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SCWDS BRIEFS

A Quarterly Newsletter from the
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West Nile Virus Heads South

West Nile virus (WNV) recently was detected in wild birds found dead in Florida and Georgia. Crows infected with WNV were found in early July in Jefferson County, Florida, and later in adjacent Madison County. By the end of July, WNV had been found in wild birds in eight counties in northern Florida. A single human WNV infection has been confirmed in Jefferson County, and neurologic disease caused by WNV has been diagnosed in horses in Madison County.

WNV was confirmed in a dead crow from Lowndes County, Georgia, examined at SCWDS on July 10, 2001. Lowndes County is in southern Georgia near the positive Florida counties. The crow was examined as part of the wild bird surveillance that SCWDS conducts for WNV under an agreement with the Georgia Department of Human Resources. Subsequent to identification of the first positive bird, SCWDS has detected WNV in dead birds submitted by public health officials from 12 additional counties around Georgia, including two in the metro Atlanta area. The number of affected counties is expected to increase. Submission of birds to SCWDS for WNV testing increased dramatically after the first Georgia case and accompanying media exposure. Prior to the first positive bird, we received approximately 5 to 20 birds per week; that number increased to more than 50 birds daily. SCWDS has tested more than 550 dead birds from Georgia during the first 7 months of 2001.

WNV is a member of the flavivirus family and is closely related to St. Louis encephalitis virus that has long been present in the United States. However, WNV was only recognized in the United States for the first time in late summer of 1999 in the New York City area. At that time, the virus killed numerous birds and also caused fatal neurologic disease in seven humans and several horses. Mosquitos carry the virus from viremic birds to other birds, humans, horses, and other animals. Most humans exposed to the virus via mosquito bites do not develop observable illness. A small percentage of infected persons have mild flu-like symptoms, from which they readily recover. A very small percentage of infections, primarily in persons over 75 years old or with compromised immune systems, may result in severe illness with potentially fatal inflammation of the brain. A human vaccine against WNV infection currently is unavailable, and avoidance of mosquito bites is the primary mode of prevention.

WNV activity also has been detected in wild birds this year in Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, and Virginia. With the addition of Florida, Georgia, and Ohio this year, the total number of states with WNV since its recognition in 1999 now stands at 14. Dead wild birds are the best indicators of virus activity in an area, and infection has been documented in over 55 native avian species. Crows and jays are highly susceptible, and surveillance efforts are concentrated on these species. WNV infections also were found during 2000 in a handful of mammals in the

New York City area, including bats, a chipmunk, a raccoon, a skunk, and two rabbits. Ongoing surveillance throughout the country undoubtedly will document expansion of the range of this emerging pathogen in the United States. (Prepared by Danny Mead and John Fischer)

Update on AVM Studies

The cause of avian vacuolar myelinopathy (AVM) remains undetermined despite extensive diagnostic and research investigations conducted since the disease was first recognized as a significant cause of eagle mortality in 1994. However, AVM recently was reproduced experimentally in unreleasable, rehabilitated hawks that were fed tissues from coots affected with the disease. This significant development confirms the long-held theory that raptors, such as bald eagles, can acquire AVM via ingestion of other affected birds. These studies were conducted by SCWDS in cooperation with the Georgia Department of Natural Resources, the U.S. Army Corps of Engineers, and Auburn University.

AVM first was recognized as a fatal neurologic disease of bald eagles in the winter of 1994-95 when 29 eagles died at DeGray Lake, Arkansas. In 1996, when AVM killed 26 eagles in the same area, it became apparent that American coots also were suffering from neurologic disease and had identical brain lesions. It was then hypothesized that eagles acquire AVM by ingesting affected coots. Since then, AVM has been documented as a cause of eagle mortality in Arkansas, Georgia, North Carolina, and South Carolina, with at least 82 eagles succumbing to the disease. Last winter, AVM was confirmed or suspected in the deaths of 16 bald eagles at Lake Strom Thurmond (also known as Clarks Hill Lake) on the South Carolina/Georgia border (SCWDS BRIEFS Vol. 16, No. 4). AVM also was confirmed in two great horned owls, two Canada geese, numerous coots, and a killdeer during the outbreak.

Mallards and ring-necked ducks previously had been diagnosed with AVM in North Carolina.

Investigators of the cause of AVM have been frustrated by a long list of negative test results. Diagnostic tests for infectious agents and known toxins have yielded uniformly negative results, and other feeding trials have failed to produce neurologic disease or brain lesions. Materials used in other feeding trials included tissues from affected coots, vegetation, water, and sediment collected from sites during AVM outbreaks. Clinical disease and brain lesions developed in healthy coots and mallards from an unaffected site shortly after they were released at Woodlake, North Carolina, during an AVM outbreak. Conversely, however, susceptible birds that were co-housed with affected birds taken to a remote facility failed to develop signs or lesions of AVM. The results of these studies suggest that exposure to the causative agent occurs on site and may not be transmissible from bird to bird. Organizations participating in these studies include the National Wildlife Health Center in cooperation with the U.S. Fish and Wildlife Service, North Carolina Wildlife Resources Commission, and North Carolina State University College of Veterinary Medicine. (Prepared by John Fischer)

Update on FMD

The spread of foot-and-mouth disease (FMD) that began in the United Kingdom in February 2001 has slowed dramatically. The peak of the epidemic curve occurred from late March through early April when approximately 45 to 65 new cases of FMD were found each day. That number declined by early May to 2 to 6 new cases daily, with the exception of a few days when 8 to 13 cases were detected. The total number of cases in the United Kingdom is approaching 1,900 at the end of July. FMD has not been detected in wildlife tested during the current outbreak, and culling of wildlife is not part of the FMD control program.

New cases of FMD have not been detected in France, Greece, Ireland, or the Netherlands for several weeks. However, stringent measures remain in place to prohibit shipments to the United States of animals, animal products, and used farm equipment from high-risk countries, including the United Kingdom, the four countries listed above, and other countries around the world where FMD has been confirmed in recent months. On May 25, 2001, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) lifted restrictions on imports from the remaining countries of the European Union following completion of a scientific risk assessment. The lifting of restrictions associated with FMD does not alter other regulations on importation of ruminants and ruminant products that are in place to prevent the introduction of bovine spongiform encephalopathy, also known as Mad Cow Disease.

FMD is a highly contagious viral disease of cattle and swine, as well as sheep, goats, deer, and other cloven-hoofed animals. Although rarely transmissible to humans, FMD is devastating to livestock and has critical economic consequences. The United States has been free of FMD since 1929, thanks to the vigilance of APHIS. In addition to preventing the introduction of FMD into the United States, APHIS continues to assist the United Kingdom in its current eradication efforts by providing veterinarians and other animal health experts. Additional information regarding APHIS and FMD may be found at www.aphis.usda.gov (Prepared by Rick Gerhold and John Fischer)

Multi-State Test Exercise

A test of the animal disease emergency management system was conducted July 9-12, 2001, by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) and the states of Florida, Georgia, North Carolina, and South Carolina. The test simulated an outbreak of foot-and-mouth disease (FMD), and was designed to assess the

combined state/federal response to an outbreak of a highly contagious foreign animal disease. SCWDS assisted APHIS with planning the test exercise, and SCWDS personnel Drs. John Fischer, Joe Corn, and Rick Gerhold participated in the Wildlife Section of the operation.

The simulated outbreak began in central Florida with an accidental introduction of FMD by an international traveler. In Florida, the response included all levels of the county, state, and federal governments, including the Florida Department of Agriculture and Consumer Services, Florida Fish and Wildlife Conservation Commission, Florida Department of Emergency Management, and APHIS's Regional Emergency Animal Disease Eradication Organization (READEO). Most of the spread of the virus within Florida and to other states was via livestock movements, but apparent spillover into wildlife also was simulated in this test exercise.

A specific objective of the exercise was to develop and evaluate responses to various wildlife issues. During the simulated outbreak, lesions consistent with FMD were observed in free-ranging and captive wildlife, and appropriate responses were developed. Potential spread of infection to free-ranging wildlife, primarily white-tailed deer and feral swine, was addressed via surveillance conducted on and near infected premises in the quarantine zones. Personnel for the wildlife surveillance teams initially were provided by the Florida Fish and Wildlife Conservation Commission and supplemented by APHIS' Wildlife Services and SCWDS, but as the outbreak developed a nationwide request for additional personnel was made. In the simulation, 21 surveillance teams, each consisting of 2 biologists and an enforcement officer, were trained and operating by day 3 of the outbreak, and 42 additional teams were requested. These aspects of the exercise were conducted in real time, including the development of surveillance protocols, requests for personnel commitments, activation

of personnel, training, and deployment. In a real outbreak, these tasks would have been accomplished.

Other issues addressed included collection methods, biosecurity, sample size, specimen collection, carcass disposal, disinfection, and access to private land. Surveillance of free-ranging wildlife was designed to determine if FMD was being spread by wildlife, and if so, this information would be used to develop control strategies. Also implicated in the simulated outbreak was a large game farm. Because several species of exotic wildlife on this farm were infected, all susceptible animals had to be depopulated. Issues dealt with at this site included methods for depopulation, carcass disposal, disinfection, and appraisal and indemnification.

APHIS maintains Eastern and Western READEOs, and many states also have developed animal disease emergency management systems. Test Exercises such as the recent simulated FMD outbreak in Florida enable these agencies to evaluate current response capabilities and to make adjustments to the systems as needed. This was the first such exercise to utilize a fully activated state emergency management center. (Prepared by Joe Corn)

Anthrax Hits Texas

Several cases of anthrax have been reported this summer in deer and livestock on ranches in Edwards, Uvalde, and Val Verde counties in southwest Texas, and there are suspected cases in three additional counties. As of July 7, confirmed cases have been diagnosed in three white-tailed deer, two horses, one fallow deer, and one cow. The actual number of cases undoubtedly is much higher than the number confirmed, as there are estimates that hundreds of animals have died. Anthrax occurs worldwide and tends to recur in certain locations. This area, bordered by Uvalde,

Ozona, and Eagle Pass, is where anthrax historically has occurred in Texas.

Anthrax is caused by the bacterium *Bacillus anthracis*. The bacteria form spores that are highly resistant to temperature extremes, chemical disinfectants, and dessication. Spores can lie dormant for years in soil and organic matter. Anthrax outbreaks generally occur when heavy rains or floods are followed by a drought, especially in areas that have a high amount of organic matter in the soil and an alkaline pH. Herbivores are presumed to become infected by ingestion of contaminated food and water. Outbreaks decline with the arrival of cool weather.

Anthrax can affect virtually all mammals. Clinical signs in herbivores include fever, respiratory distress, staggering, disorientation, and sudden death. Carnivores may develop edema of the face and neck and swollen lymph nodes. Herbivores that die from anthrax usually exhibit rapid bloating and bloody discharges from orifices. Characteristic necropsy findings include dark, unclotted blood and a markedly enlarged, hemorrhagic spleen. Isolation of *B. anthracis* is necessary to confirm an anthrax infection.

There are several human forms of anthrax, depending on the route of infection, the most common being the skin form. Minimizing contact by wearing gloves and long-sleeved clothing when handling infected animals, carcasses, or animal by-products decreases the chance of infection. Ingesting or inhaling anthrax spores can also infect humans and may result in the life-threatening disease. Anthrax in humans is treatable with antibiotics.

The best control methods for anthrax in livestock are vaccination and prevention of environmental contamination with anthrax spores. Carcasses of animals that die from anthrax contain millions of infectious spores, so field necropsies should not be performed. Animals that have died from anthrax should be

burned, along with the animal's bedding, manure, and surrounding soil. Wild animals and pets should be kept away from the carcass, and livestock should be moved to a different pasture. Outbreaks of anthrax usually are over by hunting season, but it is always advisable to only harvest and consume healthy looking animals. (Prepared by Elizabeth Embree, Virginia-Maryland Regional College of Veterinary Medicine).

Atlantic Brant Die-Offs

Atlantic brant breed in the arctic and over-winter primarily along the New Jersey coast. Recently, the midwinter population of brant on the New Jersey coast was estimated at 95,000. During the past year, three significant brant die-offs have occurred on the New Jersey coast. The first two occurred in early winter at the Edwin B. Forsythe National Wildlife Refuge, near Oceanville, where 5,000 to 10,000 brant use a 900-acre shallow freshwater impoundment. Mortality was not observed in other species at the refuge, although several thousand ducks, tundra swans, coots, and eagles were present.

Refuge personnel first observed sick and dead brant in early November 2000. Sick birds isolated themselves from the flock, had difficulty swimming or flying, and sat hunched with wings drooping forward. Birds generally died shortly after displaying signs of illness. Mortality ceased by early December, after approximately 700 brant carcasses had been collected. In January 2001, a second brant mortality event occurred at the refuge, with most deaths occurring the week of January 15-22. Again, approximately 700 brant died with mortality ceasing around January 30.

At necropsy, birds from the first die-off appeared to be in good body condition, suggestive of an acute disease process. Gross findings were inconsistent, but included pulmonary edema and hemorrhages on the surfaces of the heart, major blood vessels,

proventriculus, and colon. Birds from the second die-off had dark red, edematous lungs.

Pathologists who examined brant carcasses suspected that an infectious agent, such as a virus, was involved. However, the cause of the two die-offs remains undetermined despite extensive diagnostics, including bacteriologic, virologic, toxicologic, and tests by light and electron microscopic examinations. Agencies cooperating in the investigation included New Jersey's Office of Fish and Wildlife Health and Forensics, U.S. Geological Survey's National Wildlife Health Center (NWHC), SCWDS, National Oceanic and Atmospheric Administration's Marine Biotoxin Program, U.S. Department of Agriculture's Animal and Plant Health Inspection Service, and the New Jersey Departments of Agriculture and Health. Because the cause of the mortality was undetermined, hunters were advised not to shoot or consume brant that appeared to be sick or exhibiting odd behavior.

The third brant die-off occurred this spring and fortunately, the cause of the mortality was not so elusive. Between April 30 and May 3, 2001, 85 brant were found dead at Post Creek Basin in Cape May County. Postmortem examinations and laboratory testing by diagnosticians at the New Jersey Office of Fish and Wildlife Health and Forensics disclosed organophosphate toxicosis as the cause of death. The specific compound detected was the commonly used pesticide diazinon.

The unusual brant mortality in New Jersey, particularly the undiagnosed die-offs of December and January, generated a great deal of interest from the news media and the public. Wildlife authorities are ready to continue investigations of the cause of brant mortality if it recurs this winter. At this point, it is unclear whether this disease could have a significant impact on Atlantic brant populations. (Prepared by Cynthia Tate with assistance from Kim Miller, NWHC)

USDA Lab Upgrade Deserves Support

If one were to choose the place in the United States with the most expertise in animal diseases, it would have to be Ames, Iowa. The population of Ames is only about 48,000 people, but 1 person in 268 is a veterinarian! Although the College of Veterinary Medicine of Iowa State University accounts for a lot of the veterinarians, most are associated with three USDA facilities, viz., the National Veterinary Services Laboratories (NVSL); the National Animal Diseases Center (NADC); and the Center for Veterinary Biologics (CVB). These laboratories, and their field stations in other locations, serve as the Nation's "nerve centers" for animal disease diagnostics (NVSL), food animal disease research (NADC), and animal vaccines/biologics (CVB).

Unfortunately, time has taken its inevitable toll on USDA's present facilities. The newest building at Ames is 23 years old, and some labs currently are housed in rented space in strip malls. Relatively minor animal disease emergencies, such as the recent outbreak of West Nile virus, can quickly overwhelm laboratory capabilities. Therefore, the problems associated with a major foreign animal disease incursion such as foot-and-mouth disease or bovine spongiform encephalopathy (a.k.a. mad cow disease) are almost unthinkable. If the United States is going to maintain its coveted status in regard to healthy animals and affordable food supplies, the quality of our central animal laboratories must be maintained.

The remedy proposed in USDA's Master Plan for Facility Consolidation and Modernization involves an estimated \$447 million in new construction and remodeling over a 9-year period. Although this is a lot of money, it pales beside the \$99 billion generated annually in cash receipts from the sale of livestock and poultry. On a percentage basis, the entire upgrading effort for the laboratories would amount to only 0.05% of the farm animal cash revenue generated over the 9 years. This plan, which will be sent to Congress for

consideration, has strong support from the United States Animal Health Association, the American Veterinary Medical Association, the American Farm Bureau Federation, and essentially all major livestock and poultry associations.

The NVSL and NADC are constantly involved with diagnostics and research on high profile wildlife health problems such as brucellosis in bison and elk, chronic wasting disease in wild and captive cervids, and bovine tuberculosis in white-tailed deer. Data generated by these laboratories are constantly being used to formulate wildlife management strategies when these diseases occur in wild animals. Investigations of many diseases in wildlife eventually are referred to the NVSL for diagnostic assistance. In fact, West Nile virus was first isolated by NVSL. In regard to veterinary biologics, it was the CVB that oversaw the safety and efficacy of the oral rabies vaccines for raccoons, coyotes, and gray foxes. Essentially all wildlife disease investigation units that service state or federal fish and wildlife agencies depend upon USDA's animal disease resources for test reagents, consultations, and sample referrals. Wildlife managers should recognize the value of these laboratories to their own professional efforts and support the Congressional funding initiative. (Prepared by Vic Nettles)

Personnel Changes

Anyone making a telephone call to SCWDS during the last few months may have recognized a different voice on the line. Jeanenne Brewton is a new Senior Secretary who came to work in the front office in February of this year to help out our Office Manager, Cindy McElwee. Jeanenne does a lot more than just answer the phone, however; and she is well qualified. She graduated from Athens Technical College in December 2000 with a 4.0 grade point average! Jeanenne's many duties include assisting with finalizing correspondence and manuscripts, handling travel requests and expense statements

for staff members, compiling and maintaining information for Annual Reports, preparing payroll vouchers, and handling numerous other details that make life easier for all of us. We are happy and fortunate to have her with us.

SCWDS has a highly productive arrangement with its graduate student program and student extern program, whereby students spend time here, ranging from a few weeks to a few years, working and learning. Senior veterinary students from the veterinary college here at Georgia or from other states or countries spend 1 or 2 months here to learn about wildlife population health and assist with SCWDS diagnostic cases, research projects, and literature reviews. Individuals who recently graduated from veterinary school or wildlife school also come here to earn an M.S., Ph.D., or both. It is a symbiotic relationship; we benefit greatly from their stay here, and they take something valuable away with them. SCWDS is fortunate to be in the position to continue this program, because these young people always are filled with the fresh ideas and enthusiasm that are vital to the continued high quality service we provide to our sponsors in the wildlife and animal health fields.

Occasionally, after graduation, the individual stays on and becomes an important member of our staff; two good examples are Dr. Randy Davidson and our former Director, Dr. Vic Nettles. Unfortunately, however, some of the really good guys move on. Such is the case now with Dr. Joe Gaydos. Joe is a West Virginia native who earned his B.S. degree from Virginia Polytechnic Institute and his V.M.D. from the University of Pennsylvania. He came on board at SCWDS in June 1998 as a Graduate Research Associate to serve on our diagnostic staff and to work on a Ph.D. Regrettably for us, Joe has completed his course work, research, and dissertation and will receive his doctorate in August 2001. He has accepted a job offer from the School of Veterinary Medicine at the University of California at Davis (UCD) that starts August 1, 2001. Joe will have an

unusually attractive and exciting position as Associate Veterinarian with UCD's Wildlife Health Center. He actually will be living and working on Orcas Island, Washington, at their Marine Ecosystem Health Program, a thousand miles from the UCD campus. We will miss Joe, his lovely wife Julie, and their two beautiful daughters, Hannah and Olivia. We wish them well.

Moving in to help replace Joe Gaydos on our diagnostic staff is Dr. Rick Gerhold. Rick is from East Greenville, Pennsylvania, but for the last 9 years West Lafayette, Indiana, the location of Purdue University, has been his home. Rick earned a B.S. degree in wildlife biology from Purdue in 1997 and received his D.V.M. degree from Purdue's School of Veterinary Medicine in May of this year. Rick spent a 2-month externship at SCWDS during his senior year of veterinary school, and we mutually agreed while he was here that he should return, after graduation. He hopes to begin his Ph.D. program at SCWDS in the fall of 2002.

We have another new D.V.M. who just arrived to help in the diagnostic lab and obtain an advanced degree – Dr. Samantha (Sam) Gibbs. Sam hails from Gainesville, Florida. She has an International Baccalaureate degree, a B.S. degree in wildlife ecology, and a D.V.M. degree from the University of Florida. Sam spent a 3-week externship at SCWDS during her senior year of veterinary school, and we are glad to have her back. Her official title is Veterinary Medical Graduate Assistant, and she will begin her Ph.D. work in the upcoming Fall semester.

Another veterinarian recently hired to temporarily beef up our diagnostic staff is Dr. Nicole Gottdenker. Nicole was hired May 1, 2001, for a 4-month period, and she has certainly earned her keep. She is handling the majority of the avian specimens that have flooded our laboratory as part of the surveillance program for West Nile virus in wild birds. Nicole is well suited for this work; she

completed a pathology residency at the Wildlife Conservation Society's Bronx Zoo, where West Nile virus was first recognized in 1999. (Prepared by Gary Doster)

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