



# SCWDS BRIEFS

A Quarterly Newsletter from the  
**Southeastern Cooperative Wildlife Disease Study**  
**College of Veterinary Medicine**

**The University of Georgia**  
**Athens, Georgia 30602**

Phone (706) 542-1741

FAX (706) 542-5865

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## Passerine Birds and Avian Influenza Virus

The involvement of wild birds in the epidemiology of H5N1 highly pathogenic avian influenza A viruses (AIV) in Europe and Asia sparked an unprecedented number of research investigations into the potential role of wild bird populations as reservoirs of these and other influenza viruses. These studies greatly increased the number and diversity of avian species that have been surveyed for AIV and enhanced our understanding of the role of wild birds, especially passerines, in AIV epidemiology.

Although it was well known that some passerine species could be infected experimentally with AIV, or infected when associated with outbreaks in poultry, there was little evidence to indicate that they serve as reservoirs for these viruses under natural conditions. The reported detection of AIV in passerines in some recent studies challenged this paradigm, and it was suggested that additional research was warranted to better define the role of passerine birds as potential AIV hosts. To investigate this apparent inconsistency with the historical literature, we reviewed existing publications reporting results from AIV surveillance of passerines, and we conducted prospective virologic and serologic surveillance of North American passerines for antibodies against these viruses. Results from this study recently were published in the *Journal of Wildlife Diseases* (50(4): 792-809) in a paper entitled "Are passerine birds reservoirs for influenza A viruses?" by Slusher, et al.

From 1975-2013, AIV testing results from 829 species of passerines and other terrestrial birds were published in 60 papers. Based on virus isolation, 119 positive results were reported from 25,438 (0.47%) birds. However, most of these positive samples (92 of 119) came from birds sampled in settings where contact or potential

contact with AIV-infected poultry was likely or could not be discounted. Only 27 isolates were reported from birds sampled in more natural environments; all isolates were reported from only two studies, only one AIV subtype was reported from each study, and the viruses were not further characterized. Most of the recently reported positive results were associated with 19 molecular-based studies in which 248 of 29,258 (0.85%) birds tested positive by reverse transcriptase polymerase chain reaction (RT-PCR). Confirmation of these positive RT-PCR results by virus isolation was attempted in nine of these studies. Of the combined 74 RT-PCR-positive samples reported in these nine studies, virus was isolated from only nine birds, and all were from a single study in which the birds potentially were associated with highly pathogenic H5N1 Eurasian AIV-infected poultry in China.

In our prospective study, 3,868 serum samples and 900 swab samples were collected and tested from 102 terrestrial wild bird species in Delaware, Georgia, Minnesota, and New Jersey. The Minnesota and New Jersey sites were sampled during August/September and May when AIV prevalence is highest in waterfowl and shorebirds, respectively; and the presence of AIV at the time of passerine sample collection was confirmed by virus isolation from waterfowl and shorebirds. Antibodies to the nucleoprotein of AIV were detected in only 4 of 3,868 (0.1%) passerine birds, and all positive birds were from Minnesota. Of the 900 swab samples tested by virus isolation or matrix real-time RT-PCR, none tested positive for AIV.

In reviewing the current literature, there are two recurring problems that made the interpretation of reported data difficult. Background material on study areas and sampling techniques often provided little or no information related to

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potential exposure to domestic sources of influenza viruses. In addition, many results, especially from molecular based tests, often were not supported by confirmatory tests, such as sequencing or virus isolation. Despite these problems, collective results support the historic literature: Although passerines and terrestrial wild birds occasionally are infected with AIVs and may play a limited role in their epidemiology, this appears to occur primarily when there is an association with infected domestic poultry or other hosts. There is no evidence suggesting they are natural reservoirs of AIV. (Prepared by Joe Slusher and Dave Stallknecht)

### **More CWD News**

On October 3, 2014, the Iowa Department of Agriculture and Land Stewardship (IDALS) reported the Chronic Wasting Disease (CWD) test results from a depopulated breeding herd of captive white-tailed deer. Portions of the press release follow; the entire document is available at <http://www.iowaagriculture.gov/newsAndEvents.asp>.

*“The IDALS today announced that the test results from the depopulation of a quarantined captive deer herd in north-central Iowa showed that 284 of the 356 deer, or 79.8% of the herd, tested positive for Chronic Wasting Disease (CWD). The owners of the quarantined herd have entered into a fence maintenance agreement with the Iowa Department of Agriculture and Land Stewardship, which requires the owners to maintain the 8 foot perimeter fence around the herd premises for five years after the depopulation was complete and the premises had been cleaned and disinfected...”*

*“On July 18, 2012, USDA Animal and Plant Health Inspection Service’s (APHIS) National Veterinary Services Lab in Ames, IA, confirmed that a male white tail deer harvested from a hunting preserve in southeast IA was positive for CWD. An investigation revealed that this animal had just been introduced into the hunting preserve from the above-referenced captive deer herd in north-central Iowa... The captive deer herd was immediately quarantined to prevent the spread of CWD. The herd has remained in quarantine until its depopulation on August 25 to 27, 2014...”*

*“The IDALS operates a voluntary CWD program for farms that sell live animals. Currently 145 Iowa farms participate in the voluntary program. The above-referenced captive deer facility left the voluntary CWD program prior to the discovery of the disease as they had stopped selling live animals. All deer harvested in a hunting preserve must be tested for CWD.”*

A similarly high prevalence (79%) of CWD infection was found in 2006 in a captive white-tailed deer herd in Wisconsin that was depopulated four years after the first detection of CWD in the herd. The Wisconsin Department of Natural Resources subsequently purchased that facility in order to maintain the perimeter fences and prevent exposure of wild deer to the contaminated site.

On October 23, 2014, the Ohio Departments of Agriculture (ODA) and Natural Resources (ODNR) announced that the state’s first case of CWD had been confirmed in a white-tailed buck from a captive deer facility in Holmes County. According to a joint press release issued by the agencies, *“the preserve had been under quarantine since April 24, 2014, and was subject to intensive monitoring and sampling protocols because of a known connection to a captive deer operation in Pennsylvania that tested positive for CWD earlier this year. The quarantine will remain enforced until the state is satisfied that disease transference can no longer occur...”*

*“The state has quarantined 43 captive deer operations in Ohio since April 15, 2014, for receiving approximately 125 deer from operations in Pennsylvania that later tested positive for CWD. Twenty-two of those quarantines were lifted after negative CWD test results were confirmed in 53 of the suspect animals from Pennsylvania. The ODA will continue to enforce quarantine restrictions on 21 operations... until the department is satisfied that the threat of disease transference has passed...”*

*“In response to this positive finding, the ODNR Division of Wildlife will increase sampling efforts in the wild deer population within six miles of the hunting preserve from which the CWD-positive deer came, as well as near the other captive operations that are under quarantine. Those samples will include high-risk animals, such as*

*those killed on roads or exhibiting neurological symptoms, as well as hunter-harvested deer in the area.”*

In late November 2014, the ODA and ODNR issued a press release urging hunters in Holmes County to assist in minimizing the risk of CWD because captive animals from the CWD-affected facility had been killed outside the fenced enclosure. According to the release, *“Successful hunters in Holmes County are encouraged to have their deer processed at a facility in the county and that the carcass remains within the county as well. At this time, no cases of CWD have been discovered in Ohio’s wild deer herd, and hunters should continue to enjoy deer hunting this season. These additional precautions follow a positive test for CWD earlier this fall at a facility in Holmes County. Recently, six captive deer have been harvested outside of deer facilities in the county, two of which have been traced back to the affected facility. Neither of those deer have tested positive for CWD.”* The press releases can be found at <http://www.agri.ohio.gov/apps/odanews/ODANews.aspx>.

The ODA also issued a *Notice of Order of Destruction of Animals* in late November to the owner of the CWD-affected captive herd in Holmes County because, *“...all deer present at the preserve have been exposed to a dangerously contagious and infectious disease and therefore endanger the health or well-being of animal populations in the state of Ohio.”* The Notice also indicated that the animals to be destroyed must be appraised prior to destruction, and the owner may request a hearing if he disagrees with the ODA’s findings. In the Notice of Order, the ODA additionally stated the owner of the affected herd had violated the quarantine in effect at one of his breeding facilities by introducing two deer to the premises without the written consent of ODA. The Notice also stated, *“Further, you have chronically violated record keeping requirements at farms you own, operate or house deer,”* because of failure to notify ODA within seven days of the acquisition of deer at three of his facilities.

Chronic wasting disease has been found in 66 captive deer and elk herds in the United States since 1997. Since 2012, CWD has been detected

in some captive herds that had achieved certification of being at low risk for having CWD after more than five years of monitoring. In response to CWD detection in certified herds, the U.S. Animal Health Association (USAHA) has requested the complete results of epidemiological investigations of the captive and free-ranging cervid herds in which CWD has been found in the United States. The USAHA resolution, which was adopted at its 117<sup>th</sup> annual meeting in October, follows: *“The USAHA requests the APHIS – Veterinary Services to work cooperatively with the states to assemble, analyze, summarize, and make available at the USAHA meeting in 2015, all pertinent information from epidemiological investigations of CWD in farmed and free-ranging cervid herds. Specific information requested includes, but is not limited to: prevalence of CWD in positive herds; demography of positive and negative animals in infected herds; results from all tissues that were tested; proximity of affected herds to wild and/or farmed cervid herds with CWD; duration of monitoring prior to detection of the first case, including numbers of animals in the herd, numbers tested and numbers not tested; results of trace-forward and trace-back investigations; and all other pertinent data that will enhance risk assessment of CWD in farmed cervids and identification of effective mitigation measures.”* (Prepared by John Fischer)

### **Deer Smugglers Sentenced in Mississippi**

On October 30, 2014, the U.S. Attorney’s Office in the Southern District of Mississippi announced that three men had been sentenced for violating the Lacey Act by illegally importing white-tailed deer into Mississippi. The Lacey Act, which was signed into law by President McKinley in 1900, is a federal conservation law that prohibits trade in wildlife, fish, and plants that have been illegally taken, possessed, transported, or sold.

According to a press release issued by the U.S. Attorney’s office, *“in the latter part of 2012, the U.S. Fish and Wildlife Service (FWS) and the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP) initiated an investigation into the illegal importation of live white-tailed deer into the state of Mississippi. A Slidell, Louisiana corporation, along with three Slidell residents, conspired to import the deer onto their property in*

*Lamar and Pearl River counties, MS. From 2009-2012, at least nine shipments of deer, with a value exceeding \$100,000, were released onto their property."*

One man, who previously pled guilty to felony deer importation, was sentenced to nine months in the custody of the Bureau of Prisons and two years of supervised release. His father, who previously pled guilty to a misdemeanor offense of importing deer, was sentenced to three years of probation, six months home confinement, and a \$10,000 fine. The third man, who also previously pled guilty to misdemeanor deer importation, was sentenced to three years of probation, nine months home confinement, and was fined \$10,000. Their closely held corporation pled guilty to a felony and was sentenced to five years of probation. In addition, all defendants were ordered to pay \$1.5 Million in restitution to the MDWFP, and each defendant forfeited all interest in the deer, a truck, and breeding facility.

United States Attorney Gregory K. Davis stated. *"This office will continue to work closely with the FWS and MDWFP to enforce the Lacey Act. It is my hope that the \$1.5 Million restitution payment will help mitigate any damage done by these defendants and send a strong message that the illegal importation of white-tailed deer into our State will not be tolerated."* (Prepared by John Fischer)

### **Orbivirus Gap Analysis Report**

In response to a resolution adopted in 2012 by the United States Animal Health Association, the United States Department of Agriculture (USDA) and the U.S. Department of the Interior (DOI) organized a workshop to perform a gap analysis on the current knowledge of Orbiviruses. The workshop was conducted at the USDA's Arthropod-Borne Animal Diseases Research Unit in Manhattan, Kansas, May 14-16, 2013.

Disease caused by bluetongue viruses (BTV) and epizootic hemorrhagic disease viruses (EHDV) are of growing concern to livestock producers and wildlife managers in North America due to: 1) the introduction and apparent establishment of new serotypes; 2) increased reports of BTV and EHDV spillover and clinical disease in cattle and; 3) the increased spread of both diseases to new

geographical areas. The gap analysis was attended by a diverse panel of international experts, including industry stakeholders, SCWDS and other university researchers, wildlife resource professionals, and federal and state research and regulatory agency representatives. The objectives of this meeting were to assess available scientific information and countermeasures to effectively control and mitigate the impact of these viruses.

Gaps in our understanding of these viruses and the diseases that they cause included unknowns related to hosts, agents, vectors, and the environmental drivers of orbiviral disease epidemiology. For example, host susceptibility at the species and individual animal levels is not fully understood. Transmission mechanisms within these host populations also need to be better defined. Likewise, the factors that determine the virulence of these viruses in ungulate hosts are not known.

Regarding the insect vectors, basic knowledge related to distribution and the ability to transmit the virus is incomplete, as is information relative to vector biology, such as determination of breeding sites and adult dispersal. Currently there is limited information on the environmental factors that drive vector species composition and populations, and the occurrence and distribution of these diseases cannot be predicted based on environmental factors.

Gaps also were identified relating to surveillance and the control of these diseases, especially regarding vaccination and vector control options. Currently, surveillance for these viruses is restricted to passive strategies based on diagnostic submissions to various laboratories, and there needs to be better coordination and consistency of methodology among the labs. There are two important vaccine issues that need to be addressed; the safety of modified-live vaccines and the development of better vaccines that reduce infection and transmission, as well as disease. Current vector control techniques are limited, but there are options to be explored.

Overall, we have a long-way to go before we fully understand the epidemiology of these diseases and perhaps a longer way to go before we can predict, prevent, or control them. It is hoped that

the interest generated from the recent BTV and EHDV outbreaks that led to this gap analysis will allow science and management to catch up with these diseases.

The entire report is available at the following link: <http://www.ars.usda.gov/SP2UserFiles/Program/103/OrbivirusGapAnalyWkshpReportMay2014.pdf>. (Prepared by David Stallknecht)

## SCWDS News

Dr. Heather Fenton, SCWDS pathologist and Chief of the SCWDS Diagnostic Section, successfully completed the board certification examination of the American College of Veterinary Pathologists. The exam was given in early September in Ames, Iowa. The American College of Veterinary Pathologists (ACVP) is an organization of board-certified scientists that has been setting the standard for veterinary pathology since 1949. *“By promoting excellence in veterinary pathology, ACVP improves and protects human and animal health for the betterment of society.”* We heartily congratulate Heather on this great accomplishment.

Dr. Betsy Elsmo, anatomic pathology resident and SCWDS diagnostician, was the recipient of the Student Travel Scholarship awarded jointly by the American Association of Wildlife Veterinarians and the United States Animal Health Association (USAHA). This funding supported Betsy’s travel to the Annual Meeting of the USAHA and American Association of Veterinary Laboratory Diagnosticians in Kansas City, MO, where she presented a poster entitled “Acute, necrotizing, hemorrhagic, interstitial pneumonia and suppurative myocarditis associated with *Bartonella henselae* in a Florida panther (*Puma concolor coryi*).”

Dr. Jennifer Ballard, a SCWDS doctoral student and diagnostician, received the Best Student Presentation Award at the recent International Sea Duck Conference. The meeting was held in September in Reykjavik, Iceland, and was co-hosted by the University of Iceland and the Sea Duck Joint Venture. Dr. Ballard received the award for two papers she presented from her dissertation research: “Patterns of Wellfleet Bay Virus Seroprevalence in Common Eiders” and

“Experimental Inoculation of the Common Eider with Wellfleet Bay Virus.”

Dr. Ballard also recently was accepted to the Federal Pathways Internship Program with the U.S. Fish and Wildlife Service (FWS). As an intern with the FWS Refuges Division, she will be providing diagnostic support and veterinary services for wildlife disease issues and research within the National Wildlife Refuges System. After completing her PhD degree, Dr. Ballard will have the opportunity to expand on this work as a veterinarian in the FWS Wildlife Health Office in Fort Collins, Colorado.

SCWDS parasitologist Dr. Michael Yabsley recently was elected to the board of the Companion Animal Parasite Council (CAPC). The Companion Animal Parasite Council (CAPC) is an independent council of veterinarians, veterinary parasitologists, and other animal health care professionals established to create guidelines for the optimal control of internal and external parasites that threaten the health of pets and people. Dr. Yabsley obtained his PhD in Parasitology at SCWDS under the direction of Dr. Randy Davidson in 2004, and currently is an Associate Professor of Wildlife Diseases with a joint appointment at SCWDS and the Warnell School of Forestry and Natural Resources, University of Georgia. He teaches and conducts research on parasitology, wildlife diseases, and wildlife techniques. Dr. Yabsley is a past-president of the Southeastern Society of Parasitologists and the Georgia Chapter of the Wildlife Society. In 2012, he was elected as a Fellow of the Royal Entomology Society.

SCWDS Director Dr. John Fischer received the Tom Thorne and Beth Williams Memorial Award from the Wildlife Disease Association and the American Association of Wildlife Veterinarians during their 2014 annual conference in New Mexico. The award is presented in acknowledgement of either an exemplary contribution or achievement combining wildlife disease research with wildlife management policy implementation, or elucidating particularly significant problems in wildlife health. Dr. Fischer was recognized for *“his understanding of wildlife and the complexities of policy, management and governance, along with his gift as a great communicator, which has fueled his success in*

*influencing important management-based actions and policy for wildlife.”* Tom Thorne and Beth Williams had unequalled careers in wildlife health until their untimely deaths in December 2004. They were very dear friends of SCWDS, they continue to inspire us, and we miss them.

The new position of SCWDS Public Service Assistant/Wildlife Veterinarian has been filled by Dr. John A. Bryan, II. Dr. Bryan is a native Georgian who received his DVM and MS degrees from UGA, and worked with SCWDS as diagnostician and CWD Coordinator from 2007 to 2009. John returns to SCWDS from the Biological Resource Management Division of the National Park Service in Fort Collins, Colorado, where he worked as a Veterinary Medical Officer/Wildlife Veterinarian on projects involving wildlife disease, welfare, and policy. In his new duties, Dr. Bryan will be addressing issues involving feral swine, exotic arthropods, disease surveillance, and diagnostics. (Prepared by John Fischer and John Bryan)

### **Necrobacillosis in Two Fawns**

Two white-tailed deer fawns were submitted to SCWDS in late August 2014, from a disease outbreak that began earlier that month in an Oklahoma wildlife rehabilitation center. Affected fawns at the facility had nasal discharge followed by facial swelling, necrosis of the palate, and death, typically within 36 hours of the onset of clinical signs. The fawns were housed in an outdoor pen adjacent to raccoons, and free-ranging adult deer had been observed entering the area. The facility was located in an area with a large amount of livestock production, but the fawns had no known contact with domestic animals.

On gross examination, both fawns had fibrinous, nasal exudate in their nostrils (Figure 1). There were extensive ulcerations of the palate and gingiva, fibrinonecrotic debris covering the ulcerated areas, and abnormal communication between the oral and nasal cavities, known as an oronasal fistula (Figure 2). Samples of skin from each fawn were submitted to the Athens Veterinary Diagnostic Laboratory for bacterial culture, and heavy growths of *Fusobacterium necrophorum* and other bacteria, including *Pasteurella multocida*, *Trueperella*

*pyogenes*, and *Streptococcus* sp., were isolated from one fawn. Although multiple bacterial species were isolated from the second fawn, *F. necrophorum* was not among them.

*Fusobacterium necrophorum* is an obligate anaerobic, gram-negative, rod-shaped bacterium, and disease caused by this organism is called necrobacillosis. This bacterium is a common environmental organism that frequently inhabits the oral cavities and intestinal tracts of apparently healthy horses, cattle, sheep, captive and free-ranging ungulates, marsupials, and humans. *Fusobacterium necrophorum* cannot penetrate intact epithelium and therefore is an opportunistic invader following epithelial damage. Consequently, it is seen most often in the oral cavity associated with erupting teeth or coarse feed. However, *F. necrophorum* also is commonly associated with severe, debilitating lesions of the hooves (often called "foot rot") of domestic livestock and captive hoofed stock.

Ongoing oral bacterial infections may lead to local invasion of the jawbone and subsequent progression to a condition called "lumpy jaw." Changes in rumen pH also can contribute to clinical signs because carbohydrate overload or dietary changes can cause ulceration of the rumen mucosa ultimately resulting in the spread of *F. necrophorum* to the liver or other organs. In addition, the pathogen can be spread via fomites.

*Fusobacterium necrophorum* is found worldwide in many species of wild and domestic hoofed stock and can cause significant production losses in captive deer, especially when associated with stress or immunosuppression due to poor husbandry factors, such as wet environment, over-crowding, and/or inadequate nutrition. Although not uncommon in captive facilities, clinical disease associated with *F. necrophorum* is seen only occasionally in free-ranging wildlife. In 1975, an outbreak associated with cold stress, food shortage, and concentration around artificial feeding stations in Saskatchewan occurred in free-ranging white-tailed deer, mule deer, and pronghorn. Similar *F. necrophorum* outbreaks involving artificial feeding, as well as contact with domestic livestock, were regarded as the cause of 10% loss of free-ranging elk in affected herds in Wyoming. Other free-ranging wildlife species in which *F. necrophorum*-associated disease has

been documented include mule deer in California, several marsupials in Australia, ungulates in Africa, and bison and reindeer in

Europe. (Prepared by Brittany McHale, University of Illinois College of Veterinary Medicine, and Heather Fenton and Lisa Last)



**Figure 1.**



**Figure 2.**

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College of Veterinary Medicine  
The University of Georgia  
Athens, Georgia 30602-4393

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