

**IAFWA Report to the Fish and Wildlife Health Committee  
Wildlife Disease Issues of Interest to State Managers and Directors  
USGS National Wildlife Health Center, Madison, WI  
September 14, 2005    Leslie A. Dierauf, VMD**

*The following information is of a topical nature to provide wildlife management agencies and entities timely information on wildlife disease; many partners and collaborators are involved in gathering the information presented here.*

**Avian Influenza (AI)**

A particularly virulent strain of avian influenza has emerged in domestic poultry in Asia, including Siberia, Mongolia and Kazakstan -- the highly pathogenic avian influenza H5N1 (HPAI) is of concern because it: 1) poses a threat to domestic poultry, especially chickens, 2) has caused the death of at least 57 people as of August 2005, and 3) has caused mortality in at least 40 species of wild birds including ducks, geese, herons, and falcons in Asia.

HPAI has not been detected in North America, and there are no known cases of humans becoming infected with HPAI from wild birds. However, the increasing numbers of reports that HPAI is infecting wild birds has raised concerns that the virus might spread into new geographical regions via migratory waterfowl and shorebirds.

The U.S. Geological Survey National Wildlife Health Center (NWHC) and Alaska Science Center (ASC) are working with the U.S. Fish and Wildlife Service in Alaska to sample for HPAI in 2005. The week of September 12<sup>th</sup> there will be sampling of Steller's eiders at Izembek National Wildlife Refuge on the Alaska Peninsula, and Northern pintails from Susitna Flats, Cook Inlet near Anchorage. Samples have already been collected from black brant at Teshekpuk Lake on the North Slope near Barrow, Alaska. Cloacal swabs will be taken and tested for HPAI at NWHC. USGS has also begun selectively testing samples from wild bird mortality events for HPAI.

The Department of Homeland Security Policy Coordinating Committee has asked the Department of Interior (DOI) and U.S. Department of Agriculture (USDA) to work together to organize an interagency working group to develop a plan for early detection of highly pathogenic avian influenza (HPAI) introduction into North American birds, specifically in Alaska. Dr. Tom DeLiberto (APHIS WS) and Rick Kearney (USGS) cooperated in forming the working group, which consists of representatives of DOI, Health and Human Services (HHS), and USDA, the International Association of Fish and Wildlife Agencies (IAFWA), the Alaska Department of Game and Fish and the Southeast Cooperative Wildlife Disease Study.

USGS NWHC has distributed three Wildlife Health Bulletins on highly pathogenic avian influenza (HPAI). The most recent being *Interim Guidelines for the Protection of Persons Handling Wild Birds With Reference to Highly Pathogenic Avian Influenza H5N1*. The NWHC Web site at <http://www.nwhc.usgs.gov> has been updated to include additional information on HPAI, including: Wildlife Health Bulletins, HPAI Fact Sheet, maps, referenced reports of species that HPAI has been detected in, and links to other sites with HPAI information.

**Key Points to Remember about HPAI:**

- Primarily affecting domestic ducks, geese and chickens
- Humans infected with HPAI H5N1 are primarily those working with poultry

- Primarily detected in Asia – SE Asia and parts of Russia
- Movement seems to be west towards Europe
- Bird migration is only one of several possible routes for HPAI to be transported to new locations. Infected people, contaminated clothing, and infected poultry, smuggling of illegal pet birds, and poultry equipment and products, are more direct means to transport the virus.

**Plague Will highlight plague outbreak**

**Ecology of Plague in Black-Footed Ferret and Prairie Dog Populations:** This USGS study is directed toward gaining further understanding of the ecology of plague (*Yersinia pestis*) during periods between epizootic outbreaks of the disease in prairie dogs. If enzootic plague is depressing populations of small mammals, an ambitious effort to remove plague may allow increased population densities to develop over several years. This study will attempt to reduce the incidence of plague (or eliminate it) from test areas by reducing the population of fleas that transmit the disease. The initial objective of this study is to assess efficacy, longevity, and cost of flea control by using deltamethrin delivered as dust within burrows and to measure population responses of prairie dogs and associated mammals.

**Sylvatic Plague Detected in South Dakota Prairie Dogs:** In mid-August an outbreak of sylvatic plague was confirmed in black-tailed prairie dogs in South Dakota about 30 miles from the Conata Basin, The Conata Basin is one of the primary sites for the endangered black-footed ferret reintroduction effort. Up until this point, South Dakota was considered to be plague free. One prairie dog tested plague positive in analysis conducted by South Dakota State University and a different prairie dog was confirmed by CDC. USGS scientists from the Fort Collins Science Center (FORT) and the National Wildlife Health Center have been working with the U.S. Fish and Wildlife Service, South Dakota, National Park Service, U.S. Department of Agriculture to develop and implement controls efforts.

USGS has obtained enough injectable plague vaccine from the Department of Defense to vaccinate 50-100 of the black-footed-ferrets. USGS has been testing vaccines against sylvatic plague in prairie dogs and black-footed ferrets. The injectable vaccine has been shown to be successful in preventing plague experimentally in endangered black-footed ferrets, and was deployed this past year in a field experiment in collaboration with the Fish and Wildlife Service. NWHC be preparing the vaccine and shipping the second week in September. Trapping efforts will begin in September and continue through October. The animals will be closely monitored for survival and the results we obtain will be added to our ongoing vaccine efficacy trial in field-released ferrets.

FORT has been providing training personnel and equipment, and assisting on the ground in control efforts. They plan to dust the prairie dog holes in a 5000 acre area. This effort is expected to take approximately two months to complete. There are also public health concerns on the Pineridge, Rosebud and Cheyenne River Reservations.

**West Nile Virus**  
**Humans**

As of August 30, 2005, current tallies for WNV for 2005 from CDC are:

# of states reporting WNV =	47 (all continental states except WA)
# of human cases reported =	689
# of states reporting human cases =	31
# deaths =	16

CDC summary of WNV activity in the U.S. (as of August 30, 2005): Of the 689 reported human cases of WNV, 16 deaths have been recorded. The states with highest WNV activity and number of human cases are California (268), South Dakota (110), Louisiana (52), Illinois (46), and Nebraska (29).

Of the 689 human cases, 275 (40 percent) were reported as West Nile meningitis or encephalitis (neuroinvasive disease), 384 (56 percent) were reported as West Nile fever (milder disease), and 30 (4 percent) were clinically unspecified at this time. Please refer to state health department Web sites for further details regarding state case totals.

## **West Nile Virus**

### **Wildlife**

With regard to surveillance, since 1999, only AK and HI have not yet detected WNV activity in their states. Washington State remains free of human cases – an earlier report of a human case was proven to be an error.

With regard to wildlife, WNV has now been detected in over 300 avian species, 35 mammalian and 2 reptilian species. Collaborative efforts with state/federal/public health/academic/wildlife agency interdisciplinary activities are ongoing. There is Department of Defense WNV surveillance in 13 states (AK, AZ, GA, IL, KY, MD, MO, NC, NJ, NY, PA, VA, WA), and extensive state surveillance in FL, NJ, WA, and NC. The NWHC tested a total of 355 birds so far this calendar year.

In addition, as of July 15, 2005, 281 dead corvids and 96 other dead birds with WNV infection have been reported from 16 states during 2005. WNV infections have been reported in horses in 11 states. WNV seroconversions have been reported in 40 sentinel chicken flocks in 5 states (Arizona, Arkansas, California, Florida, and Minnesota). A total of 439 WNV-positive mosquito pools have been reported in 13 states.

The U.S. Army Center for Health Promotion and Preventive Medicine West, the Western Regional Veterinary Command (WRVC), the U.S. Army Medical Research Institute of Infectious Disease, the Department of Defense Global Emerging Infections System, and the WRMC continue to meet the challenge of controlling the spread of WNV in the U.S.

A total of 175,942 female mosquitoes placed in 19,407 pools were submitted by DOD collaborators for testing by USACHPPM Public Health Laboratories in 2004. Of the pools tested, 117 were positive for WNV. These positive WNV mosquito pools were collected from 28 military installations in AZ, CO, DC, GA, MD, NC, ND, NM, NY, TX, VA and WI.

## **WNV-RELATED RESEARCH**

**Measuring the Effects of West Nile Virus on American Kestrel Populations in Colorado:** USGS scientists are monitoring kestrels and burrowing owls to assess the annual inception and level of occurrence of WNV among these birds, and compare survival and reproduction parameters between infected and non-infected individuals within the population. In 2004, the USGS began an investigation to assess the prevalence and potential effects of WNV on wild American kestrel populations along the Front Range of Colorado. A total of 116 individual adults and 262 young were sampled throughout the breeding season for a total of 747 WNV samples. While the WNV was not detected in serum or oral swabs, 97.4 percent of the blood sampled adults captured in this study tested positive for WNV antibodies, suggesting prior exposure to the disease.

**West Nile Virus and Hawaiian Birds:** The introduced vector of avian malaria, the Southern House Mosquito *Culex quinquefasciatus*, is widely distributed throughout the islands and is a recognized enzootic vector of West Nile Virus. With a well distributed vector in place and large populations of native birds, West Nile Virus has the potential to sweep through Hawaii with devastating impact to native birds and human health. USGS scientists have conducted studies on the relative vector competence of Hawaiian *Culex quinquefasciatus* for West Nile virus and the level of susceptibility of Hawaii Amakihi to West Nile Virus as a model for evaluating its potential impact on threatened and endangered forest birds. Preliminary analysis suggests about 30% mortality in challenged birds but necropsies revealed little gross pathology. Most birds underwent a transient drop in food consumption which may be a significant factor in wild bird survival.

**Risk Assessment for West Nile Virus in Hawaii:** USGS is collaborating with Hawaii Department of Public Health (HIDOH) to conduct serosurveys (serologic tests on populations) for flaviviruses in Hawaii in an attempt to detect WNV as early as possible if it is transported to the islands from the mainland by air. Scientists have collected blood samples from 405 birds including java sparrows, laceneck doves, house finches, house sparrows, zebra doves, and red-crested cardinals from the Honolulu International Airport. This wild bird surveillance supplements mosquito surveillance and abatement activities being done by HIDOH. USGS is also conducting laboratory studies, in partnership with the State of Hawaii and the USFWS, to determine the suitability of non-native Hawaiian birds, such as java sparrows, laceneck doves and house finches, to serve as amplifying, reservoir hosts or sentinels for WNV in Hawaii. Another laboratory study is involved with investigating the susceptibility of native honeycreepers to WNV by using the amakihi.

**West Nile Virus and Other Avian Pathogens in Greater Sage-grouse:** West Nile virus (WNV) has been diagnosed as a cause of death in wild greater sage-grouse and experimental studies have shown that this species is highly susceptible to the virus. This field and laboratory study is designed to develop a disease monitoring and research strategy to support adaptive management of sagebrush ecosystems. In addition to evaluating the prevalence of exposure to WNV and other avian pathogens in greater sage-grouse, other vertebrate species within sagebrush habitat are being sampled to determine if they are affected by WNV and what role they may play in the transmission of the disease within this habitat. Field research has focused on greater sage-grouse and other potential vertebrate hosts of WNV at study sites in Nevada, Oregon, and California. To date, WNV has been found in 1 of 13 greater sage-grouse carcasses examined, but samples from live greater sage-grouse and alternate hosts (passerines and feral horses) have not shown evidence of exposure to the virus. Greater sage-grouse exhibit a high frequency of infection by certain blood parasites, but lower frequencies of intestinal helminths. Laboratory studies indicate that chukar partridge may serve as an amplifying host for WNV and may be a useful sentinel for the virus in the field. This project is being carried out in cooperation with individuals in other federal and state agencies and universities.

### **White Pelican Investigation**

The USGS's National Wildlife Health Center (NWHC) and Northern Prairie Research Center (NPRC) are working cooperatively with three National Wildlife Refuges and State Waterfowl Management Areas on a two year study titled: *Impact of West Nile virus on white pelican colonies in northern Montana, North Dakota and South Dakota*. The field portion of the second year is nearing completion. Juvenile pelicans in all three states were banded, monitored and 146 dead birds were collected for necropsy examinations and West Nile virus testing. At the NWHC, we have completed examinations and testing on 127 pelicans

to date. West Nile virus has been isolated and confirmed by RT-PCR in a significant number of the juvenile pelicans from each state. Microscopic examination of tissues will be completed this fall. In 2004, the study colony in North Dakota was not used due to abandonment of the colony by the breeding adults. In 2005 the adults did return and breed.

## **Chronic Wasting Disease (CWD)**

### **CWD Update**

Chronic Wasting Disease was identified in New York State in the spring of 2005. Initially detected in two captive cervid facilities in Oneida County, intensive surveillance subsequently documented the disease in two free-ranging white-tailed deer. The New York Department of Environmental Conservation (DEC) has responded with a series of regulatory changes, public education efforts, and enhanced surveillance. Details are available from DEC at <http://www.dec.state.ny.us>. CWD has also recently been documented in free-ranging deer in both Alberta and West Virginia. In Alberta, approximately 30 km southeast of Oyen, a free-ranging mule deer has tested positive for CWD. This location is very near the Saskatchewan border and is adjacent to CWD-affected regions of Saskatchewan. In West Virginia, a road-killed white-tailed deer in Hampshire County has tested positive for CWD. Hampshire County is located in the northeastern portion of West Virginia, immediately adjacent to both Virginia and Maryland, and very close to Pennsylvania. The West Virginia Department of Natural Resources (DNR) will immediately be conducting intensive surveillance (~125 deer within a 5-mile radius of the index case) in an initial effort to determine the distribution of the disease before the beginning of hunting seasons. Additional information is available from the West Virginia DNR at <http://www.wvdnr.gov>.

### **CWD Data Clearinghouse**

Through the collaboration of the National Biological Information Infrastructure (NBII), the NBII Wildlife Disease Information Node (WDIN), and the USGS National Wildlife Health Center (NWHC), a prototype for the Chronic Wasting Disease Data Clearinghouse (CWDDC) was completed and tested. Guided by the feedback and comments received, partners were ready for the next phase to create a working version. Production responsibilities were shifted over to the WDIN team. The database architecture was restructured and rescaled for flexibility. This robust and extensible version will enable the system to expand and accommodate other wildlife disease data.

The CWDDC project continues to work with established partners: the Nebraska Game and Parks Commission, the Tennessee Wildlife Resources Agency, the Wisconsin Department of Natural Resources, and the Maryland Department of Natural Resources; however, the CWDDC also gained new partners. Three additional agencies agreed to share their CWD testing result data, Idaho Fish and Game, Oregon Department of Fish and Wildlife, and the Washington Department of Fish and Wildlife. The Native American Fish and Wildlife Society is working closely with WDIN to design customized, Web-based data entry forms for managing their CWD data. This version was demonstrated at the 2<sup>nd</sup> International CWD Symposium in July 2005, and is scheduled to be demonstrated again to partners and other wildlife health community members in early September. This working version will be available for use for the 2005 hunting season.

### **Research Update**

#### ***CWD-Positive Tissue Bank***

In collaboration with the University of Wyoming and the Wyoming Game and Fish Department, the USGS National Wildlife Health Center is developing a CWD-positive tissue bank. Thirty six wild-caught

cervids (12 elk, 12 mule deer, and 12 white-tailed deer) were orally inoculated with CWD at the Tom Thorne/Beth Williams Wildlife Research Center (formerly the Sybille Wildlife Research Center) in Wheatland, Wyoming. Animals will be euthanized and tissues harvested at 6-month intervals, post-inoculation. Harvested tissues will be made available for reviewed research projects and for testing/validation of CWD assays. The initial tissue harvest was completed in June 2005.

### ***Statistical Epidemiological Theory and Analysis***

In a new research project, NWHC researchers will collaborate with the Colorado Division of Wildlife, the University of South Carolina, and the Wildlife Conservation Society to apply modern statistical epidemiological theory to long-term CWD data sets collected by the state of Colorado. In this effort to rapidly advance our understanding of the factors driving the dynamics of CWD epidemics in space and time, researchers will draw upon analytical theory from the fields of epidemiology and spatial analysis to develop new approaches to analyze geo-referenced CWD data. The goal of the analysis is to determine the extent to which CWD distribution can be explained by landscape and geographic features.

### ***Comparative Study of Two CWD Epidemics***

In this new research project, NWHC will collaborate with the Wisconsin Department of Natural Resources, the Illinois Department of Natural Resources, the Wisconsin Cooperative Wildlife Research Unit and the Illinois Natural History survey in a long-term study to identify biological and environmental factors associated with CWD epidemics in Wisconsin and Illinois, and to evaluate the effectiveness of ongoing management efforts in these two states. Two relatively distinct disease foci, with very different land cover/land-use patterns, have been documented in this region (southwestern Wisconsin and southeastern Wisconsin/northern Illinois). This situation offers a unique opportunity to perform powerful comparative analyses of these epidemics.

### ***Susceptibility of Small Mammals to CWD***

A variety of small mammals scavenge deer carcasses and could therefore potentially come in contact with infectious material. It is critical to understand whether CWD can jump the species barrier and become established in other wildlife species. Significant progress has been made in establishing a breeding colony of voles for CWD-susceptibility testing. Live trapped animals are successfully breeding in captivity, and numbers will soon be adequate for CWD challenge.

### ***Strain Identification Assay for CWD in Cervids:***

This ongoing project will attempt to identify and monitor strains of CWD in wild and captive cervids and establish a strain identification assay for CWD. Preliminary results indicate that a western blot fingerprinting technique may be useful for identifying specific CWD strains. Collaborators for this project are Dr. Richard Bessen at Montana State University and Dr. Tonie Rocke at the National Wildlife Health Center.

### **Common Tern Mortalities in Massachusetts and Maine**

In summer of 2005, a research project, funded by the National Science Foundation, was launched by scientists from the USGS National Wildlife Health Center and the University of Wisconsin (Madison), in an attempt to prove the hypothesis that a novel virus is causing immune system impairment and mortality in fledgling common and arctic terns in the Northeastern U.S. Field work was conducted at Seal and Eastern Egg Rock Islands in Maine, and on South Monomoy Island in Massachusetts. Sick and apparently healthy tern chicks and fledglings were collected systematically at each site throughout the breeding season. Field necropsies were conducted at the time of collection and tissues were saved for virologic,

bacteriologic, and histopathologic examination. Results so far are very preliminary. Fledgling common and arctic terns exhibiting clinical signs similar to those seen in 2004 were again observed in Maine and a second salmonellosis outbreak with high mortality occurred in fledgling common terns at Monomoy National Wildlife Refuge this summer. Tissues from birds collected this summer will be analyzed this fall for the presence of viral infection and for attempted elucidation of viral pathogenesis.