



**Report to the Western Association of Fish and Wildlife Agencies
from the
USGS National Wildlife Health Center
December 2008**

The following information is of a topical nature for wildlife management agencies and entities; many partners and collaborators are involved in gathering and researching the information herein.

Field Investigation Team Summaries: June to December 2008

Laysan Duck Mortality Due to Avian Botulism Type C (HI)

A recent die-off of Laysan ducks occurred at Midway Atoll National Wildlife Refuge during August 2008. Laysan ducks are a federally listed endangered species. About 136 ducks are estimated to have died out of a population of 400 on 3 separate islands in the atoll. Preliminary diagnosis of avian botulism was made in the field by USGS scientists and confirmed in samples sent to the National Wildlife Health Center. Avian botulism is a common cause of mortality in waterbirds during the summer during high temperatures when wetlands have low oxygen conditions. The U.S. Fish and Wildlife Service managed the outbreak by draining a catchment basin and refilling it with fresh water. The Laysan duck population on Midway Atoll was introduced in 2004 from Laysan Island where there are an estimated 600 ducks in an isolated population. Midway Atoll National Wildlife Refuge is home to nearly 2 million birds, including the Laysan albatross and 16 other seabird species.

Avian Botulism Outbreak in Waterfowl in North Dakota (ND)

Dry conditions during July and August 2008 contributed to outbreaks of avian botulism at Turtle Lake II and III Waterfowl Development Area (WDA) in central North Dakota. Over 700 birds were affected; mallards, American coot, and American wigeon were the primary species involved in the die-off. The event lasted for about a month with U.S. Fish and Wildlife Service performing regular collections of carcasses to prevent secondary botulism poisoning from contaminated remains. Avian botulism was first diagnosed in the area in 1993 and periodic outbreaks have occurred. Turtle Lakes WDA are part of the Audubon Wetland Management District, a complex of 8 National Wildlife Refuges dedicated to the production of migratory birds and public use.

Virulent Newcastle Disease responsible for cormorant mortalities in multiple Minnesota counties (MN)

Summer mortality events beginning in July 2008 involving double-crested cormorants were determined to be the result of virulent Newcastle Disease (vND) in 8 MN counties. In addition, individual cases of Newcastle Disease in cormorants were reported to NWHC from WI, MI, CT and MO. Mortality counts ranged from less than 10 birds up to 1,200 birds at the various sites and often included other species such as ring-billed gulls and American white pelicans. While the virus was isolated from several pelicans and a common loon in this epizootic, characteristic brain lesions were not observed. At one MN site, infections of West Nile virus, salmonellosis, and intestinal parasitism contributed to the large number of pelican mortalities (1,900 estimated) where the overall avian mortality was estimated to be 2,500 birds. This was the second consecutive year that vND occurred at two of the MN sites. On-site incineration of carcasses and restricted access to affected areas were instituted to reduce spread of the virus. Canada also experienced increased cormorant mortality associated with avian paramyxovirus-1, the agent of Newcastle Disease, this summer around Lakes Ontario, Erie and Huron. Virulent Newcastle Disease

outbreaks in cormorants have occurred intermittently throughout the United States since 1992. No known domestic poultry was involved with this summer's outbreak.

Salt Toxicosis Results in Duck Mortality at White Lake, North Dakota (ND)

Birds with excessive salt encrusted on their feathers were discovered by USFWS personnel at White Lake in Mountrail County, North Dakota in late June. Affected birds were alert and moving their wings, but were unable to fly. Mortality was estimated at 110 birds with Mallards, Gadwall, Eared Grebes, Ruddy Ducks, Franklin's Gulls, Green-winged and Blue-winged Teal, Northern Shovelers, American Wigeons, and American Coots affected. Shorebirds in the area did not appear to be impacted. White Lake is a large, alkaline lake with a former salt mine nearby. Euthanized and freshly dead birds had brain sodium levels between 1,370-1,700 ppm, wet weight. Salt acts as a preservative against carcass decomposition so older mortalities (possibly >1-year-old) have been observed at this lake. In 1985, a die-off occurred at this same location after cold temperatures made fresh water from other lakes unavailable.¹ Salt toxicosis also has occurred during summer months in hypersaline lakes where birds were affected in less than 5 hours of entering the water.²

1. Windingstad, R.M., F. X. Karch, R.K. Stroud, and M. R. Smith. 1987. Salt toxicosis in waterfowl in North Dakota. *Journal of Wildlife Diseases* 23:443-446.

2. Stolley, D.S. and C.U. Meteyer. 2004. Peracute sodium toxicity in free-ranging Black-bellied whistling ducks. *Journal of Wildlife Diseases* 40:571-574.

Exotic Parasite Discovered in Mississippi River (WI, MN)

In August 2008, NWHC and MN DNR scientists discovered *Leyogonimus polyoon*, an exotic parasitic trematode affecting American coot, in exotic faucet snails collected from the Rabbit Flowage of Lake Winnibigoshish, in MN. The discovery was made when scientists were conducting snail and parasite surveys. Coot mortalities attributed to *L. polyoon* were detected at this new location in November. In June 2007, scientists at the USGS National Wildlife Health Center (NWHC) discovered *Leyogonimus polyoon*, an exotic parasitic trematode affecting American coot, in exotic faucet snails collected from the Upper Mississippi National Wildlife and Fish Refuge, near La Crosse, Wisconsin. Based on data from 2004–2006 surveys, *L. polyoon* was not present in the Upper Mississippi River until 2007. The American coot is the only natural definitive host thus far reported to be susceptible to infection in North America. Coot fall victim to the parasite by feeding on infected insect larvae. The snail and parasite are native to Eastern Europe. In the United States, coot and aquatic insects are widely distributed, so control of the parasite will focus on controlling the snail.

Expansion of Plague-Affected Area into Black-Footed Ferret Territory in Conata Basin (SD)

Sylvatic plague reached the Conata Basin area of South Dakota earlier this July. The Conata Basin is a portion of the Buffalo Gap National Grasslands, south of Badlands National Park, where the last remaining plague-free area existed for black-footed ferret reintroduction. Prior estimates indicated the plague had spread to about 10,000 of the 25,000 acres of black-tailed prairie dog habitat. Prairie dogs carry fleas infected with *Yersinia pestis*, the bacteria that causes plague. Black-footed ferrets primarily feed on prairie dogs. Ferret populations in Conata Basin were estimated around 300 animals (roughly half of the free-ranging black-footed ferret population), but the plague outbreak may have killed as many as 100. Fall spotlight surveys are underway to obtain more accurate estimates. US Fish and Wildlife Service and partners plan to dust 11,000 acres with insecticide and continue to vaccinate ferrets against plague. As a new management option, the National Wildlife Health Center and other partners are working to develop a plague vaccine that can be delivered via oral bait for prairie dogs and ferrets to protect against plague-associated mortalities.

Lesser Sandhill Crane Mortality During Migration (OK)

109 lesser sandhill cranes were found dead in northcentral Oklahoma in early November. Carcasses examined at the National Wildlife Health Center had extensive blunt trauma to the body, including fractured sternum, pelvis, vertebrae, and ribs. There were no powerlines nearby or evidence of collision with a stationary object. There was a storm event the evening prior to the cranes being found.

Recurring Aspergillosis in Cackling Geese in Oregon (OR)

Staats Lake in west-central Oregon experienced a recurrence of a die-off of Cackling geese from aspergillosis. Mortality events occurred at this location last year and in Marion County for over a decade. Cackling geese appear to be the only species affected. Aspergillosis is caused by inhalation of fungal spores of *Aspergillus fumigatus*, which is often associated with birds feeding on waste grain.

Mortality Due to Ranavirus in Long-Toed Salamanders at Lassen Volcanic National Park (CA)

Ranavirus is responsible for mortality in many species of amphibians and is suspected to be a source for many declining populations. A mortality event involving up to 100 larval long-toed salamanders (*Ambystoma macrodactylum*) occurred at Lassen Volcanic National Park at the end of September. There had been recorded die-offs in this species in various lakes around the Park since 2000. Sick and dead specimens were observed with red lesions on their ventral skin and collected for testing at NWHC. This is the first time a ranavirus has been identified in long-toed salamanders.

Enteritis in American Crows USA (multiple states)

Since late December 2007, deaths among American crows associated with a reovirus-like virus have been observed in five states: New York, Massachusetts, Iowa, Ohio, and New Jersey. Low mortality in crows with enteritis and isolation of reo-like viruses has been diagnosed at the NWHC nearly annually since 2001. Other states with a history of crow enteritis mortality include KY, MD, WA, WI, KS, PA, MO and the District of Columbia. Most recently, a crow from OR appeared to have similar lesions. Although pathogenicity tests have not yet been performed, it is speculated that the virus replicates in the intestines, and is transmitted through the feces. The disease seems more common at winter roost sites, although it has also been seen sporadically in summer and fall.

White-Nose Syndrome in Bats (MA, NY, VT, NH, CT)

Since the winter of 2006/2007, thousands of bats have died at more than 30 caves and mines in the northeastern U.S. The USGS and U.S. Fish and Wildlife Service are working with the New York State Departments of Environmental Conservation and Public Health, Vermont Fish and Wildlife Department, and Cornell University to study bats exhibiting a condition now referred to as white-nosed syndrome (WNS).

WNS-affected hibernating bats often present with visually striking white fungal growth on their muzzles, ears, and/or wing membranes. Histopathological analyses confirmed that 90 percent (105 of 117) of necropsied bats submitted from WNS-positive sites exhibited an associated cutaneous fungal infection. Direct microscopy and culture analyses demonstrated that the skin of WNS-affected bats is colonized by a cold-loving fungus with unique spore morphology. A growing body of circumstantial evidence supports an association between WNS and fungal infection of the skin. Given the hundreds of thousands of hibernating bats found throughout the WNS-affected region, this condition represents an unprecedented threat to bats of the northeastern United States and potentially beyond.

The USGS National Wildlife Health Center issued a Wildlife Health Bulletin in April 2008 advising wildlife and conservation officials throughout the U.S. to be on the lookout for WNS-affected bats and to report suspected cases of the disease.

http://www.nwhc.usgs.gov/publications/wildlife_health_bulletins/WHB_08_01.jsp

Another Wildlife Health Bulletin was issued after description of the fungus was described and published in *Science* in October 2008:

http://www.nwhc.usgs.gov/publications/wildlife_health_bulletins/WHB08-03WNS.pdf

H5N1 Highly Pathogenic Avian Influenza

The Federal, State and Tribal partnership formed to develop and implement the National Interagency Early Detection System for Highly Pathogenic H5N1 Avian Influenza in Wild Migratory Birds has continued into the third year of surveillance. Birds have been tested from all 50 states and 6 freely-associated states and territories. While the surveillance focused on waterfowl, shorebirds, gulls and terns, a total of 284 species were sampled. So far, during the 2008 sampling year (April 1, 2008 – March 31, 2009) cooperating agencies collected and analyzed over 64,000 wild bird samples and the highly pathogenic avian influenza H5N1 virus was **not** detected. Since April 1, 2008, over 21,000 birds have been sampled for avian influenza at the NWHC. Of these, 460 have tested positive for avian influenza based on molecular screening; 34 were H5 positive and 2 were H5N1 (none of these were highly pathogenic).

Up-to-date information on the U.S. wild bird surveillance program including the number of birds tested and the wide geographic distribution of samples collected, and information on the low path H5N1 virus isolates detected, can be seen at: <http://wildlifedisease.nhii.gov/ai/>.

Surveillance activities for highly pathogenic H5N1 avian influenza are also occurring in Canada. Current information on results of their sampling and testing can be found at the website of the Canadian Cooperative Wildlife Health Center: <http://wildlife1usask.ca/en/aiv/index.php>

Modeling the Dynamics of Avian Influenza in Wild Birds and Potential Transmission with Domestic Fowl

The objective of this project is to develop a simplified epidemiological model of AI transmission among wild birds and wetland ecosystems and to consider potential routes of transmission between wild and domestic birds. Currently little is known about the many factors that likely influence the dynamics of AI in wild birds. This project will focus on simple models that incorporate rates of virus shedding, infection, and recovery for wild bird populations; input and turnover of virus in wetland systems; and alternative routes of transmission between wild and domestic birds (e.g., common wetlands, use of contaminated water, exposure via field contamination). Model development, complexity, and initial parameter estimation will be based on information or data obtained from published and unpublished reports and on knowledge provided by wildlife disease experts.

Chronic Wasting Disease (CWD) Research

Susceptibility of various small rodent species to CWD

The susceptibility of various small rodent species to CWD has and is being examined by intra-cerebral challenge studies at the NWHC. Meadow voles (*Microtus pennsylvanicus*) are very susceptible to intra-cerebral CWD challenge, with 100% penetrance and a median post-challenge survival time of 270 days.

The incubation period shortens significantly upon second passage. Deer mice (*Peromyscus maniculatus*) and white-footed mice (*P. leucopus*) have proven to be relatively resistant to the disease, although resistance is not complete. Red-backed voles (*Myodes gapperi*) challenge studies are still underway, but appear to be no more susceptible than meadow voles. Experiments are being initiated with the University of Wisconsin to further explore the implications of voles' susceptibility to CWD, especially the likelihood of voles acquiring infections via natural routes. Among other things, we will be examining whether soil minerals potentiate the oral infectivity of CWD in voles, as has been demonstrated by Aiken and Pederson for a prion/hamster model system.

Statistical spatial-temporal epidemiological models of CWD

In conjunction with the Wisconsin Department of Natural Resources and other partners, the NWHC has been developing statistical spatial-temporal epidemiological models of CWD epidemics in free-ranging cervids. Substantial progress has been made in developing new statistical "backcasting" models based on dynamic process theory that allow the estimation of the rates at which the disease is growing and spreading. The analyses have discovered that substantial fine-scale spatial heterogeneity exists in infectivity, and spatial patterns in infectivity seem quite stable over time.

Persistence of CWD prions and factors affecting their degradation

An environmental reservoir of infectivity contributes to the natural transmission of chronic wasting disease (CWD) and a growing number of studies suggest that soil serves to preserve infectivity and potentially spread disease. A general paucity in the understanding of the fate of CWD agent (prions) in the environment as well as the mechanism of environmental CWD transmission limits disease management and control efforts. The goal of this study is to test the hypothesis that the fate of prions in the environment is affected by soil, plants and microbes. Results from these studies can provide insight into the mechanisms of CWD transmission in the environment and potentially provide methods for bioremediation of prion-contaminated soil.

CWD Symposium

The Third International CWD Symposium will be held in July 2009 in Park City, Utah. The Utah Division of Wildlife Resources has graciously agreed to host the meeting. Conference dates, details and a call for papers are forthcoming.

The NWHC thanks all the state, federal and tribal agencies who worked with us the past year. We are at your service to provide technical support, field investigation assistance and diagnostic capabilities as your needs dictate.

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