMR) near Fort Peck, and Medicine Lake NWR is north of the Missouri River east of the CMR. Better understanding of mule deer movements and dispersal patterns, especially in high risk areas, will allow us to better predict risk and develop targeted surveillance efforts in areas where early detection of CWD is most likely. Early detection of the disease and an improved understanding of possible CWD movement pathways will provide for more effective and efficient CWD management actions in Montana.

Project Description:

The primary goals of this study are 1) to improve our understanding of CWD transmission risk between mule deer populations in northeastern Montana and Canada and 2) to predict the potential pathways for spread of the disease within northeastern Montana. Data obtained from this effort will be used to develop and improve risk assessment models directly related to the primary goals. Data collected will be used to improve future surveillance efforts and improve our ability to detect the disease in Montana. Results from this study will inform future decisions regarding both the management of wildlife species in areas where CWD is detected, and appropriate actions for control of CWD.

The study will also support MFWP surveillance efforts planned for high risk areas by providing samples from captured deer. Wildlife managers in Alberta have previously expressed an interest in conducting a similar study in that province. Although no commitment for a study has been made, initiation of a study in Montana will provide additional incentive for a project in Alberta, further improving our understanding of mule deer movement patterns and CWD transmission risk.

Objectives:

1) Improve our understanding of movement corridors and connectivity of mule deer populations in the high risk areas of northeastern Montana to CWD positive populations in Canada.
2) Increase our understanding of mule deer movement patterns and home range use in high CWD risk areas in northeastern Montana.
3) Improve and develop CWD risk assessment models to better quantify and predict transmission risk both into Montana and within Montana, once CWD is detected.
4) Increase sample sizes within the high risk area to enhance surveillance efforts with the goal of early detection of CWD.
5) Inform future surveillance efforts to improve probability of early detection of CWD in wildlife populations.
6) Inform management decisions aimed at reducing the spread of CWD to other populations.
7) Contribute to regional and statewide efforts to detect CWD in free-ranging wildlife.

Methods:

This proposal describes the accomplishments and results of the first phase of this study, and describes the second portion of the study, planned for winter 2015-16. The first portion of this study was completed in the winter of 2014-15 and focused on the high risk area in HD 600. Results from the first portion of this study are described in the next section.

The second phase of the study will focus on the high risk area in HD 401. We propose to contract with a specialized helicopter service in winter of 2015-16 to net-gun capture and radio collar up to 30 adult ($\geq$ 1 years of age) mule deer from the Sweet Grass Hills area (HD 401) in northeastern Montana, which has been identified as high risk for CWD movement into the state. Captured mule deer will be fitted with Global Positioning System (GPS) radio collars. The collars will be scheduled to obtain one fix per day with an expected life span of approximately 4 years. Locations will be obtained via a web service. Therefore, only occasional relocation flights will be required. We will focus on male mule deer as they tend to have larger home

ranges (Silbernagel 2010) and have higher prevalence of CWD in endemic areas (Walsh and Miller 2010). Rectal biopsies will be collected from captured deer and tested for evidence of PrP^{CWD} (Wild et al. 2002, Wolfe et al. 2007) to determine CWD status of collared individuals and to increase sample sizes for surveillance efforts within the high risk area. Biological sample collection and collaring of deer will be conducted by MFWP personnel. Thirty biopsies will be tested using IHC through the FWS CWD testing contract. Movement data will be used to delineate home ranges and elucidate possible connectivity to other mule deer populations in Canada and Montana. Data will be collected, stored, analyzed and reported by MFWP. Annual reports will be provided to cooperating refuges no later than September 30 of every year over the course of the project (December 2014-January 2018 based on expected collar life).

Results

In February, 2015, 25 mule deer were captured in HD 600 north of Chinook, MT. Twenty adult males and 5 adult females were captured via net gun by a contracted helicopter service. FWP staff sedated captured individuals, collected rectal biopsies, blood samples, fecal samples and a gene card. Each animal was fitted with a Lotek GPS Lifecycle collar and a metal ear tag. Five collars could not be deployed because they were too small to safely fit on adult female deer. These five collars will be resized and deployed in HD 401.

On 2/24/15, a mortality signal was received for a collar on an adult male. FWP staff retrieved the carcass for examination. The carcass was too autolyzed and scavenged to determine cause of death, but retropharyngeal lymph nodes were collected for a second CWD test of this animal. Results of this test are pending. The collar was retrieved and will be deployed in HD 401 in winter 2015-16.

Twenty-three of the 25 animals were tested for CWD by Colorado State University Diagnostic Lab. CWD was not detected in any samples. Two biopsies were insufficient to meet test requirements. Serologic testing and parasitology results are pending.

Please see the complete Progress Report provided with this proposal regarding completion of the first portion of this study. This Report was also uploaded into ServCat on 03/09/2015, ServCat ID number 44172.

Literature Cited:

Pybus, M.J. 2012. CWD program review 2012. Alberta Fish and Wildlife Division Publication No. I/626. ISBN Nos. 978-7-4601-3809-8. 38pp.

Russell, R.E., J.A. Gude, N.J. Anderson, J.R. Ramsey. 2014. Estimating relative risk of chronic wasting disease infection in mule deer across Montana. In review. 27pp.

Silbernagel, E. 2010. Factors affecting movement patterns of mule deer (Odocoileus hemionus) in southern Saskatchewan: implications for chronic wasting disease spread. M.SC. Thesis. University of Saskatchewan, Saskatoon, Canada.

Walsh, D.P. and M.W. Miller. 2010. Designing a weighted surveillance system for chronic wasting disease in Colorado. Journal of Wildlife Diseases. 46:118-135.

Walsh, D.P. and D.L. Otis. 2012. Disease surveillance: incorporating available information to enhance disease-detection efforts. Pp 11-23 *in* D.P. Walsh, editor. Enhanced surveillance strategies for detecting and monitoring chronic wasting disease in free-ranging cervids. U.S. Department of the Interior, U.S. Geological Survey Open File Report 2012-1036. 43pp. <http://pubs.usgs.gov/of/2012/1036>

Wild, M.A., T.R. Spraker, C.J. Sigurdson, K.L. O'Rourke, and M.W. Miller. 2002. Preclinical diagnosis of chronic wasting disease in captive mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*) using tonsillar biopsy. Journal of General Virology. 83:2629-2634.

Wolfe, L.L., T.R. Spraker, L. Gonza´ lez, M. P. Dagleish, T. M. Sirochman, J.C. Brown, M. Jeffrey, and M.W. Miller. 2007. PrP^{CWD} in rectal lymphoid tissue of deer (Odocoileus spp.). Journal of General Virology. 88:2078-2082.