

CWD Update 89

January 4, 2008

State and Provincial Updates

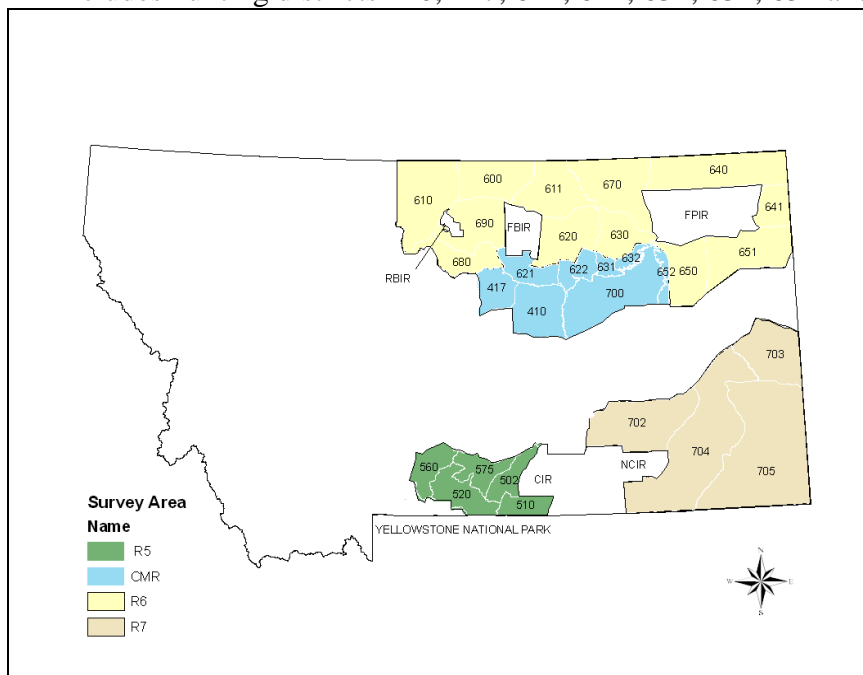
Montana:

Neil Anderson, Montana Fish, Wildlife and Parks, provides the following: As of December 11, 2007 a total of 1481 samples have been submitted for testing. Results from 177 elk, 1060 mule deer, 239 white-tailed deer and one moose have been received with no evidence of CWD being detected. Results are pending for the remaining 8 samples and surveillance efforts for symptomatic animals is ongoing. Table 1 indicates the number of samples collected within surveillance areas of eastern Montana. Hunter-harvested animals comprised the majority of animals tested (93.5%, n = 1381) followed by road-killed animals (5.5%, n = 81) and symptomatic animals (1.0%, n = 15). Montana FWP CWD information is available at: <http://fwp.mt.gov/hunting/chronicWD.html>.

	Region 5	Region 6*	Region 7*	CMR**	Other Areas	Total
Elk	3	10	2	159	3	177
Mule Deer	159	245	262	390	4	1060
White-tailed Deer	63	110	35	22	9	239
Moose	0	0	0	0	1	1
Total	225	365	299	571	17	1477

* Excludes hunting districts associated with the CMR (listed below).

** Includes hunting districts 410, 417, 621, 622, 631, 632, 652 and 700



Montana CWD survey area for the 2007 surveillance period (July 1, 2007- June 30, 2008).

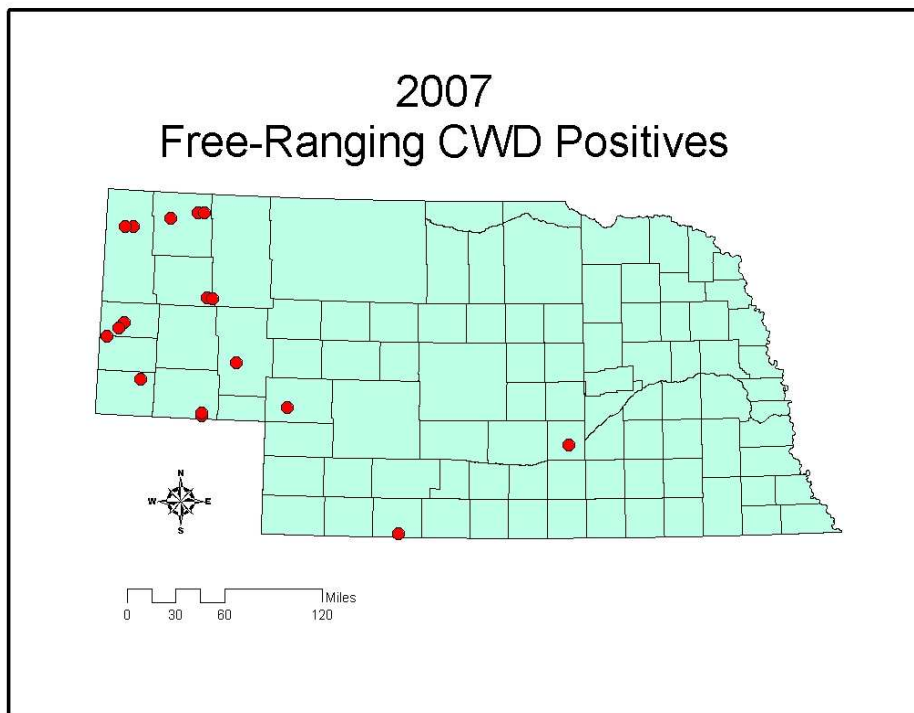
Nebraska:

Bruce Trindle, Nebraska Game and Parks Commission, provides the following: The Nebraska Game and Parks Commission tested more than 3,200 hunter-harvested deer for chronic wasting disease (CWD) during the firearm deer season that ended November 18. A total of 44 elk were also tested during the elk season. A total of 17 deer tested positive for the disease, and all but three of the positive tests were from deer harvested within the endemic area in the Panhandle. None of the elk tested positive. The three deer that tested positive outside the panhandle were all white-tailed deer. A firearm hunter in Keith County shot one of the afflicted deer a few miles west of Ogallala on the South Platte River. The second positive deer was shot in Red Willow County on the Beaver Creek drainage near the Kansas border, and the third positive was harvested in Hall County a few miles south of Alda. Biologists plan on sampling more deer from the areas where the disease has not previously been detected. Additional samples will help indicate the prevalence of CWD within those immediate harvest locations. According to Trindle, "The prevalence of CWD in deer tested over the past three years has been less than one percent, and the distribution of the disease has expanded very slowly."

The Nebraska Game and Parks Commission confirmed CWD in the state's deer population in 2000. To date there have been 133 free ranging deer that tested positive for CWD through the Commission's surveillance program which has sampled over 33,000 deer. CWD has never been detected in the Nebraska wild elk population. The Commission plans on continuing its diligent testing of Nebraska's deer herds for this disease.

Nebraska Game & Parks Commission CWD information is at:

<http://www.ngpc.state.ne.us/wildlife/guides/CWD/cwd.asp>.



South Dakota:

Steve Griffin, South Dakota Game, Fish and Parks, provides the following: In the South Dakota CWD Surveillance period of July 1, 2007 to December 31, 2007 a total of 2,342 samples were collected for CWD surveillance. Breakdown of the sampling is as follows:

475 elk sampled--473 NOT Positive-- 1 result pending (1 Positive Elk Found)

536 mule deer sampled--518 NOT Positive-- 13 results pending (5 Positive MD Found)

1,331 white-tailed deer--1,300 NOT Positive-- 23 results pending (8 Positive WT Found)

Below is a listing of the positive cervids that have been found in South Dakota during the surveillance period of July 1, 2007 to December 31, 2007.

1. White-tailed deer female from Unit BD3 in Pennington County. (Hunter Harvest)
2. Elk female from Unit H3B in Custer County. (Hunter Harvest)
3. White-tailed deer female from Unit BD3 in Pennington County. (Vehicle Kill)
4. White-tailed deer male from Rapid City in Pennington County. (Vehicle Kill)
5. White-tailed female from Unit 21A in Pennington County. (Hunter Harvest)
6. White-tailed male from Unit 27B in Fall River County. (Hunter Harvest)
7. Mule deer male from Unit 27A in Fall River County. (Hunter Harvest)
8. Mule deer female from Unit 27B in Fall River County. (Hunter Harvest)
9. White-tailed female from Unit CU1 in CSP in Custer County. (Hunter Harvest)
10. White-tailed male from Unit 27A in Fall River County. (Hunter Harvest)
11. White-tailed female from Unit 27B in Fall River County. (Hunter Harvest)
12. Mule deer male from Unit 27B in Fall River County. (Hunter Harvest)
13. Mule deer male from Unit 27A in Fall River County. (Hunter Harvest)
14. Mule deer female from Unit 27A in Fall River County. (Sick/Surveillance)

In Summary: South Dakota is reporting a total of 14 positive cervids (1 elk, 13 deer) in the testing period of July 1, 2007 to December 31, 2007. To date, South Dakota has found 72 cases of CWD (52 deer and 20 elk) in free ranging deer and elk since testing began in 1997. Wind Cave National Park accounts for 17 of these animals (9 elk, 8 deer). Three elk and 1 deer have been found in Custer State Park. A total of 17,188 wild deer and elk have been tested for CWD since 1997.

South Dakota Game, Fish, and Parks CWD information is at:

<http://www.sdgfp.info/Wildlife/hunting/BigGame/CWD.htm>.

West Virginia:

The following press release (shortened for inclusion on this update) was issued by the West Virginia Department of Natural Resources on December 17, 2007: Five Additional Deer Test Positive for Chronic Wasting Disease in Hampshire County, West Virginia. Preliminary test results have detected the Chronic Wasting Disease (CWD) agent in five hunter-harvested deer collected in Hampshire County during the 2007 deer firearms hunting season. "As part of our agency's ongoing and intensive CWD surveillance effort, samples were collected from 1,285 hunter-harvested deer brought to game checking stations in Hampshire County," noted Frank Jezioro, Director for the West Virginia Division of Natural Resources (DNR). The five CWD positive deer included one 2.5 year-old doe, two 2.5 year-old bucks, one 3.5 year-old buck, and one 4.5 year-old buck. Four of the five deer were harvested within the Hampshire County CWD Containment Area (i.e., that portion of Hampshire County located North of U.S. Route 50). The

Federal appropriations for CWD in FY2008:

The “Consolidated Appropriations Act, 2008” was signed into law on December 26, 2007.

Language from the USDA section of the “Joint Explanatory Statement”

(<http://www.rules.house.gov/110/text/omni/jes/jesdiva.pdf>) accompanying the act includes the following: “The amended bill provides \$17,807,000 for chronic wasting disease. Of this amount, \$1,299,000 is for surveillance in Wisconsin; \$183,000 is for surveillance in Utah; and \$38,000 is for surveillance in Colorado.”

Recent Publications

Species barriers for chronic wasting disease by *in vitro* conversion of prion protein

Li Li, Michael B. Coulthart, Aru Balachandran, Avi Chakrabarty and Neil R. Cashman
Biochemical and Biophysical Research Communications 364 (2007) 796–800.

Abstract: Chronic wasting disease (CWD) is a transmissible spongiform encephalopathy that can affect North American cervids (deer, elk, and moose). Using a novel *in vitro* conversion system based on incubation of prions with normal brain homogenates, we now report that PrP^{CWD} of elk can readily induce the conversion of normal cervid PrP (PrP^C) molecules to a protease-resistant form, but is less efficient in converting the PrP^C of other species, such as human, bovine, hamster, and mouse. However, when substrate brain homogenates are partially denatured by acidic conditions (pH 3.5), PrP^{CWD}-induced conversion can be greatly enhanced in all species. Our results demonstrate that PrP^C from cervids (including moose) can be efficiently converted to a protease-resistant form by incubation with elk CWD prions, presumably due to sequence and structural similarities between these species. Moreover, partial denaturation of substrate PrP^C can apparently overcome the structural barriers between more distant species
<http://www.sciencedirect.com/science/journal/0006291X>. (Volume 364, Issue 4, pages 796-800).

Elk with a long incubation prion disease phenotype have a unique PrP^d profile

Katherine I. O’Rourke, Terry R. Spraker, Dongyue Zhuanga, Justin J.Greenlee, Thomas E.Gidlewski and Amir N. Hamir
NeuroReport 18:1935-1938.

Abstract: The transmissible spongiform encephalopathies (TSEs) invariably result in fatal neurodegeneration and accumulation of PrP^d, an abnormal form of the host prion protein PrP^C, encoded by the PRNP gene. A naturally occurring polymorphism (methionine/valine) at PRNP codon 129 is associated with variation in relative disease susceptibility, incubation time, clinical presentation, neuropathology, and/or PrP^d biochemical characteristics in a range of human TSEs. A methionine/leucine polymorphism at the corresponding site in the Rocky Mountain elk PRNP gene is associated with variation in relative susceptibility and incubation time in the cervid TSE chronic wasting disease. We now report that elk lacking the predisposing 132-methionine allele develop chronic wasting disease after a long incubation period and display a novel PrP^d folding pattern.

<http://www.neuroreport.com/pt/re/neuroreport/abstract.00001756-200712030-00012.htm>

Direct Detection of Soil-Bound Prions

Sacha Genovesi, Liviana Leita, Paolo Sequi, Iginò Andrighetto, M. Catia Sorgato and Alessandro Bertoli
PLoS ONE 2(10): e1069. doi:10.1371/journal.pone.0001069.

Abstract: Scrapie and chronic wasting disease are contagious prion diseases affecting sheep and cervids, respectively. Studies have indicated that horizontal transmission is important in sustaining these epidemics, and that environmental contamination plays an important role in this. In the perspective of detecting prions in soil samples from the field by more direct methods than animal-based bioassays, we have developed a novel immuno-based approach that visualises *in situ* the major component (PrP^{Sc}) of prions sorbed onto agricultural soil particles. Importantly, the protocol needs no extraction of the protein from soil. Using a cell-based assay of infectivity, we also report that samples of agricultural soil, or quartz sand, acquire prion infectivity after exposure to whole brain homogenates from prion-infected mice. Our data provide further support to the notion that prion-exposed soils retain infectivity, as recently determined in Syrian hamsters intracerebrally or orally challenged with contaminated soils. The cell approach of the potential infectivity of contaminated soil is faster and cheaper than classical animal-based bioassays. Although it suffers from limitations, e.g. it can currently test only a few mouse prion strains, the cell model can nevertheless be applied in its present form to understand how soil composition influences infectivity, and to test prion-inactivating procedures.

Complete article is at:

<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0001069>

Prion Strain Discrimination Using Luminescent Conjugated Polymers

Christina J Sigurdson, K Peter R Nilsson, Simone Hornemann, Giuseppe Manco, Magdalini Polymenidou, Petra Schwarz, Mario Leclerc, Per Hammarstrom, Kurt Wuthrich and Adriano Aguzzi

Nature Methods 4, 1023 - 1030 (01 Dec 2007).

Abstract: The occurrence of multiple strains of prions may reflect conformational variability of PrP^{Sc}, a disease-associated, aggregated variant of the cellular prion protein, PrP^C. Here we used luminescent conjugated polymers (LCPs), which emit conformation-dependent fluorescence spectra, for characterizing prion strains. LCP reactivity and emission spectra of brain sections discriminated among four immunohistochemically indistinguishable, serially mouse-passaged prion strains derived from sheep scrapie, chronic wasting disease (CWD), bovine spongiform encephalopathy (BSE), and mouse-adapted Rocky Mountain Laboratory scrapie prions. Furthermore, using LCPs we differentiated between field isolates of BSE and bovine amyloidotic spongiform encephalopathy, and identified nonconophilic deposits in prion-infected deer and sheep. We found that fibrils with distinct morphologies generated from chemically identical recombinant PrP yielded unique LCP spectra, suggesting that spectral characteristic differences resulted from distinct supramolecular PrP structures. LCPs may help to detect structural differences among discrete protein aggregates and to link protein conformational features with disease phenotypes.

<http://www.nature.com/nmeth/journal/v4/n12/abs/nmeth1131.html>

Landscape Genetics and the Spatial Distribution of Chronic Wasting Disease

Julie A. Blanchong, Michael D. Samuel, Kim T. Scribner, Byron V. Weckworth,

Julia A. Langenberg and Kristine B. Filcek
Biology Letters doi:10.1098/rsbl.2007.0523.

Abstract: Predicting the spread of wildlife disease is critical for identifying populations at risk, targeting surveillance and designing proactive management programmes. We used a landscape genetics approach to identify landscape features that influenced gene flow and the distribution of chronic wasting disease (CWD) in Wisconsin white-tailed deer. CWD prevalence was negatively correlated with genetic differentiation of study area deer from deer in the area of disease origin (core-area). Genetic differentiation was greatest, and CWD prevalence lowest, in areas separated from the core-area by the Wisconsin River, indicating that this river reduced deer gene flow and probably disease spread. Features of the landscape that influence host dispersal and spatial patterns of disease can be identified based on host spatial genetic structure. Landscape genetics may be used to predict high-risk populations based on their genetic connection to infected populations and to target disease surveillance, control and preventative activities.

Complete article is available at:

<http://journals.royalsociety.org/content/44065255151h0704/fulltext.pdf>