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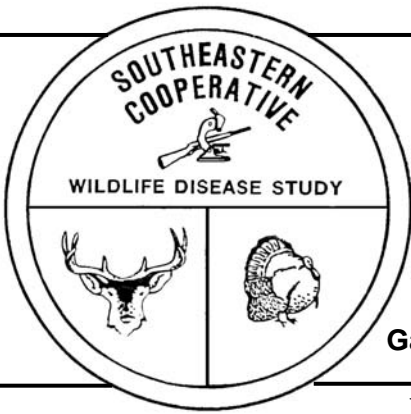
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SCWDS BRIEFS

A Quarterly Newsletter from the
Southeastern Cooperative Wildlife Disease Study
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Birds Falling From the Sky

On the night of December 31, 2010, an estimated 4,000 to 5,000 birds "fell from the sky" as residents celebrated New Year's Eve in Beebe, Arkansas, about 35 miles northeast of Little Rock. The birds came from a large roost containing an estimated 1.6 million red-winged blackbirds, common grackles, brown-headed cowbirds, and European starlings. Wildlife biologists with the Arkansas Game and Fish Commission investigated the event and sent dead birds for postmortem examinations to SCWDS, as well as to the Arkansas Livestock and Poultry Commission Diagnostic Laboratory and the U.S. Geological Survey's National Wildlife Health Center (NWHC).

Three days later, approximately 500 dead and dying birds of the same species were found near New Roads, Louisiana. This area is about 40 miles northwest of Baton Rouge and more than 350 miles south of Beebe, Arkansas. Officials with the Louisiana Department of Wildlife and Fisheries investigated the incident and also submitted dead birds to SCWDS, NWHC, and USDA's National Veterinary Services Laboratories for postmortem examination.

The necropsy results for the Arkansas and Louisiana birds were identical at all of the laboratories and included broken bones, liver fractures, and internal hemorrhages, all consistent with blunt force trauma. There was no evidence of infection, toxicosis, or other underlying disease that might have affected coordination and the ability to fly.

Die-offs of wild birds are not uncommon and may be due to a variety of causes. Blunt force trauma in wild birds typically results from flying into stationary objects, such as trees, buildings,

windows, power lines, or towers, but collisions with vehicles also occur. Flight into stationary objects has been very well documented in the Beebe, Arkansas, mortality event. Some citizens reported hearing loud noises from fireworks at approximately 10:00 PM. Around the same time, Doppler radar detected large flights of birds in the air above and near the roosting area. The species of birds that died in Beebe have poor night vision and do not normally fly after dark. Thus, after being startled from their roost sites, the birds began to collide with houses, trees, parked cars, and mailboxes, some of which were witnessed by local residents.

Although the scenario differed somewhat in Louisiana, collision with stationary objects during night flight appears to be the common denominator. Unlike in Arkansas, there were no witnesses for the Louisiana event but a fast-moving cold front passed through the area, and radar images showed isolated stormy weather activity in the vicinity throughout the day. The roost was close to a heavily travelled railroad track that may have been the source of disturbance for the birds. The affected birds were found in the morning in close proximity to power lines along a road through agricultural fields, and it is suspected that the birds collided with the lines and towers while flying during a time of poor visibility.

The coincidental events in Arkansas and Louisiana drew significant media attention locally, nationally, and internationally. In fact, CNN made three live broadcasts from SCWDS on January 5, 2011. The media coverage drew the attention of many people with a variety of interesting theories regarding the cause of these mortality events, as well as others. However, the thorough field investigations conducted by

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wildlife officials in Arkansas and Louisiana, the submission of excellent diagnostic specimens, and the consistent results obtained by the laboratories conducting the examinations resulted in unequivocal diagnoses in both of these cases. (Prepared by Brandon Munk)

CWD in Two New States

Two more states have been added to the list of those that have confirmed chronic wasting disease (CWD) in free-ranging cervids. Within a two-week period, both Minnesota and Maryland reported that white-tailed deer samples collected for CWD surveillance were confirmed to be positive.

On January 26, 2011, the Minnesota Department of Natural Resources (MN DNR) reported that a positive sample was collected from a deer killed by a hunter during archery season about three miles from Pine Island in southeastern Minnesota. The MN DNR had intensified sampling efforts in this area since 2009, when four captive elk from a Pine Island herd tested positive for CWD.

In response to the discovery of CWD in a wild deer, the MN DNR has begun to assess the deer herd in the area. The agency has enlisted landowners to help collect and test 900 deer within 10 miles of the site of the positive animal. In addition, on February 14, 2011, the department enacted a ban on wildlife feeding in Olmsted County and adjacent counties in order to reduce deer-to-deer contact at feed sites and reduce the rate of spread of the disease.

Further east, the Maryland Department of Natural Resources announced on February 11, 2011, that an 18-month-old male deer killed by a hunter in November 2010 in Green Ridge State Forest in eastern Allegany County tested positive for CWD. Allegany County shares a border with Hampshire County, West Virginia, where CWD has been known to occur since 2005. Sampling in Maryland has been heavily weighted towards the counties in close proximity to the CWD-affected region of West Virginia. Diagnosis was based on immunohistochemistry of retropharyngeal lymph node samples submitted to SCWDS, and the results were

confirmed by USDA's National Veterinary Services Laboratories in Ames, Iowa.

Minnesota and Maryland are the 14th and 15th states, respectively, to confirm CWD in free-ranging deer. Chronic-wasting disease was not found in any new states from 2005 until the fall hunting season of 2009-2010: it was discovered in Virginia in November 2009 and in North Dakota in March 2010. (Prepared by Kevin Keel)

Update on Bat Fungus

White nose syndrome (WNS), the fungal disease that has decimated affected bat populations in the northeastern United States, continues to expand its range. The disease recently was confirmed in two new states – Indiana and North Carolina – bringing the total to 12 states and two Canadian provinces that have confirmed WNS in bats.

On January 23, 2011, wildlife biologists with the Indiana Department of Natural Resources were monitoring a bat hibernaculum in a Washington County cave when they saw two little brown bats (*Myotis lucifugus*) with what appeared to be white fungus on the skin. They euthanized one of the bats and submitted it to the National Wildlife Health Center in Madison, Wisconsin, where WNS was diagnosed. Although not yet confirmed, routine bat surveys at other Indiana caves revealed additional bats in Crawford and Monroe counties with evidence of WNS.

On February 9, 2011, the North Carolina Wildlife Resources Commission and the U.S. Fish and Wildlife Service jointly reported that bats from two sites in Avery County had signs of WNS. Little brown bats, tricolored bats (*Perimyotis subflavus*), Indiana bats (*M. sodalis*), and northern long-eared bats (*M. septentrionalis*) collected during a survey of a hibernaculum in a retired iron mine were affected. The bats were submitted to SCWDS for testing, and all four species were confirmed to be infected with *Geomyces destructans*, the causative agent of WNS. A dead Indiana bat and a dead northern long-eared bat collected from a cave in Avery County also were positive for WNS.

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Just before the North Carolina press release, two additional little brown bats from a mine in Yancey County were submitted to SCWDS. One had white fungal material on its nose and was hibernating in a cluster of about 10 other little brown bats. Microscopic examination revealed fungal growth characteristic of *G. destructans* on the skin, and skin samples tested positive by polymerase chain reaction assay (PCR). Unfortunately, continued spread of WNS is anticipated by bat biologists and wildlife health specialists. (Prepared by Kevin Keel)

World Equestrian Games

The Alltech *Fédération Equestre Internationale* (FEI) World Equestrian Games (WEG), the definitive world championships for horse events were held September 25-October 10, 2010, at the Kentucky Horse Park (KHP) in Lexington, Kentucky. More than 750 horses from 58 countries competed for world championships in eight equestrian sports. This was the first time the WEG have been held in the United States, and it was complicated by the fact that some of the horses coming to the United States were serologically positive for equine piroplasmiasis (EP), a foreign animal disease. Advance planning that included a risk assessment and recommendations put together by a team that included SCWDS personnel, and through implementation of the team's recommendations, mitigated the risks of the EP-positive horses in Kentucky.

EP is a tick-borne parasitic protozoan disease that is endemic in Africa, the Caribbean, Eastern and Southern Europe, the Middle East, and South and Central America. Although there have been recent occurrences of EP in the United States, EP is not considered to be endemic in this country. Two protozoa, *Babesia caballi* and *Theileria equi* (formerly *B. equi*), cause EP, and ticks are biological vectors that transmit the red blood cell parasites to horses under specific conditions. Infection in horses may result in fever, anemia, jaundice, hemoglobinuria, central nervous system disturbances, and sometimes death. Horses that survive may carry the parasites for prolonged periods and serve as potential sources of infection to other horses via tick-borne transmission or mechanical transfer by

biting ticks, hypodermic needles, or surgical instruments.

The ticks *Dermacentor nitens* and *Amblyomma cajennense* are biological vectors of EP, while *D. albipictus*, *D. variabilis*, and *Boophilus microplus* have served as experimental vectors. *Dermacentor albipictus* and *D. variabilis* both infest native wildlife in Kentucky.

During the 1984 and 1996 Summer Olympic Games, the United States granted waivers for EP-positive horses to enter the United States; however, EP-positive horses were not allowed to participate in events with prolonged exposure to vegetation and an opportunity for tick infestation. Conversely, during the WEG in 2010, EP-positive horses competed in all events, including the three that took place on the grounds of the KHP and surrounding farms.

Five years before the WEG began, the USDA assembled a group of experts on piroplasmiasis, tick and wildlife biology, risk analysis, international equestrian competitions, and U.S. import requirements, in order to assess the risk of EP transmission to susceptible horses during the games. As a member of this group, SCWDS contributed to a report published by USDA's Animal and Plant Health Inspection Service (APHIS) entitled *Risk Assessment and Recommendations for Participation of Piroplasmiasis-Positive Horses in Field Equestrian Events for the 2010 World Equestrian Games at the Kentucky Horse Park*. In addition, for two years prior to the 2010 WEG, SCWDS conducted extensive surveys for ticks on wildlife hosts at the KHP and surrounding farms. Although ticks, including *D. variabilis*, are present in the area, implementation of the recommended tick control plan effectively separated EP-positive horses from contact with ticks and tick habitat at the venue during the WEG.

The APHIS report's recommendations included general long-term strategies for tick control, preparation of the venue for the WEG, tick control for horses, and biosecurity. The World Games 2010 Foundation, USDA, the State of Kentucky, and FEI all cooperated to form an action and tick control plan. Mitigation measures were evaluated over time through tick surveys and on-site evaluations in which

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SCWDS participated. This successful control program is an excellent example of cooperation among state and federal agencies, international organizations, and industry in the development and execution of a disease control plan. (Prepared by Joseph Corn)

Cooperating to Regulate Live Animal Imports

The U.S. Government Accountability Office (GAO) recently reported the results from a study of the regulatory and statutory framework for importing live animals into the United States. The study was conducted because of the volume (more than 1 billion animals from 2005-2008), potential for disease introduction, and complicated regulatory structure. Live animal importation is governed by five principal statutes and is implemented by four agencies: the Centers for Disease Control and Prevention (CDC), the U.S. Fish and Wildlife Service (USFWS), USDA's Animal and Plant Health Inspection Service (APHIS), and Customs and Border Patrol (CBP). The GAO's goal was to identify potential gaps in the statutory and regulatory framework that may increase introduction and spread of zoonotic and other animal diseases, as well as to identify the extent to which agencies cooperate and address any potential barriers to collaboration. To accomplish these goals, GAO spoke with officials at multiple organizations, including SCWDS, reviewed the statutes concerning animal importation, surveyed animal import experts, and physically visited ports of entry.

The GAO identified multiple gaps in regulation and implementation that may allow disease introduction and found many of the gaps are due to the involvement of multiple agencies. Although each agency has specific goals and duties regarding animal importation, the goals do not overlap to form an adequate barrier against disease introduction, and there is no overarching body that covers every aspect. For example, CDC regulations seek to prevent importation of live animals that pose a previously identified risk for some diseases, such as monkeypox, but there are regulatory gaps that may allow animals presenting other disease risks to be imported. The USFWS regulations cover exotic animals that could become

invasive, but do not focus on disease risks. APHIS focuses on disease risks for agricultural animals, but not risks for native wildlife species.

Individual actions and collaboration between the agencies have been undertaken to bridge these gaps. However, experts surveyed by GAO identified multiple barriers to increasing partnership and cooperation among agencies. Chief among these are differing charges and goals of each agency. Further, there currently is no comprehensive data sharing system between agencies. Because each agency has its own system focused on its priorities, these systems may be incompatible. A proposed data sharing system is being developed and will be maintained by the CBP, but a definitive date for implementation of that system has not been set.

Each agency had independently taken steps to address these gaps prior to GAO investigation, and several recommendations are proposed for future goals. GAO suggests the secretaries of the departments of Agriculture, Health and Human Services, Homeland Security, and the Interior come together to detail a strategy for collaboration to prevent disease introduction. By creating a strategy that encompasses all agencies, the differences in program priorities may be minimized and allow more interagency cooperation. This also allows for the clarification of agency roles regarding animal importation, including leadership positions, resources necessary for implementation, and sharing of those resources among agencies. GAO also suggested agencies conduct more research into better ways to share data until the combined data system is implemented, as well as to work together in the development of the system by identifying essential data points. GAO also recommended exploring the need for additional legislative or executive authority to implement the strategy, such as forming a coordinating interagency working group.

These findings and recommendations, as well as the responses of the agencies, can be viewed at <http://www.gao.gov/products/GAO-11-9>. The website will be updated as actions are taken on each point. (Prepared by Tiffany Umlaf, senior veterinary student, University of Georgia College of Veterinary Medicine)

Deer Parapoxvirus Infects Hunters

A report published in the *New England Journal of Medicine* in 2010 indicates that a novel parapoxvirus associated with deer may have human health implications. Many parapoxviruses are zoonotic and usually are seen in people who have direct contact with visibly infected livestock.

The article discussed the cases of two deer hunters who developed large, tender, non-painful and non-pruritic swellings on a finger. Both men, one in Connecticut and one in eastern Virginia, had a recent history of cutting themselves while field-dressing white-tailed deer. They had no history of recent contact with any domestic livestock, and it was assumed they had contracted the virus from the deer. Both deer apparently were healthy and had no obvious lesions on the head or muzzle. Due to the persistence of the lesions, both men sought medical attention and the lesions were surgically removed. Histologically, both lesions exhibited characteristics of a parapox-like infection, and the virus type was confirmed by electron microscopy and polymerase chain reaction (PCR) tests. Both men went on to recover uneventfully, although one reported lingering discomfort at the surgical site.

The parapoxvirus group contains the agents that cause contagious ecthyma (orf, soremouth) in sheep and goats and pseudocowpox (milker's nodule) associated with cattle. Contagious ecthyma and pseudocowpox are manifest as ulcerated or scabbing lesions on the mouth, teats, and sometimes lower legs of susceptible domestic animals. Although the lesions may cause discomfort, subsequent anorexia, and can become secondarily infected, the disease itself does not cause significant morbidity or mortality. Most animals fully recover within a few weeks, but infection does not confer immunity, and they may become infected again at a later time. In humans, lesions usually occur on the hands and are seen as large blister-like swellings that may be painful or itchy. These lesions usually rupture or become ulcerated and develop scabs that heal and leave minimal scarring.

The disease is spread by direct contact with lesions, scabs, and saliva, or through fomites

such as halters, shears, or nursing equipment. Both humans and animals are more likely to become infected when there is a break in the skin. Vaccines are available for the disease, but all contain modified live virus and are used to lessen the impact of disease rather than prevent it. Vaccination is not recommended for naïve herds, and the vaccine may be infective to people if not properly handled.

The disease has been experimentally recreated in captive white-tailed deer, but inoculated deer developed lesions much milder than those seen in other species, and the lesions completely regressed in 8 to 10 days. Naturally occurring cases of the disease have not been reported in white-tailed deer. The deer hunters that developed orf in the recently reported cases did not notice any lesions on the deer, and the evidence that they acquired the infection from deer is highly suggestive but circumstantial.

The report in the *New England Journal of Medicine* concludes that this virus is a novel strain not previously seen and is closely associated with pseudocowpox. Though the origin of this virus is unknown, it is possible that deer have become infected through contact with domestic species, such as cattle, and that the virus has since diversified. Parapoxviruses have been isolated from cervids in Asia and Europe, but little has been described in North America. Neither of the deer handled by the men in the recent case report had any lesions or signs of illness. At this point it is not possible to assess the impact this disease may have on deer populations or hunters. These cases provide another reminder to practice proper safety and hygiene when handling carcasses of deer, other game, and domestic livestock and poultry. (Prepared by Tiffany Umlaf, senior veterinary student, University of Georgia College of Veterinary Medicine)

Woodchuck Victim of Raccoon Roundworm

Much of our attention is focused on the larger wild animals because they are readily observed, and if they are sick or die the bodies are less likely to disappear quickly. Conversely, many smaller animals are likely to die unobserved and be scavenged quickly, but when a full-grown

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woodchuck is doing back flips in the backyard, people are more apt to notice. Such was the case with a woodchuck recently submitted by Dr. Aaron Hecht, wildlife veterinarian with the Kentucky Department of Fish and Wildlife Resources.

A landowner from Mercer County, Kentucky, just south of Frankfort called Dr. Hecht to report a woodchuck that couldn't walk correctly, seemed to have difficulty breathing, and was easily approached. The next day the animal was in the same location and had the same clinical signs. Dr. Hecht's clinical assessment was that the woodchuck was affected with a neurologic problem, and he elected to euthanize it and submit it to SCWDS for necropsy.

The animal was a juvenile female in good nutritional condition. The only grossly visible lesion was a mild infestation of American dog ticks (*Dermacentor variabilis*), which was considered incidental to the neurologic problem. Samples of the brain were negative for rabies by fluorescent antibody assay. Microscopic examination of brain sections revealed severe chronic inflammation and areas of necrosis (tissue death). The necrosis and the types of inflammatory cells were suggestive of parasite migration through the brain. Cross sections of nematode larvae were seen in tissue samples examined microscopically (Figure 1). The features of the nematodes were consistent with an ascarid, and the location in the brain makes it all but certain that these were larvae of the raccoon roundworm, *Baylisascaris procyonis*.

Raccoons are the definitive host of *B. procyonis* and do not develop significant disease in association with the infestation. The adult nematodes live in the intestines of the raccoon, and eggs are shed in the feces. The life cycle is completed when a raccoon ingests larvated eggs in the environment or eats another host in which larvae are encysted in the tissues. If an aberrant host ingests the eggs, the nematodes do not develop to the adult stage, but the *Baylisascaris* larvae hatch out, burrow through the gut wall, and may become encysted in various organs. They often travel throughout the body, creating significant tissue damage. When the larvae burrow through the brain or spinal cord, the infestation may be fatal. Over 90

species of birds and mammals are known to be susceptible to such disease. In endemic areas, some species of birds, rodents, and lagomorphs can suffer high morbidity and mortality rates due to migrating *Baylisascaris* larvae.



Figure 1

Baylisascaris procyonis also presents a health risk to humans. Like other species, humans can be infested by the larvae and can develop significant disease, especially as larvae migrate through the abdominal organs, eyes, or central nervous system. People are exposed by the fecal-oral route, and small children are at greatest risk of consuming larvated eggs because they are more likely to put contaminated soil or foreign objects in their mouths. Such foreign material can be heavily contaminated if raccoons have used the area as a latrine. The eggs are very hardy and can survive in the environment for years.

In the United States, *B. procyonis* is most prevalent in the Midwest, Northeast, and Pacific states. In the Southeast, it has been found in Georgia and in the mountainous regions of Kentucky, Virginia, and West Virginia. SCWDS researchers recently documented the geographic spread of *B. procyonis* into Florida and additional areas in Georgia. The reasons for the increasing distribution have not been determined, but the added human health risk is certain. (Prepared by Kevin Keel)

Change in AFWA Health Committee Leadership

Bob Duncan, Director of the Virginia Department of Game and Inland Fisheries, is the new Chair of the Fish and Wildlife Health Committee of the Association of Fish and Wildlife Agencies (AFWA). Bob has long recognized the importance of diseases that can affect wildlife, as well as humans and/or domestic animals, and has played a key role in wildlife health research and management as a member of the SCWDS Steering Committee since 1986, and as its Chair since 1998. We look forward to Bob's leadership of the AFWA Fish and Wildlife Health Committee as biologists and administrators across the United States and Canada address the growing and changing role of diseases in natural resources management.

The chairmanship of the AFWA Fish and Wildlife Health Committee became available in December 2010 when Becky Humphries retired after 32 years with the Michigan Department of Natural Resources (DNR). When Becky became Director of the Michigan DNR in 2004, she also was selected as Chair of the AFWA Fish and Wildlife Health Committee. She was no stranger to wildlife health issues: as head of the Wildlife Division of the DNR in the mid-1990s, Becky began addressing the complicated scientific and sociopolitical aspects of bovine tuberculosis when it was found to be endemic in wild deer in a portion of the state. In addition to her role on the AFWA Fish and Wildlife Health Committee, Becky became chair of the Steering Committee of the National Fish and Wildlife Health Initiative when it was endorsed by AFWA in 2005. Closer to home for us here at SCWDS, Becky represented AFWA on the SCWDS Steering Committee. We deeply appreciated her taking the time to travel to Athens for our annual meetings, and her experience at both the state and national levels was evident in the guidance she provided to us. Since retiring from the Michigan DNR, Becky has accepted the position of Regional Director of Ducks Unlimited in Ann Arbor, Michigan. We wish Becky the very best in the next chapter of her highly productive career as a natural resources manager and thank her for her tireless leadership, dedication, and friendship. (Prepared by John Fischer)

Advisory Committee on Animal Health

SCWDS Director John Fischer recently was appointed to a two-year term on the Secretary's Advisory Committee on Animal Health (SACAH) by U.S. Agriculture Secretary Thomas Vilsack. The SACAH reestablishes the former Secretary's Advisory Committee for Foreign Animal and Poultry Diseases, on which retired SCWDS Director Dr. Victor Nettles previously served. The reestablished committee is broader in scope and will prioritize animal health issues and provide advice on agricultural matters, including livestock disease management and traceability strategies.

The committee will advise the Secretary of Agriculture on actions related to prevention, surveillance and control of animal diseases of national importance and, in doing so, will consider the implications for public health, conservation of natural resources, and the stability of livestock economies. To ensure well-rounded advice and recommendations, this committee represents a broad spectrum of interests throughout the greater animal health community and includes ranchers, farmers, and livestock producers; veterinarians from industry, academia, and state animal health agencies; and others. Its members will remain culturally, technically, and geographically diverse throughout its tenure.

The SACAH met for the first time in January 2011 in Washington, DC. The meeting was well-attended and included a series of presentations followed by clarifying questions and discussion. The topics included animal disease traceability, aquaculture and aquatic animal health, emergency response, national disease management programs, and the strategic planning efforts of USDA APHIS-Veterinary Services. A second meeting of the committee is scheduled for early March 2011 via teleconference. (Prepared by John Fischer with information from APHIS. Additional information is available at www.aphis.usda.gov).

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