

SCWDS BRIEFS

A Quarterly Newsletter from the
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National Feral Swine Mapping System

Feral swine are free-ranging Eurasian wild boar, recently escaped or released domestic swine or their descendants, as well as hybrids of any of these animals. Feral swine are well known for the damage they cause to crops and wildlife habitat and for carrying domestic swine diseases, such as pseudorabies (PRV) and swine brucellosis. Feral swine populations represent a risk for transmission of these diseases to domestic pigs, particularly those in facilities with inadequate biosecurity. The significance of PRV and *Brucella suis* in the feral swine reservoir has been elevated by the eradication of these diseases from domestic swine in the United States, and a recently implemented real-time map of feral swine distribution now allows animal health officials, wildlife biologists, and swine producers to assess the risk that feral hogs currently represent on a local basis. In 1982, SCWDS produced a set of maps depicting the nationwide distribution of feral swine and several other species of cloven-hoofed native wildlife that are susceptible to foot and mouth disease. SCWDS updated the feral swine map in 1988 and 2004 to meet the continuous demand for information on the dramatically expanding range of these animals: In 1982, 17 states reported feral swine in 475 counties, and by 2004, 28 states reported feral swine in 1,014 counties.

In response to the need for current data on feral swine distribution, SCWDS has developed the National Feral Swine Mapping System (NFSMS) in cooperation with USDA-APHIS-Veterinary Services. This is an interactive data collection system that can be accessed at <http://www.feralswinemap.org/>. The site was developed to collect and display current distribution data on feral swine in the United States. The home page is available to the public, but a password available only to designated personnel is necessary to access the interactive data collection areas of the site. Operation of the NFSMS is a

collaborative effort between SCWDS, the University of Georgia's (UGA) College of Veterinary Medicine's Information Technology Department, and the Center for Remote Sensing and Mapping Science in the UGA Department of Geography.

As with previous maps, personnel with state and territorial natural resources agencies, as well as with USDA-APHIS-Wildlife Services, provide distribution data for the NFSMS. Agency personnel can submit this information at any time, the data are carefully evaluated by SCWDS, and we update the national map on a monthly basis. The NFSMS allows us to collect data on a continual basis, as well as to differentiate established populations from one-time sightings. Agency personnel simply locate the selected areas on the website map and draw additions to the feral swine distribution directly onto the map using a computer mouse. Populations and sightings are differentiated as shaded areas or single points. Areas where feral swine have been eliminated can be deleted from the map in the same manner.

In addition to providing the national map through the website, SCWDS can furnish state or regional maps on request. Although it was developed primarily for evaluating the local risk of PRV and swine brucellosis posed by feral swine, the NFSMS also can provide critical information for emergency responders attempting to stamp out an incursion of foot-and-mouth disease or other foreign animal disease affecting feral hogs. (Prepared by Joseph Corn)

Feral Hog Conference

The 2008 National Conference on Feral Hogs was held in St. Louis, Missouri, April 13-15. The conference was organized by the Missouri Department of Conservation and was attended by more than 190 persons from state and federal agencies, non-governmental organizations, private

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companies, and universities. Participants came from throughout the continental United States, Hawaii, Australia, and England. This level of participation reflects the concern over the expansion of feral hogs in the United States and elsewhere over the past 20 years.

Conference presentations addressed private landowner issues, expanding feral hog distribution, new feral hog control methods, legislation and legal status relative to control and eradication, and immunocontraception. In addition, numerous updates on feral hog control and eradication programs were provided by state agencies, USDA-APHIS-Wildlife Services, and the U.S. National Park Service.

Regional approaches to feral hog control differed according to the status of swine populations. In the Southeast and Texas, where feral swine have been well established for many years, efforts are concentrated on management techniques and damage mitigation, because eradication appears unfeasible. However, in the Midwest, Northeast, and Plains states, where feral swine are relatively new, the focus is on legislation, control techniques, and eradication: Efforts are underway to eradicate wild hogs in Kansas, Michigan, Missouri, Nebraska, and New York. In Kansas and Nebraska, feral hog hunting has been banned in order to stop illegal swine releases. Landowners in these states are allowed to kill feral hogs on their property, but wildlife and agriculture officials are discouraging development of public interest in feral swine hunting.

Looking to the future, priorities for further study included immunocontraception, improved control techniques, evaluating the economic impacts on wildlife resources and agriculture, and economic impacts at the urban/suburban interface. The continued expansion of feral swine in the United States has greatly increased the magnitude and geographic range of crop and habitat damage issues associated with these animals. Further feral swine expansion will come with a higher price as conflicts increase between humans and wild hogs because of damage to native wildlife, habitat, and crops, as well as increased risk of disease transmission to domestic swine. (Prepared by Joseph Corn)

Wilbeest MCF in U.S. Cattle

In April 2008, wildebeest-associated malignant catarrhal fever (MCF) was diagnosed in six cattle from a Texas ranch. Three cases occurred in cattle on the ranch, and three others were found among approximately 135 breeding heifers that had been shipped to Alabama, Arkansas, Georgia, Illinois, Louisiana, Mississippi, and to other Texas ranches. One heifer transported to Georgia developed keratitis, bilateral nasal discharge, and fever shortly after shipping. The animal was hospitalized at the University of Georgia's College of Veterinary Medicine but was euthanized after developing progressive neurologic signs. An ante-mortem polymerase chain reaction (PCR) test on this animal at Washington State University indicated the heifer had been exposed to ovine herpesvirus-2 (OHV-2), the cause of sheep-associated MCF. However, results of nested PCR tests on tissues collected at necropsy in Georgia and sent to the USDA-APHIS-National Veterinary Services Laboratories (NVSL) revealed the heifer also suffered from wildebeest-associated MCF caused by alcelaphine herpesvirus-1 (AHV-1). The NVSL ultimately diagnosed MCF AHV-1 in samples from two other clinically-affected heifers and one bull in the original Texas herd, as well as from one heifer in Alabama and one in Louisiana. All affected cattle apparently were exposed to the virus via captive wildebeest on the original Texas ranch prior to shipping.

Malignant catarrhal fever is a sporadic but usually fatal disease of domestic and wild ruminants, including cattle, bison, deer, and elk. It poses no threat to human health and is not transmissible to people. Although OHV-2 is endemic in North America, AHV-1 (wildebeest-associated MCF) in cattle is considered a foreign animal disease to the United States. Neither infected sheep nor wildebeest show signs of disease; however, they shed the MCF viruses, particularly during parturition. Ruminants that develop clinical MCF appear to be dead-end hosts, and cattle to cattle transmission of MCF virus is regarded as rare or nonexistent.

The wildebeest- and sheep-associated forms of MCF are indistinguishable in infected animals, and disease typically is acute and fatal. Clinical signs of MCF can vary and are due to the predilection of the virus to infect lymphocytes and epithelial cells. The typical signs of acute MCF are fever with mucopurulent nasal and ocular discharges, corneal opacity, mucosal erosions and ulcerations,

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salivation, hematuria, and diarrhea. Necropsy findings may include ulcerations in the upper respiratory and gastrointestinal mucosa and enlarged lymph nodes throughout the body. Microscopically, epithelial necrosis, lymphocytic vasculitis, and perivascular lymphoid proliferation may be seen. Death often occurs within 7-8 days post infection in the acute form of MCF.

Malignant catarrhal fever has been diagnosed in many captive wild animals, including several cervid species housed or pastured in proximity to wildebeest or sheep. However, confirmed MCF cases in free-ranging ruminants in the United States have been rare. Sheep-associated MCF was diagnosed in four free-ranging mule deer in the winter of 2003 in Colorado (Shultheiss et al. 2007. *Journal of Wildlife Diseases* 43:533-537). Post-mortem lesions were consistent with MCF, and genetic sequences of OHV-2 were detected in lung tissue by PCR testing. The only other reported MCF in free-ranging wildlife occurred in 1985 in black-tailed deer in California, but MCF was not confirmed by demonstration of the virus.

Because wildebeest-associated MCF in cattle is considered foreign to the United States, federal and state animal health agencies have taken measures to control the outbreak. The Texas facility was quarantined to prevent any future movement, and all animals from the herd were placed on hold while an epidemiologic investigation identifies cattle that may have been exposed to the wildebeest virus. USDA-APHIS-Veterinary Services is tracing animal movements from the Texas herd and is working with states that received exposed cattle to depopulate the heifers and indemnify the owners for the loss. Additional information on MCF can be found at the USDA-APHIS website www.aphis.usda.gov/newsroom. (Prepared by Jessica Stewart, UGA College of Veterinary Medicine, Class of 2009)

The Value of Wildlife Recreation

Results of the 2006 “National Survey of Fishing, Hunting, and Wildlife-Associated Recreation” recently became available following collection and analysis of data by the U.S. Fish and Wildlife Service (USFWS). According to the survey, 87.5 million people 16 years old and older (38% of the population) spent \$122.3 billion on fishing, hunting, and wildlife watching in the United States in 2006. Many people participated in more than one of the activities. The 30 million who fished spent \$42.2

billion, while 12.5 million hunters spent almost \$23 billion. But, as in previous surveys, “non-consumptive” wildlife-related activities, such as watching, feeding, and photographing wildlife, were far more popular than fishing or hunting, with about 71.1 million individuals participating and spending \$45.7 billion.

The USFWS gathers this information in order to better manage America’s wildlife resources. The survey determines how many people utilize these resources and who they are, as well as the economic impacts of fishing, hunting, and wildlife watching in the United States. The survey began in 1955 and is conducted every five years at the request of the state fish and wildlife agencies to measure the importance of wildlife-based recreation. The survey was developed in cooperation with the states, the Association of Fish and Wildlife Agencies, and national conservation organizations.

Those who fish, hunt, bird watch, or otherwise enjoy the bountiful wildlife resources of this country are well aware of the aesthetic values derived from participating in these activities, but the USFWS Survey shows that the related expenditures are quite significant on a national basis. For example, the total expenditures of \$122 billion equal approximately 1% of the country’s gross domestic product. Fish and wildlife recreationists spend money on licenses, transportation, gasoline, lodging, boats and motors, food, bait, fishing tackle, guns and ammunition, binoculars, land use fees, special clothing, magazines, and hundreds of other incidentals.

The entire 174-page document can be accessed at http://library.fws.gov/nat_survey2006_final.pdf. The report is packed with detailed and interesting information related to state, region, gender and age of participants, and is organized according to the many species of fish and wildlife pursued by anglers, hunters, and wildlife watchers. And, of course, for us to continue to enjoy and benefit from our precious and abundant fish and wildlife resources it is important that we all do everything we can to maintain healthy and well managed populations. SCWDS is proud of the role we have played for the last 51 years. (Prepared by Gary Doster)

Unusual Antlered Doe

In January 2008, a hunter killed what he thought was a fork-horn buck in Levy County, Florida. The deer had polished antlers and a massive neck like a buck in rut (Figure 1). However, when the hunter prepared to dress the deer he was surprised to discover that the “he” was in fact a “she”. There were no male genitalia, and the deer had what appeared to be a normal vulva. The hunter notified personnel with the Florida Fish and Wildlife Conservation Commission (FFWCC) who conducted a necropsy to investigate the gender of the deer. They collected samples for a testosterone assay and determined that this doe had levels similar to those of a rutting buck. However, the deer had a vulva and teats that appeared normal. The ovaries and uterus were identified at necropsy, but the deer was not pregnant. The left ovary was atrophied (0.5 X 0.4 X 0.3 cm), while the right ovary was greatly enlarged (7 X 8 X 6 cm). In all other aspects the deer seemed healthy.

Formalin-fixed tissues were submitted to SCWDS for a diagnosis of the ovarian mass. Cut surfaces revealed the ovary was largely replaced by firm, white, nodular tissue, interpreted to be a tumor (Figure 2). This ovary also had a ruptured 6-cm-diameter cystic cavity on one side and a hemorrhagic nodule just under the capsule. Microscopic examination revealed that the ovary was largely obliterated by a neoplasm known as a granulosa cell tumor. This tumor is most commonly found in horses and often is associated with aggressive behavior due to the production of hormones, including testosterone.



Figure 1 Photo by Gene Fuget

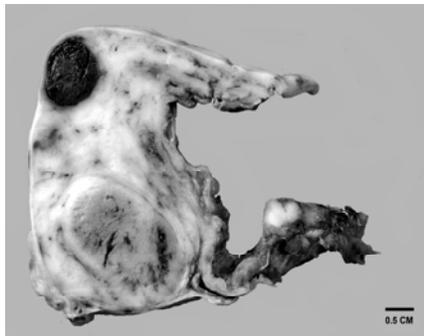


Figure 2 Photo by Kevin Keel

There have been multiple reports of antler development in pseudohermaphroditic deer: They had external female genitalia but internal male sex organs. The Florida case is unusual because it appears that this deer began life as a normal doe, but later developed a tumor that resulted in

testosterone production. Due to the elevated testosterone, the deer developed secondary male characteristics, including antlers and muscular hypertrophy.

We thank the FFWCC personnel involved in this case for a thorough investigation and for taking the time to submit tissues to SCWDS for histopathology. (Prepared by Kevin Keel)

White Nose Syndrome in Bats

White nose syndrome (WNS) in bats was first identified near Albany, New York, in early 2007 and subsequently has affected tens of thousands of hibernating bats in the Northeast. It is named for a distinctive white ring of fungal growth around the muzzle of affected bats; however, it is unknown if the fungi kill the bats or are secondary to one or more unidentified disease processes. To date, WNS has been found in bats in more than 25 caves and mines in Connecticut, Massachusetts, New York, and Vermont and is suspected at three sites in Pennsylvania. Mortality rates among hibernating bats have approached 90%. The little brown bat has been the hardest hit species, but varying numbers of northern long-eared bats, small-footed bats, eastern pipistrelle bats, and endangered Indiana bats also have been affected.

On April 30, 2008, the U.S. Geological Survey's National Wildlife Health Center (NWHC) issued a Wildlife Health Bulletin describing the current knowledge of WNS (<http://www.nwhc.usgs.gov/>). The most common finding in necropsied bats is emaciation, with many bats showing little or none of the body fat needed to survive winter hibernation. Some hibernating bats were found clustered in unusual locations near the entrances of caves and mines, and bats have been seen flying outside their hibernacula during winter, which is highly unusual. Some bats had lesions in the lungs; however, fungi have not been observed internally in affected bats other than in sebaceous glands of the skin. Most bats have microscopic or grossly visible external fungal colonies, and the white material may be an overgrowth of fungi normally found on bat skin rather than a primary pathogen. Investigations into the cause(s) of morbidity and mortality, including underlying environmental factors, potential pathogens, and toxins, are under way.

Currently, it is unknown whether infectious disease agents play a key role in WNS. Because causative

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agents and their epidemiology are unknown, concerns have been voiced regarding the potential ease of transmission among hibernating bats densely clustered in caves. Additional concerns have been raised about a potential role for humans in the spread of WNS from cave to cave, although this has not been documented. Containment and decontamination procedures to prevent potential human-facilitated spread of WNS between caves have been recommended by the Northeast Region of the U.S. Fish and Wildlife Service (USFWS) (http://www.fws.gov/northeast/white_nose.html).

Persons finding sick or dead bats inside or outside caves are advised not to handle the bats, but are asked to contact their state wildlife management agency, nearest office of the USFWS, or the NWHC.

Bats are integral components of the ecosystems they occupy, and they consume huge numbers of insects. Significant reduction of bat populations could have far-reaching ecological effects, potentially including increased populations of insects carrying disease agents that can affect humans, as well as wild and domestic animals. There has been no evidence that WNS poses a risk to humans. However, our poor understanding of WNS and its cause warrants a cautious approach when in contact with sick or dead animals or their environment. Additional information on WNS, including WNS distribution maps and telephone numbers and email addresses for reporting sick or dead bats, can be found at the websites of the NWHC, the Northeast Region of the USFWS, state wildlife management agencies, and Bat Conservation International. (Prepared by Jessica Stewart, UGA College of Veterinary Medicine, Class of 2009)

New Myxozoan Parasite in Ducks

Myxozoans are spore-forming metazoan parasites that traditionally have been known to infect invertebrates and cold-blooded vertebrates. Myxozoan species that parasitize cold-blooded vertebrates are in the Class Myxosporea, and the vast majority infect fish. Most of these parasites are host-adapted, and infection does not result in severe disease or death of the host animal. Important exceptions include Myxozoan species in wild and captive-raised fish that cause significant problems, such as whirling disease and proliferative gill disease. Currently, more than 2,000 species of Myxozoans are known worldwide. While the biology and developmental stages of most Myxozoans are

not completely understood, the life cycle of several species that parasitize fish have been found to require an alternation between two host systems: an invertebrate host (commonly aquatic oligochaete annelid worms) and a cold-blooded vertebrate host (fish). The life cycle of Myxozoan parasites that infect non-fish vertebrate hosts, including reptiles, amphibians, and mammals, has not been described, and it is unknown if an alternate life stage occurs in an invertebrate host.

In addition to fish, Myxozoan infections occur occasionally in other cold-blooded vertebrates, with 20 species reported to infect turtles, tortoises, and amphibians. Sporadically, Myxozoan parasites have been reported in mammals, including humans, but the vast majority of these mammalian infections were unconfirmed, presumptive diagnoses. Although developmental stages of the parasites were detected, mature spores or other features required to confirm the parasite as Myxozoan were absent, or mature spores were detected in the absence of developmental stages. Mature spores without developmental stages might indicate that spores were simply passing through and the host was not actually parasitized. Recently, both developmental stages and mature spores of a new species of Myxozoan were reported in several shrews in Poland, providing definitive evidence for the development of this parasite in a warm-blooded host.

SCWDS personnel recently became part of a collaborative research team that described a new species of Myxozoan, *Myxidium anatidum*, that infects ducks. This constitutes the first report of a Myxozoan in an avian species. The manuscript will appear in an upcoming issue of the *International Journal for Parasitology* and will provide details of nine cases of Myxozoan infection in free-living, feral, and captive ducks that occurred from 1994-2006 in California, Florida, Georgia, and Texas. Myxozoan infections were detected in juveniles, adults, males, and females of seven species: South African yellow-billed ducks (*Anas undulate undulate*), cape teal (*Anas capensis*), mallards (*Anas platyrhynchos*), Baikal teal (*Anas formosa*), wood ducks (*Aix sponsa*), smews (*Mergus albellus*), and Pekin ducks (*Anas platyrhynchos*). In each case, only individual ducks were affected. The ducks all were found dead, and Myxozoans were detected microscopically in the liver and bile ducts during routine diagnostic examination. In most cases, a primary cause of mortality other than the Myxozoan was identified, although mild to severe inflammation

was associated with the presence of the parasite in the livers of some ducks. Although the parasitism may not have directly caused the death of these ducks, the infection and associated inflammation may have adversely affected the health of the host and potentially contributed indirectly to these mortalities.

We currently have a limited understanding of Myxozoan parasites in waterfowl. Numerous questions remain regarding the life cycle, the route of transmission, host range, and the ability of Myxozoans to cause disease and death in ducks. Additionally, and on a larger scale, we do not understand how or why this parasite, traditionally found in cold-blooded vertebrates, now is being detected in warm-blooded hosts (mammals and birds). Detection of this organism in ducks, combined with recent increased surveillance of waterfowl for avian influenza virus and for diseases in general, may yield more cases of parasitism and a better understanding of this newly recognized host-parasite relationship. (Prepared by Justin Brown)

Duncan New Director in Virginia

On February 6, 2008, The Board of Game and Inland Fisheries in Virginia announced that Bob Duncan had been selected as the Executive Director of the Virginia Department of Game and Inland Fisheries (VDGIF) and was to take office on February 10. They could not have chosen a better man for the job.

We have a special interest in Bob as a good friend and as Chairman of the SCWDS Steering Committee. In fact, Bob is the senior member of the 23-person committee, having served since 1986, and he has been Chairman since 1998.

Bob earned a BS degree in forestry and an MS degree in wildlife management from the University of Tennessee in 1971 and 1974, respectively. After completing his MS degree, Bob worked as a wildlife biologist for the Kansas Department of Wildlife and Parks for a year and then spent three years with the Tennessee Wildlife Resources Agency. In 1978 he returned to his native Virginia and began working for VDGIF, where he has remained for the last 30 years. Bob steadily moved up through the ranks from District Game Biologist to Game Management Field Coordinator to Assistant Chief of Wildlife, and,

since 1990 he has served as Director of the Wildlife Division of VDGIF.

Bob has enjoyed a productive, illustrious career with VDGIF and is highly respected by his superiors, his peers, and the sportsmen and sportswomen of Virginia. It would take an entire issue of the *SCWDS BRIEFS* to recount all of his accomplishments and his numerous awards. The Chairman of the VDGIF Board, Jimmy Hasel, said it best when he announced that Bob had been selected for the job: "Bob Duncan is highly regarded by wildlife professionals and sportsmen alike. His passion for his work and commitment to the science of wildlife management have earned him a national reputation among wildlife professionals. His passion for hunting gives him a special connection with the Department's constituents." We could not agree more. (Prepared by Gary Doster)

SCWDS Personnel Awards

We have been justly honored and proud over the years for all the awards and recognition received by SCWDS students and staff - and they keep coming!

Dr. Justin Brown, who has been recognized numerous times since joining us, just received another award - this one for Excellence in Research by Graduate Students, given by the University of Georgia. Five awards of \$1,000 each are given annually to recognize outstanding student research, one from each of five scholastic disciplines in the university. Students are nominated by their departments, and recipients are selected by a faculty committee. Justin was nominated by Drs. David Stallknecht and Buffy Howerth for his work on his PhD dissertation entitled "H5N1 Highly Pathogenic Avian Influenza Virus in Wild Birds: Potential for a New Wildlife Disease or a Dead End?" This is just one of several awards received by this exceptional and dedicated individual during his graduate career, and we predict great things for him in the future. Way to go, Justin.

Another regular award winner, Dr. Michael Yabsley, added another prize to his growing list by receiving the 2008 John M. Bowen Award for Excellence in Animal/Biomedical Research given annually to a "member of the faculty who has demonstrated excellence while developing an animal health/biomedical research program in the College of Veterinary Medicine at the University of Georgia."

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Recipients must hold the rank of assistant professor or assistant research scientist, have been hired within the last five years, and be the principle investigator in a project that “shows promise of attaining national recognition and that has been supported by extramural funds.” Michael has had several projects that fulfill these criteria. The prize consists of an inscribed plaque and a \$1,000 cash award to be used for research expenses. The award was presented at the annual Phi Zeta Awards ceremony on April 18, 2008. Congratulations, Michael.

Congratulations also are in order for Josh Parris, who was chosen as this year’s Outstanding Senior in Wildlife by the members of the Student Chapter of The Wildlife Society at the University of Georgia’s Warnell School of Forestry and Natural Resources. For the past year Josh has been a student worker at SCWDS, and his primary responsibility was working in the lab processing chronic wasting disease samples for Dr. Kevin Keel. However, he could always be depended on to help out on any other project if he was needed. Josh graduated in May 2008 and has accepted a position as Research Technician III at SCWDS. We are pleased and fortunate to have him with us.

The most significant national awards to be received by anyone affiliated with SCWDS were recently bestowed on Ms. Christina Lynn Faust. Christina was one of 65 students chosen from a group of 595 candidates from 283 colleges and universities nationwide to receive a 2008 Harry S. Truman Scholarship, which provides funding for graduate study up to \$30,000! To make the award truly special, on March 25, 2008, University of Georgia President Michael F. Adams interrupted one of Christina’s classes to announce that she had won.

The scholarship is administered by the Truman Scholarship Foundation, with the stated mission: “to find and recognize college juniors with exceptional

leadership potential who are committed to careers in government, the nonprofit or advocacy sectors, education or elsewhere in the public service; and to provide them with financial support for graduate study, leadership training, and fellowship with other students who are committed to *making a difference* through public service.” The Harry S. Truman Scholarship Foundation was established and endowed by the U.S. Congress in 1975 to furnish a perpetual memorial for former president Truman.

As if this were not enough reward for one person, Christina also was one of 80 students selected to receive the 2008 Morris K. Udall Undergraduate Scholarship, a prominent national award honoring outstanding sophomores or juniors who plan to have careers related to environmental or Native American policy. Included in the benefits is up to \$5,000 for tuition, room and board, or other educational expenses. The U.S. Congress established The Morris K. Udall Scholarships in 1992 to honor Mr. Udall for his 30-year career as a U.S. Representative.

Christina is pursuing a dual bachelor’s/master’s degree, and her research represents a collaborative project between SCWDS and the University of Georgia’s Eugene P. Odum School of Ecology. Under Dr. David Stallknecht’s direction, Christina has been working on environmental factors that affect the transmission of avian influenza virus during its aquatic cycle, and she completed a research project to determine how aquatic mollusks absorb viruses.

Christina will graduate in May 2009 and plans to pursue both DVM and PhD degrees. We hope that the University of Georgia’s College of Veterinary Medicine is on her list of places to accomplish this. We offer our heartiest congratulation and best wishes to this remarkable and bright young lady, and we hope to continuing working with her during her academic career. (Prepared by Gary Doster)

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