National Wildlife Disease Surveillance and Emergency Response Program

THE CARRIER

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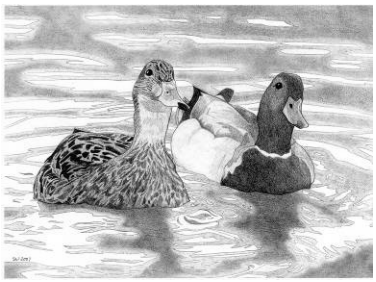

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COORDINATOR COMMENTARY

By Dr. Thomas DeLiberto

The National Wildlife Disease Program has had a number of recent personnel changes in the program office and the field. On 14 January the program hosted a wonderful retirement dinner for Bob Beach in Fort Collins. Over 50 people came to send Bob off on new adventures and wish him the best. Thanks to Mary Beth Kowalski and Diana Rangel for organizing a great evening for us. While it will be difficult for the Program to adjust to Bob's absence, we have recently taken steps to ease that transition by hiring Dr. Tom Gidlewski, who will fill in behind Bob as an Assistant Coordinator. We are extremely happy that Tom is joining our WS team, and believe his experience on veterinary issues at the livestock-wildlife interface will be invaluable. Tom starts working for the Program on 26 April.

In the field, we also have seen a number of changes over the last few months. Tim White and Adam Randall are our newest Wildlife Disease Biologists (WDBs) in Illinois and New Jersey, respectively. Tim replaces Jane Weiskittel who became a MIS operator for the Eastern Region, while Adam replaces Beth Kabert who recently started as the NEPA coordinator for Rabies. Dr. Sheldon Owen and Todd Puckett have left the NWDP to become District Supervisors for WS. Sheldon will stay in South Carolina, while Todd is moving to Vermont.

Dr. Thomas DeLiberto and Robert Beach

Finally, Mike Marlow has accepted a position as a Resource Management Specialist for WS in Fort Collins. We will miss having these biologists in our program, but are glad they have all moved to other leadership positions within WS, and we wish them the very best.

Thank you all for another very successful year in conducting the HPAI Early Detection System. Once again, everyone did a great job ensuring that WS' surveillance targets were met. Next year's surveillance effort will be dramatically reduced as a consequence of a 33% reduction in our avian influenza budget. We intend to compensate for this reduction by eliminating level 3 priority states from the project, and by reducing sampling targets in other states.

Lastly, I wanted to mention the One Health approach to human, animal, and ecosystem health that has been gaining popularity in the international community, as well as here in the U.S. This concept has been around since the late 1800s, but until recently, it had relatively few champions. Given the increase in epidemics over the last 10-20 years involving zoonotic diseases, government agencies, non-government organizations, and universities are increasingly recognizing the importance of comprehensive health surveillance and control programs. Our NWDP will undoubtedly play an important role in the Department's One Health approach. We already have been active in USDA's One Health Joint Working Group, providing wildlife expertise as the Department develops its strategy in this global effort. The NWDP's experience and expertise in conducting comprehensive surveillance systems on diseases such as avian influenza, plague, tularemia, and swine diseases serve as models for developing cooperative projects that support the One Health Concept. I look forward to working with you as support for the One Health approach to managing diseases increases.

The wildlife drawings on this page are original artworks created by the National Wildlife Disease Program's Wildlife Technicians Erika Kampe (prairie dog) and Sarah Norton (ducks).

Surveillance for High Pathogenicity Avian Influenza in Wild, Migratory Birds*

By Seth R. Swafford and Kerri Pedersen

As the 2008 biological year for conducting HPAI surveillance in wild, migratory birds comes to an end, we wish to thank the dedication and support of state wildlife agencies, many Native American tribes, the NAHLN and NVSL, and WS employees for making the nationwide effort possible and a great success. Final results and accomplishments of the surveillance effort will be distributed in the next few months. Information provided below is a preliminary compilation of surveillance results and accomplishments .

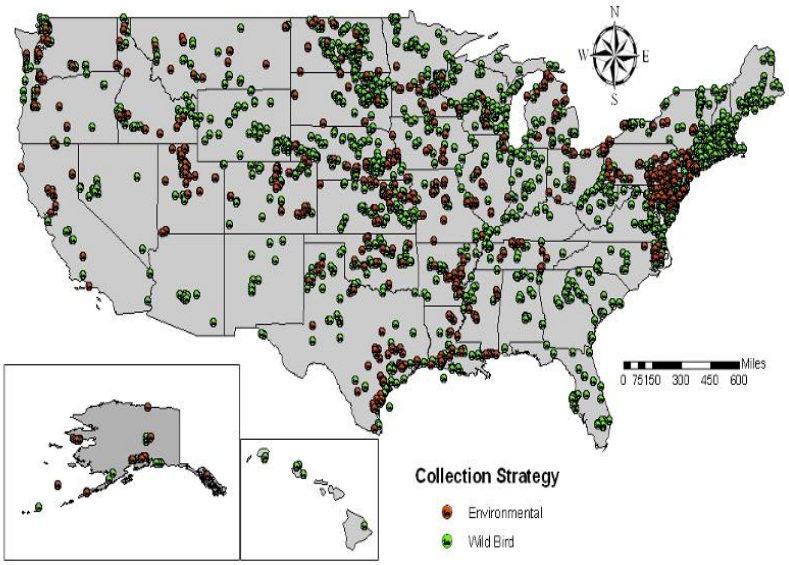


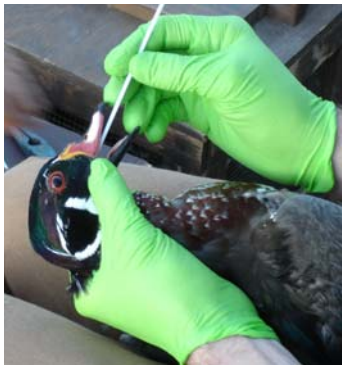
Figure 1. Biological Year 2008 Sample Distribution

This year's efforts resulting in sampling of over 1,000 sick or dead birds, and over 63,000 apparently health birds (i.e., live bird, hunter harvested, sentinels) Similar to previous years, excellent sample distribution was achieved (Figure 1). Many of the samples collected from morbidity/mortality events were submitted and diagnosed at USGS National Wildlife Health Center. Over 24,000 fecal samples were collected in 31 states and submitted to WS National Wildlife Research Center for diagnostic testing. Most notable is that none of the wild bird or fecal samples have tested positive for HPAI. From the over 63,000 wild bird samples submitted to the NAHLN, almost 6,800 (10.8%) have tested positive for type A influenza by rRT-PCR. While these data are preliminary, we've noticed a marked increase in the percentage of samples testing positive this year. Of the 6,800 positive samples, over 880 have screened positive for H5 or H7 when tested at NAHLN facilities. Fecal samples are pooled in batches of up to 5 samples prior to diagnostic testing, and approximately 150 pools have screened positive for the presence of type A influenza, with 3 of those pools testing positive for H5.

Further screening at NVSL determined that 20 samples from 13 States tested presumptive positive for both H5 and N1 by rRT-PCR; all of these have had viral sequences compatible with LPAI North American strains. Virus isolation results are pending for many of the samples, so virus isolation results and final rRT-PCR results will be published in the upcoming flyway reports. No HPAI has been detected in wild, migratory birds through this surveillance effort. Based on the enormity of the interagency surveillance effort, we are confident that our approach of balancing active, apparently healthy wild bird surveillance with morbidity and mortality investigations has yielded scientifically defendable data.

On behalf of WS NWDP, thank you for another successful year of surveillance. While we have been able to prove disease freedom of HPAI in wild, migratory birds, we have also learned a great deal regarding LPAI and determined many other causes of avian mortality.

**Data contained in this article are preliminary and should not be cited in other publications or print. For permission to cite this data, please contact the co-authors.*



http://www.aphis.usda.gov/wildlife_damage/nwdp/

Sensitivity and Specificity

By Dennis Kohler and Dr. Thomas DeLiberto

Sensitivity and specificity are measures for assessing the results of diagnostic tests. Sensitivity represents the proportion of truly infected subjects in a screened population that are identified as being infected by the test. It is a measure of the probability of correctly identifying an infected subject. Specificity is the proportion of truly non-infected subjects that are so identified by a test. It is a measure of the probability of correctly identifying a subject that is not infected.

If a test is completely accurate and performed correctly the specificity should be 100% and the sensitivity should be 100%. In other words the test always correctly identifies the infected and non-infected individuals. It should be noted that very few tests or diagnostic methods are 100% accurate. Below is a diagram depicting how samples or subjects are viewed as a test result.

Test Result	**Actual Infection Status**	
	Infected	No Infection
Positive	**true positive**	False positive
Negative	false negative	**true negative**

Individuals that actually are infected at the time of the sampling are **true positives**. Individuals that are not infected at the time of sampling are **true negatives.** A simple equation that can best describe how to calculate the sensitivity and specificity is as follows:

Sensitivity = (True positives ÷ (True positives + False negatives) x 100%

When the *false negatives* are small relative to the *true positives*, **Sensitivity** approaches 100%.

Specificity = (True negatives ÷ (True negatives + False positives) x 100%

When false positives are small relative to true negatives, **Specificity** approaches 100%.

Let's use this calculation with a hypothetical sample size of 100 birds, of which 50 have been experimentally infected in a lab and the remaining 50 are known to be free of AI. If we collect samples from these 100 birds and test them for any AI by rt-PCR, we get the following results:

Matrix rt-PCR Test Result	**Experimental infection Result**	
	Virus	No Virus
Positive	**18 (a)**	2 (b)
Negative	5 (c)	**75 (d)**

Thus:

Sensitivity of our matrix rt-PCR test is:

a/(a+c) = 18/(18+5) = 18/23 = 0.78 or 78%

and:

Specificity is:

d/(b+d) = 75/(2+75) = 75/77 = 0.97 or 97%

An inverse relationship between the sensitivity and specificity of a test usually exists. This means that for a test that is highly sensitive, the risk of having false negatives is low, but the risk of having false positives may be high. Conversely, if a test is highly specific, the risk of false positives is low, but the risk of false negatives is often high.

What exactly does this mean in the context of our HPAI Early Detection System? **Sensitivity** of the matrix rt-PCR test is the ability of the test to correctly identify those birds that **have** an AI virus. **Specificity** is the ability of the test to correctly identify those birds that **do not** have an AI virus.

If we sample wild ducks for AI and we screen them at a NAHLN lab using matrix rt-PCR, how would we calculate sensitivity and specificity of the matrix rt-PCR test? Unlike experimental infections, we do not have *a priori* knowledge of the infection status of individuals in the population. So how do we decide if an animal is truly infected or not? For diseases where we can isolate the organism and characterize it, such as the case of AI, we can use these animals as an index of truly positive individuals. Therefore, the sensitivity and specificity of the matrix rt-PCR test is based on the ability of a second test to accurately define the infection status of an individual.

A problem, though, is that we rely on the use of another test (a gold standard), such as virus isolation (VI) in the case of AI, to correctly identify the infection status of individuals. These additional tests are often not 100% accurate. For AI, VI was developed for detecting viruses in samples collected from chickens. When used in poultry VI is effective, but not perfect. For example, if a chicken was infected with an AI virus and the matrix rt-PCR test determined that a tracheal swab collected from the individual was positive, it is possible to have a negative VI test result. This could be due to a number of reasons such as the virus in the swab was dead and did not grow in eggs, or contaminates in the sample prevented growth in the eggs. If this were to occur, we would incorrectly classify the matrix rt-PCR test result as a false positive, thereby incorrectly lowering our estimate of specificity (i.e., a higher number of false positives decreases specificity).

The use of VI as the "gold standard" for determining the actual AI infection status of wild birds is even more problematic than in poultry. Factors such as dietary inhibitors, species variability, and use of chicken eggs for growing viruses adapted to wild birds all may influence growth of AI viruses in eggs.

As in the case of specificity, sensitivity can also be incorrectly estimated from a population where the *a priori* infection status is unknown. Factors such as the quality of

(Continued on page 5)

Foreign Animal Disease Surveillance in Feral Swine

By Seth Swafford and Brandon Schmit

Surveillance and monitoring of diseases transmitted or reservoired by feral swine have become increasingly important to animal health officials who are concerned with possible introductions of disease to domestic swine. Wildlife agencies and public health authorities also are concerned with impacts of feral swine due on natural resources and human health. These issues have led to the implementation of a "comprehensive" feral swine disease project by the NWDP, which includes surveillance for foreign animal diseases, monitoring of endemic diseases, and strategies to address management and control of feral swine to reduce the possibilities of disease introduction and spread.

Wildlife Services, VS, and many other partners have worked together to document disease status in feral swine populations and improve our ability to evaluate risk of disease introduction to domestic swine herds. Efforts were initially focused on pseudorabies and swine brucellosis, which have national implications on agricultural trade. Classical swine fever was added to the "comprehensive" plan because of its potential impacts to the swine industry if introduced into the United States. More recently, surveillance for *Trichinella, Toxoplasmosis*, porcine reproductive and respiratory syndrome (PRRS) in feral swine has been initiated with expectations to expand the projects to include a larger geographic area and increased sample sizes. These efforts have propelled WS to the forefront of feral swine disease surveillance and solidified the program as the lead agency regarding feral swine management in the U.S.

Significant expansion of the comprehensive feral swine disease project should occur this year by testing feral swine for three additional foreign animal diseases. The first will be WS involvement in a foot-and-mouth disease (FMD) pilot project, with support from VS, the NAHLN, and APHIS. A pilot project is being designed to test feral swine for FMD in nine States. Since FMD is one of the most contagious diseases of mammals, animal health and wildlife officials are developing proactive efforts to conduct surveillance for vesicular diseases in future years. Inclusion of feral swine in vesicular disease surveillance is a prudent step as feral swine have been identified as a viable stream for introduction and spread of the virus.

Starting this fiscal year, WS will likely participate in a negative cohort project to test feral swine for African swine fever and rinderpest. Both of these foreign animal diseases will be tested as part of a VS, NAHLN, and WS partnership to improve diagnostic testing.

Everyone's efforts have resulted in WS being recognized as the lead agency regarding feral swine management and disease surveillance. Utilizing WS skills and working at the livestock-wildlife interface allows us to address the front line issues surrounding these zoonotic, foreign animal, and endemic diseases of swine.

Wildlife Disease Program Tissue Archive

By John Baroch

The establishment of a tissue archive to collect and preserve biological samples of interest related to wildlife diseases was identified as an important function of the NWDP in the National Wildlife Disease Surveillance and Emergency Response Business Plan. For the past 3 years samples collected from wild birds, feral swine, coyotes, and other animals have been submitted to the National Wildlife Disease Tissue Archive in Fort Collins, Colorado.

The collection consists of a variety of sample types, including avian oropharyngeal and cloacal swabs, nobuto strips containing whole blood from a variety of mammal species, and serum. The largest component is the collection of swab samples from wild birds collected as part of the avian influenza surveillance project. The archive currently holds more than 150,000 swab samples collected from wild birds since 2006. The repository is unique among biological tissue collections in terms of the species surveyed, the broad geographic range of sources, and the sheer quantity of samples. The network of collectors whose samples feed into the archive includes a wide variety of federal agencies, natural resource agencies from all 50 states, and several foreign countries.

Sean Hauser aliquoting AI negative samples into cryovials

The goal of the archive is to support research into wildlife diseases through the sharing of data and direct loaning of tissue samples. The initial focus has been on streamlining the processing of incoming samples, building the physical storage capacity, and entering records into a Laboratory Information Management System (LIMS). Recently, the program began developing material transfer procedures in response to a growing number of requests for research samples. As awareness of the archive grows the number of requests for samples has increased. For example, we currently have about a dozen requests for various avian influenza samples. As requests begin to compete for the same sample sets or overlapping sample sets, the archive managers will be developing objective criteria to prioritize projects.

In the summer of 2009 the tissue archive will be relocated to a new animal disease diagnostic facility at Colorado State University. The National Wildlife Disease Program operates the tissue archive in partnership with CSU through a cooperative agreement.

Workshop on Wild Birds in Bangladesh

By Dr. Dale Nolte

Wildlife Services has conducted a series of workshops across Asia to raise awareness regarding the potential role of wildlife in the spread or persistence of avian influenza (AI). Our approach has been to form partnerships with government agencies and non government organizations to identify current capacity and future needs. Often agricultural and wildlife entities have limited experience or knowledge of each other's expertise. Working together to develop workshops facilitates a shared awareness pertinent for responding to zoonotic disease outbreaks involving wildlife.

Participants at the USDA Wildlife Services co-sponsored workshop on HPAI and Wild birds in Bangladesh

The latest workshop "The Role of Wild Birds in the Persistence and Spread of Highly Pathogenic Avian Influenza" was conducted in Dhaka Bangladesh on March 17 to 19. The workshop was hosted by IUCN and sponsored by Wildlife Services in cooperation with FAO. Developing partners in Bangladesh included Ministry of Environment and Forests, Ministry of Fisheries and Livestock, government research organizations and universities, along with non-government organizations (NGOs) working on wildlife conservation, environment and health. Several US government international agencies provided guidance and support to advance the activity.

Increased incidences of AI in Bangladesh over last few years have caused considerable concern. Bangladesh is a country with a rich diversity of plants and animals. The country harbors 644 species of birds of which almost 40% are migratory. As the migratory birds travel long distances, they are exposed to other birds and environmental conditions across varied areas and have the potential to become infected and move AI. There are frequent opportunities for wild birds and domestic birds to interact. This contact is increasing as numbers of duck farms and size of domestic flocks increase. Collecting wild birds is illegal, but both Bangladesh Forestry Department and NGOs recognize it happens as birds are commonly found for sale in markets for human consumption. Bangladeshi ornithologists have observed significant numbers of dead and sick water birds, particularly in large wetlands and along coasts; species include Gadwall, Eurasian Widgeon, Brown-headed Gull, Black-headed Gull, Lesser Sand Plover and Red-necked Stint. No investigations have been conducted so it is not possible to determine cause. NGOs have expressed concern that these were not isolated incidents and other events have occurred. Little also is known about the human health aspects of these outbreaks. A lack of awareness of the situation has created fear in the minds of some people. Conservation groups have expressed concern that people suspecting wild birds of spreading AI may kill migratory water birds to save local poultry.

The workshop goal was to improve existing knowledge on how AI is spread and the role of wildlife. Approximately 100 persons attended representing both wildlife and agriculture entities in Bangladesh. In the two-day workshop, a series of papers and presentations were delivered by national and international experts highlighting various vital issues and concerns associated with AI and wild birds. Experts covered topics ranging from a global perspective on AI, history and general knowledge, clinical signs, potential genetic variations and mutations, bio security issues, and food safety.

(Sensitivity and Specificity ~ continued from page 3)

the sample, the amount of the sample on the swab, the samples exposure to UV light, or the species of bird, could result in a negative rt-PCR test result, when in fact the animal was truly infected. Increasing the number of false negatives in the sample will result in a lower sensitivity.

In the case of HPAI, we are generally more concerned with the sensitivity of rt-PCR than the specificity. In other words, we want to maximize sensitivity, the proportion of diseased animals that are correctly identified by rt-PCR. We would rather err on the side of making false positives than false negatives. The consequences of missing the disease are much greater than those of mistakenly calling a sample positive with our screening test. False positives will always be followed up with VI, genetic sequencing, and additional sampling. However, misidentifying a truly positive bird as negative will result in no additional testing. This could ultimately delay the time at which the HPAI is detected in the population, thereby delaying response time.

By conducting a series of tests on presumptive positive samples and interpreting the results in parallel, we can enhance sensitivity in wild bird AI surveillance. This means that by running a series of tests (i.e., rt-PCR, genetic sequencing, and VI) we define a bird as positive if any of the tests are positive. Ideally, all three tests would be run on all samples, but this would take a tremendous amount of resources. Therefore, we compromise and only run genetic sequencing and VI on rt-PCR H5/H7 positive samples. This still enhances sensitivity, although not to the degree to which it would be enhanced if we ran all three tests on every bird sampled.

While the Sensitivity and Specificity are good ways to evaluate **diagnostic tests** in the context of identifying infection in populations, they are of limited value when attempting to determine the probability that a positive test is indicative of infection in a **specific individual**. Only when sensitivity or specificity is high (e.g., >80%) can you rule in or out an infection in an individual with your test. There are better predictors of the probability that an **individual** with a positive test result actually has an infection. These are Predictive values and Likelihood Ratios. However, given that we are in the business of diagnosing populations and not individuals, those are topics we will save for a later time.

STATE HIGHLIGHTS

Western Region

Avian Influenza

Janean Romines has been collecting respiratory tissue from hunter-harvested Collard Peccary taken on a ranch in North Texas. The tissue will be used for a study being conducted by researchers at NWRC in Ft. Collins, CO. The study entails looking at the epithelial cells of respiratory tissue in peccaries, to try and determine if they can play a role in the transmission of avian influenza.

Neospora

In New Mexico, Justin Stevenson has been collecting Neospora samples from coyotes during calving protection activities. Samples will be collected throughout the state in hopes of getting insight on the presence of *N. caninum* in N.M. coyotes. Brook Zscheile in Utah has been conducting trapping activities at Utah County dairy farms that have had several issues with *N. caninum*. The trapping has focused on raccoons due to their abundance and interest determining if these mammals are infected with the parasite. Fecal sampling is also being conducted for raccoon, wild canid's and domestic dogs. All the samples are submitted to the Utah State Veterinary Diagnostic laboratory for either necropsy or fecal float testing.

Raccoon Roundworm

There is growing interest in raccoon roundworm (*Baylisascaris procyonis*) in both Utah and Wyoming. In Utah, Brook Zscheile has begun to necropsy raccoons to look for B. *procyonis*. After meeting with state public health and veterinary officials, Mike Pipas in Wyoming concluded there is a strong interest in a statewide surveillance program to ascertain the prevalence of the parasite in Wyoming's raccoon population and is also initiating a survey.

Techniques

In Hawaii, a floating duck trap has been constructed to assist in collecting samples for avian influenza. The trap is essentially a 10 ft. walk-in trap attached to a 14 ft. floating platform. It can easily be deployed using a simple pulley system. Contact Sam Goldstein for details. Meanwhile in North Dakota, Ryan Powers and Brent Ternes are currently working on a shooting bench that rotates 360 degrees for wildlife removal and disease surveillance projects that are conducted from a pickup in mobile situations. The shooting bench will assist North Dakota WS personnel with numerous projects including the removal of deer at airports that are tested for CWD.

Floating Duck Trap

Cooperative Efforts

On January 5th, Bill Sparklin attended the monthly Arizona disease roundtable. The roundtable includes a number of agencies and is held to discuss the status of routine sampling, research, and emerging disease issues in Arizona. In Nebraska, Dallas Virchow has been working with a local waterfowl club to use semi-domestic waterfowl as a sentinel flock for HPAI surveillance. These waterfowl commingle with wild geese during the migratory period.

Eastern Region

Chronic Wasting Disease (CWD)

WDB Marks serves as the point of contact for the Michigan Department of Natural Resources and Michigan Department of Agriculture on CWD. After the discovery of a CWD-positive captive deer, the State of Michigan has placed quarantines on all privately-owned cervid facilities. WS has been tasked with conducting risk assessments on those facilities to assist the State in determining if they can be released from quarantine. The assessments follow similar protocols/procedures that the State uses for certification (fence/animal inspections, records checks, and audit interviews). To date, WS has conducted assessments at 219 facilities in Michigan.

CWD Sampling facility in Michigan

Malignant Catarrhal Fever (MCF)

Todd Puckett assisted the veterinarian from Virginia Department of Game and Inland Fisheries (VDGIF) and a student from University of Tennessee, College of Veterinary Medicine on a project involving the white-tailed deer variant of malignant catarrhal fever (MCF). During 2 nights on the Eastern Shore, 34 whole-blood and inguinal lymph node samples were collected from agency harvested deer. Samples were prepared and shipped to the University testing.

West Nile Virus (WNV)

Justin Gansowski is overseeing the Dead Bird Hotline in its 9th year of operation. The Dead Bird Hotline continues to assist with Avian Influenza surveillance in an effort to look for mass mortality events in birds. The hotline assists the New York State Department of Health (NYSDOH) and NYS Department of Environmental Conservation (NYSDEC) by answering calls from the public and logging information into the Health Information Network. The data collected by WS is an essential component of a statewide multi-agency WNV management plan to assist the NYSDOH in monitoring the dead crow density that appears to be a critical part of forecasting the risk to human health from WNV.

Bovine Tuberculosis (b-TB)

Paul Wolf coordinated with the Minnesota Department of Natural Resources (MNDNR) in mobilize WDB's to assist with a bovine Tuberculosis (b-TB) management project. This year, the project began in mid-February and will continue into April. MNDNR signed an MOU with the USDA/VS to collect 1,800 deer samples around the b-TB management area. Only 1,250 samples were collected from hunter harvested deer this past fall/winter hunting season. Of the samples collected, only four hunter harvested deer were identified as b-TB suspect based on lesions found on the lymph nodes. The University of Minnesota Diagnostic Laboratory and NVSL confirmed the samples as negative and indicated the abnormalities were a result of parasitic migration.

National Wildlife Disease Surveillance and Emergency Response Program

For more information on the Wildlife Services Wildlife Disease Program in your state, please call 866-4 USDA WS, or contact the following staff:

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Mexico Wild Bird AI Surveillance Program

By John Baroch and Dr. Dale Nolte

The 2008-2009 sampling season is underway. This season is the third year of large-scale, systematic surveillance of wild birds for avian influenza in Mexico. Wildlife Trust coordinates the program through a cooperative agreement with APHIS. They are a leader in wildlife conservation and wildlife disease study in Latin America, and have established cooperative relationships with scientists, educators, and natural resource agencies in Mexico. A trilateral working committee including representatives from Mexico, Canada and the United States meets annually to coordinate sampling efforts across countries and promote uniform methodologies and surveillance design program that complement each other.

Dr. Alonso Aguirre of the Wildlife Trust instructing a student in avian necropsy techniques, at the University of Veracruz Veterinary College, as part of an AI workshop presented by the NWDP.

For example, annual adjustments in the sampling program in Mexico mirror changes in the United States program. The survey plan is progressively refined with a more targeted focus each year as more is learned about the ecology and distribution of low pathogenic avian influenza in wild bird populations. This "targeted surveillance" strategy is reflected in the numbers of wetlands and birds included in the survey each year. During the 2006-07 survey, samples from 4694 birds were collected at 28 wetlands across Mexico. This year, 18 wetlands and about 3800 wild birds will be sampled.

In prior years, surveillance season in Mexico has stretched from October to March, when migratory birds from North America, along with some from Eurasia, converge on Mexico for the winter. This year the sample collection in the field was delayed until a new diagnostic laboratory was certified in Sinaloa, Mexico. Previously samples were sent to Mexico City. The new laboratory is located closer to several key wetlands which will expedite rapid transfer of samples from the field to the laboratory. Laboratory diagnostics will continue to be performed under the supervision of Dr. Anali Sandoval, APHIS/IS-Mexico. Ducks Unlimited-Mexico (DUMAC) is assisting Wildlife Trust with sample collection. Their familiarity with the wetlands and water birds of Mexico is a valuable asset to the program.

UPCOMING MEETINGS AND TRAININGS

7th International Avian Influenza Symposium on Avian Influenza
Athens, GA ~ April 5-8, 2009

SCWDS Foreign Animal Disease Training
Athens, GA ~ May 12-14, 2009

National Wildlife Disease Program Annual Meeting
Fort Collins, CO ~ June 9-12, 2009

Necropsy Training
Fort Collins, CO ~ June 15-17, 2009