SCWDS BRIEFS

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SOUTHEASTERN COOPERATIVE WILDLIFE DISEASE STUDY
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USDA Publishes Final CWD Rule

On July 21, 2006, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) published *Chronic Wasting Disease (CWD) Herd Certification Program and Interstate Movement of Farmed or Captive Deer, Elk, and Moose; Final Rule* in the Federal Register (Vol. 71, No. 140, pp. 41681-41707). The final rule is scheduled to go into effect on October 19, 2006, and is the result of efforts that began as early as 1998 when a *Model Program for Surveillance, Control, and Eradication of CWD in Domestic Elk* was presented to the United States Animal Health Association.

The summary of the final rule reads: *"We are establishing a herd certification program to eliminate CWD from farmed or captive cervids in the United States. Participating deer, elk, and moose herds will have to follow program requirements for animal identification, testing, herd management, and movement of animals into and from herds. After 5 years of enrollment with no evidence of CWD, a herd may be granted "Certified" status. Owners of herds may enroll in a State program that we have determined has requirements equivalent to the Federal program, or may enroll directly in the Federal program if no State program exists. We are also establishing interstate movement requirements to prevent the interstate movement of deer, elk, and moose that pose a risk of spreading CWD. These actions will help to eliminate CWD from the farmed or captive deer, elk, and moose herds in the United States."*

The proposed CWD rule was published on December 24, 2003 (see SCWDS BRIEFS Vol. 19, No. 4), and APHIS received 105 comments during the 60-day comment period that closed February 23, 2004. APHIS amended the final rule in response to comments from cervid ranches, national and state cervid producer associations, national wildlife organizations, state wildlife and animal health agencies, and others.

Some additional changes in the final rule include:

- Two positive official tests are required for a diagnosis of CWD in farmed or captive cervids, at least one of which will be a confirming test conducted at the National Veterinary Services Laboratories.
- Herd owners are required to report animal deaths and make carcasses of all animal 12 months and older available for CWD testing, rather than 16 months as proposed in 2003.
- Herd owners are required to provide official identification of individual animals in the certification program by 12 months of age.
- Herd owners are required to report animals that escape or disappear.
- Herd inventory must be conducted annually rather than on request as proposed in 2003.
- Farmed or captive cervids moved interstate that are going directly to slaughter are exempted from participation in the federal CWD program, provided certain other requirements are met.
- A USDA permit is required for interstate movement of cervids held for research purposes.

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USDA regards the identification of all animals, annual herd inventory, and extensive testing as essential for an effective CWD program. The five-year monitoring requirement for participating herds to achieve "Certified" status was maintained, despite comments to reduce it. The program remains voluntary for herd owners except the owners of captive or farmed deer, elk, or moose to be shipped interstate for purposes other than immediate slaughter.

Regarding interstate movement of deer, elk, and moose, the final rule states that from October 19, 2006-January 19, 2009, animals may be moved after 12 months of enrollment and CWD-free monitoring in the federal CWD program or an approved state program. There is gradual escalation of the status required to move animals interstate, so that 63 months after the rule takes effect, only animals from certified herds may be moved interstate. Herds receiving animals from lesser status herds will revert to the lower herd status. The preamble to the final rule states: "*This rule will preempt State requirements for movement of cervids into States to the extent that the State requirements are in conflict with this rule*." (Prepared by John Fischer with assistance from Dean Goeldner)

International Avian Influenza Conferences

The unprecedented occurrence of highly pathogenic avian influenza (HPAI) H5N1 viruses in wild birds in Eurasia and possibly Africa during 2005 and early 2006 was the subject of much discussion at two recent international influenza meetings. The 6th International Symposium on Avian Influenza was held at St John's College in Cambridge in the United Kingdom in April 2006. This was followed in May by an International Scientific Conference on Avian Influenza in Wild Birds held in Rome, Italy. This meeting was jointly sponsored by the Food and Agriculture Organization of the United Nations (FAO) and the World Organization for Animal Health (OIE).

Presentations at these meetings painted an interesting picture of the epidemiology and Detection of HPAI H5N1 in wild birds and the associated risks to domestic animals and public health. The European situation may be particularly relevant to what might occur if these viruses are introduced into North America. Summaries of the many excellent ongoing studies presented at these meetings follow.

- Although HPAI H5N1 viruses have been associated with mortality in a wide variety of wild avian species, most isolations have come from species in the order Anseriformes. In addition, the spread of HPAI H5N1 through Europe during 2005/2006 was spatially and temporally consistent with migratory movements of wild ducks. The association of the viruses with waterfowl is consistent with the well-described natural history of wild-type, low pathogenicity avian influenza viruses (AIVs); however, the movement of an HPAI virus from one location to another via wild bird migration previously has not been observed. It is unclear how other wild bird species, such as raptors, have been infected, but transmission presumably occurs via ingestion of infected birds (domestic or wild) or contact with contaminated habitats. It is important to recognize that many of the species that have been infected with HPAI H5N1 probably represent spillover hosts and are not reservoirs for these viruses.
- Species susceptibility appears highly variable even within the avian order Anseriformes. Although numerous species were present during several H5N1-associated waterfowl die-offs, mortality occurred predominantly in, or was confined to, a few species such as whooper swans and bar-headed geese in Asia and mute swans and tufted ducks in Europe. Species-related variation in susceptibility to HPAI H5N1 viruses also has been documented in experimental studies. Infections can be subclinical or cause acute mortality (see SCWDS BRIEFS Vol. 22, No. 2). Additionally, susceptibility decreases with age in domestic ducks, and this is important to consider when evaluating results of experimental inoculation studies.

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- Almost all of the reports of HPAI H5N1 viruses in wild birds have come from birds found dead, and testing of highly susceptible species such as mute swans that are found sick or dead has proven very effective in the detection of HPAI H5N1 in European countries. This demonstrates the importance of investigating wild bird mortality events and the need to identify susceptible species that may serve as naturally occurring sentinels for these viruses.
- Sampling of live birds for HPAI H5N1 viruses has been unproductive despite the testing of tens of thousands of wild birds. There have been no isolations of HPAI H5N1 viruses from healthy wild birds sampled in Europe or Africa.
- A consistently high level of viral shedding in HPAI H5N1 infections has been associated with the oropharyngeal cavity in both wild and domestic birds. Virus can be detected for longer durations and at higher titers from this source compared to virus detection from cloacal swabs. This differs from native AIV infections in wild birds, which most often are characterized by cloacal shedding.
- Considering the widespread detection of HPAI in wild birds throughout Europe, it is important to note that HPAI H5N1 outbreaks in domestic poultry were relatively rare and short-lived. The European experience clearly shows that HPAI H5N1 outbreaks in poultry can be prevented or controlled in the presence of infected wild birds.
- Despite the continued presence of HPAI H5N1 in wild birds since 2002/2003, there has been only one apparent human transmission event related to wild bird exposure. This was associated with people collecting feathers from swans that died of HPAI H5N1 in Azerbaijan in 2006. Seven members of an extended family were infected and four died. Although details of the exposure are uncertain, a large number of swans died in this event and very close human contact with these dead birds occurred.

The information presented at these meetings demonstrates significant progress in understanding the epidemiology of HPAI H5N1 in wild bird populations, as well as the related domestic animal and public health risks associated with these infections. There obviously is much more to learn, and it still is unclear if these viruses will spread or persist in wild bird populations. The papers from the 6th International Symposium on AI will be published in a late-2006 issue of *Avian Diseases*. Abstracts and presentations from the FAO-OIE conference can be found at www.fao.org/ag/againfo/subjects/en/health/diseases-cards/conference/index_en.html (Prepared by David Stallknecht)

Two New NIH Grants & Three New Grad Students

SCWDS and collaborators recently were awarded two new grants from the National Institutes of Health (NIH). The first grant is a 3-year study to investigate and characterize the transmission dynamics of *Trypanosoma cruzi* in the southern United States. This parasite is the causative agent of Chagas disease (American trypanosomiasis) and is a significant cause of morbidity and mortality in Latin America. There are five published reports of indigenous cases of Chagas disease in the United States; however, there are numerous reports of natural *T. cruzi* infection of wildlife, exotic, and domestic animals. Our long-range goal is to understand the risk factors that conspire to allow maintenance of *T. cruzi* in nature and ultimately its transmission to people. The primary objectives of this project are to (1) investigate transmission cycles of *T. cruzi* genetic types among wildlife reservoirs and vectors, (2) compare the growth characteristics of genetically classified clones of *T. cruzi* isolates *in vitro*, (3) compare vectoral capacity of the Eastern bloodsucking conenose bug (*Triatoma sanguisuga*) for U.S. and exotic virulent isolates of *T. cruzi*, and (4) determine infection dynamics and pathogenicity of U.S. isolates of *T. cruzi* for laboratory mice, raccoons, and opossums. Characterizing U.S. isolates will aid in understanding the natural history of *T. cruzi*, which could lead to better prevention methods in endemic areas.

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The second grant was awarded to Dr. Susan Little at Oklahoma State University, who will collaborate with SCWDS scientists to investigate the natural history of *Borrelia lonestari* in white-tailed deer and other mammalian and avian hosts in the Southeast. Previously, white-tailed deer were shown to be naturally infected with and experimentally susceptible to infection with *B. lonestari* (see *SCWDS BRIEFS* Vol. 18, No. 4 and Vol. 20, No. 2). *Borrelia lonestari* is a possible causative agent of Southern Tick-Associated Rash Illness (STARI) and is vectored by *Amblyomma americanum*, the lone star tick. This tick is common throughout many areas of the Southeast and Midwest and is an aggressive feeder. The primary goal of this project is to determine the prevalence of *B. lonestari* and other borreliae in common wildlife hosts in the southeastern United States. These data ultimately will aid in the understanding of the natural history of this tick-borne zoonosis.

To work on these new two new projects, SCWDS welcomes three new graduate students starting this fall: Emily Brown, Jessica Murdock, and Dawn Roellig. Dr. Michael Yabsley will serve as major professor for all three.

Emily received her BS degree in wildlife ecology at the University of Georgia and has a lot of experience working with wildlife. Emily will be working on the *T. cruzi* project focusing on the characterization of wildlife isolates *in vitro* and will be pursuing an MS degree in wildlife ecology and management through the University of Georgia's D.B. Warnell School of Forestry and Natural Resources.

Jessica received her BS degree in zoology from Kent State University and has worked as a naturalist on Little St. Simon's Island, Georgia, for the past year. She has extensive field experience working with snakes, sea turtles, and deer. Jessica will be working on the *B. lonestari* project and pursuing an MS degree in wildlife ecology and management through the D.B. Warnell School of Forestry and Natural Resources.

Dawn received her BS degree in biology from Agnes Scott College and her MS degree in biology from Georgia Southern University. During her MS thesis research, she studied the epidemiology of *Anaplasma* in ticks and horses in the Southeast and previously conducted research on *A. phagocytophilum* infections of lab mice at the Centers for Disease Control and Prevention. Dawn is pursuing a PhD degree in infectious diseases and will be conducting studies on *T. cruzi* to characterize the pathogencity of wildlife isolates for mammalian hosts and to better understand the immunological response of these hosts to *T. cruzi* infection. We are excited to welcome Emily, Jessica, and Dawn to SCWDS. (Prepared by Michael Yabsley)

Protozoal Epidemics Among Frogs in Georgia

A recent mortality event among larvae of large river frogs (*Rana heckscheri*) at Mayhaw Wildlife Management Area in Miller County, Georgia, was determined to be caused by a *Perkinsus*-like protozoan, recently identified as a pathogen of frog larvae. Researchers from the University of Georgia's D. B. Warnell School of Forest Resources collected some of the tadpoles on March 5, 2006, and transported them to the laboratory for further observation. At the time of the collection, two tadpoles were less active than the others and they were delivered to SCWDS for examination. Necropsy revealed a systemic infection by single-celled protozoa morphologically consistent with a *Perkinsus*-like organism. A polymerase chain reaction (PCR) assay and gene sequencing conducted at SCWDS confirmed the similarity of this protozoan to species in the genus *Perkinsus*. Over the next four weeks all of the tadpoles collected died due to this infection. On May 20, 2006, a wildlife biologist with the Georgia Department of Natural Resources discovered numerous dead or moribund large river frog tadpoles at the Miller County site. Samples of these tadpoles were submitted to researchers with the United States Geological Survey (USGS) and these tadpoles also were diagnosed with the *Perkinsus*-like organism. Subsequent surveys of the source

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pond did not turn up any additional frog larvae, although the progression of the mortality event was not continually observed.

All tadpoles examined had similar lesions. Grossly, livers were greatly enlarged. Microscopic examination revealed that they were completely obliterated by sheets of bright-purple, spherical, single-celled protozoa 0.35-0.50-µ in diameter. The parasites also greatly expanded the renal interstitium, and most tubules were necrotic and/or attenuated. Every tissue was infiltrated by the protozoa but not nearly to the extent that the liver and kidneys were invaded. Epithelial layers were not invaded, although spores were abundant in the subcutis and the lamina propria of the gastrointestinal tract. A moderate number of encysted trematode larvae also were scattered throughout the subcutis, skeletal muscle, and other tissues.

On April 21, 2006, another mortality event was discovered among leopard frog larvae (*Rana sphenocephala*) at the University of Georgia's Whitehall Experimental Forest in Clarke County, Georgia. The pond was densely populated by the leopard frog larvae. Initially, a single tadpole was observed swimming slowly and was easily caught by hand. Microscopic examination of the tissues revealed infection with the *Perkinsus*-like organism. Six additional tadpoles that appeared normal also were infected. One week later, hundreds of tadpoles were found dead in the shallow water of the pond, but live and clinically normal tadpoles also were abundant. After an additional week, very few live tadpoles could be found, although the carcass numbers had decreased moderately (presumably due to autolysis or scavenging).

The protozoan causing disease in these frog larvae has only recently been identified and it still has not been completely described. Much remains to be learned about the natural history of this protozoan, but it is evident that it can cause catastrophic mortality in local amphibian populations. It seems to primarily affect species of the genus *Rana*, although there are some reports in species from other genera of anurans. The morphology of the parasites in this case is consistent with those in other reported disease caused by *Perkinsus*-like species. Sequencing of a PCR assay product confirmed the similarity to *Perkinsus* spp., but the sequence data from the other isolates causing disease in frogs has not yet been published. Species of the genus *Perkinsus* are best known for the diseases they cause in oysters and other mollusks. We thank Dr. David Greene of the USGS for his comments concerning the morphology of the parasites. (Prepared by Kevin Keel)

Parasite & Disease Problems in Mourning Doves

In May 2006, an adult female mourning dove was submitted to SCWDS as part of West Nile virus surveillance conducted by the Health Department of Richmond County, Georgia. The bird was emaciated and had more than 150 large nematodes in the lower intestinal tract. The worms completely obstructed and greatly distended the lumen of the intestinal tract. The parasites were identified as *Ascardia columbae*, which commonly are found in columbids.

Previous surveys found *A. columbae* in 2% to 31% of mourning doves examined in several states, with infections generally consisting of less than 30 parasites per bird. The parasites have a direct life cycle and no intermediate host is required for their survival and transmission to another bird. Parasite eggs are excreted from infected hosts and acquired from the soil by other birds feeding in the area. In areas where large numbers of columbids are concentrated, clinical disease from *A. columbae* may be more prevalent. Interestingly, one study comparing the relative numbers of helminths in mourning doves and the interrelationships with the introduced white-winged dove in Florida disclosed a higher intensity of helminths, including *A. columbae*, in mourning doves in areas where white-winged doves were present. Additionally, it was reported that helminth intensity in the introduced Eurasian collared-dove was similar to that of the white-

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Mourning dove intestine impacted and distended with *A. columbae.*

winged doves, but significantly higher than that of mourning doves. However, it currently is unknown if Eurasian collared-doves directly affect helminth intensities in mourning doves in areas where the two species are sympatric.

A retrospective study of mourning dove diagnostic accessions at SCWDS disclosed that two of 135 (1.5%) doves submitted to SCWDS's diagnostic laboratory from 1971-2005 had *A. columbae* intestinal impactions and each bird carried more than 100 parasites in the intestinal tract. Interestingly, both of these doves, as well as the current case, originated from areas where Eurasian collared-doves are present.

The retrospective review also disclosed that trichomonosis caused by the protozoan *Trichomonas gallinae* was diagnosed in 40% (N=54) of these 135 doves and was the most frequent diagnosis. Rock pigeons are the natural host for *T. gallinae* and most pigeons harbor this protozoan but rarely have clinical disease. Infection with an avirulent strain or survival of infection with a virulent strain of *T. gallinae* provides columbids with protective immunity, resulting in individuals that are refractory to clinical disease. Therefore, previously infected pigeons and doves may serve as unapparent carriers of virulent strains of *T. gallinae* and are potential sources of infection for naïve birds, including raptors. *Trichomonas gallinae* is known to have a wide spectrum of virulence, but the factors that control virulence are incompletely known. A project currently is under way at SCWDS to examine possible virulence factors for *T. gallinae*.

Toxicoses due to organic chemicals (N=25, 18.5%) and avian pox (N=20, 14.8%) also were frequent diagnoses among SCWDS dove accessions. Additional diagnoses included trauma and suspected toxicosis and suspected tick paralysis that could not be confirmed. The majority of trichomonosis and avian pox cases were observed in the spring-summer, whereas the majority of the toxicosis cases were observed in the winter-spring. (Prepared by Rick Gerhold)

TWS Policy on Feral Cats

Feral cat issues continue to create significant controversy among wildlife managers, veterinarians, bird watchers, and the general public. Much of the contention has centered on the impacts of cats on native wildlife and the

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maintenance of feral cat colonies through trap, neuter, and release (TNR) programs that re-introduce cats into the environment. The Wildlife Society (TWS) adopted a final position on feral cats in 2001, and TWS Council voted in 2006 to retain this position for five additional years. Portions of the introduction and ten components of TWS position statement follow. The entire statement can be found at www.wildlife.org/policy/index.cfm?tname=policystatements&statement=ps28

Feral and free-ranging domestic cats are exotic species to North America and are one of the most widespread and serious threats to the integrity of native wildlife populations and natural ecosystems. Exotic species present special challenges for wildlife managers because their negative impacts are poorly understood by the general public. Many exotic species have become such an accepted component of the environment that many people regard them as "natural." Some exotic species have advocacy groups that promote their continued presence, and few policies or laws deal directly with their control. Competition of cats with native predators, disease implications for wildlife populations, and pet owners' attitudes toward wildlife and wildlife management also are important issues.

The estimated numbers of pet cats in urban and rural regions of the United States increased from 30 million in 1970 to nearly 65 million in 2000. Reliable estimates of the current cat population are not available, and the impact of domestic cats on wildlife is difficult to quantify. A growing body of literature strongly suggests that domestic cats are a significant factor in the mortality of small mammals, birds, reptiles, and amphibians. Even if conservative estimates are used, the number of prey animals killed by domestic cats is immense. Humans introduced domestic cats to North America, and humans must be responsible for the control and removal of feral and free-ranging cats that prey on wildlife.

The policy of TWS in regard to feral and free-ranging domestic cats is to:

1. Strongly support and encourage humane elimination of feral cat colonies.
2. Support passage and enforcement of ordinances prohibiting public feeding of feral cats.
3. Strongly support educational programs and materials that call for all pet cats to be kept indoors, in outdoor enclosures, or on a leash.
4. Support programs to educate and encourage pet owners to neuter or spay their cats and encourage pet adoption centers to require potential owners to neuter or spay their pet.
5. Support development and dissemination of information on actions individual cat owners can take to minimize predation by free-ranging cats.
6. Pledge to work with conservation and animal welfare communities to educate the public about negative impact of cats on native wildlife.
7. Support educational efforts to encourage the agricultural community to keep farm cat numbers at low manageable levels and use alternative environmentally safe rodent control methods.
8. Encourage researchers to develop better information on the impacts of cats on native wildlife.
9. Recognize that cats as pets have a long association with humans and responsible cat owners should be encouraged to continue caring for the animals under their control.
10. Oppose passage of any ordinances that legalize maintenance of "managed" (trap/neuter/release) free-ranging cat colonies. (Prepared by John Fischer)

Recent SCWDS Publications Available

Below are some recent publications authored or co-authored by SCWDS staff. Many of these publications can be accessed online from the web pages of the various journals. If you do not have access to this service and would like to have a copy of any of these papers, fill out the request form and return it to us: Southeastern Cooperative Wildlife Study, College of Veterinary Medicine, University of Georgia, Athens, GA 30602.

_____Baughman, J. and J.R. Fischer. 2005. Programs for monitoring and managing diseases in free-ranging wildlife in the 21st century. *Proceedings, North American Wildlife and Natural Resources Conference*, Washington, DC, pp. 346-358.

_____Corn, J.L., E.J.B. Manning, S. Sreevatsan, and J.R. Fischer. 2005. Isolation of *Mycobacterium avium* subspecies *paratuberculosis* from free-ranging birds and mammals on livestock premises. *Applied and Environmental Microbiology* 72(11): 6963-6967.

_____Dawson, J.E., S.A. Ewing, W.R. Davidson, J.E. Childs, S.E. Little, S.M. Standaert. 2005. Human monocytotropic ehrlichiosis. Pp 239-257. In: *Tick-Borne Diseases of Humans*. J. Goodman, D. Dennis, and D. Sonenshine (Editors). *American Society for Microbiology*. Washington, DC: ASM Press.

_____Dugan, V.G., M.J. Yabsley, C.M. Tate, D.G. Mead, U.G. Munderloh, M.J. Herron, D.E Stallknecht, S.E. Little, and W.R. Davidson. 2006. Evaluation of white-tailed deer (*Odocoileus virginianus*) as natural sentinels for *Anaplasma phagocytophilum*. *Vector-Borne and Zoonotic Diseases* 6: 192-207.

_____Fischer, J.R. and W.R. Davidson. 2005. Reducing risk factors for disease problems involving wildlife. *Transactions of the 70th North American Wildlife and Natural Resources Conference*, Washington, DC, pp. 289-309.

_____Gibbs, S.E.J., A.B. Allison, M.J. Yabsley, D.G. Mead, B.R. Wilcox, and D.E. Stallknecht. 2006. West Nile virus in avian species of Georgia, USA: 2002-2004. *Vector Borne and Zoonotic Diseases* 6(1): 57-72.

_____Gibbs, S.E.J., M.C. Wimberly, M. Madden, J. Masour, M.J. Yabsley, and D.E. Stallknecht. 2006. Factors affecting the geographic distribution of West Nile virus in Georgia, USA: 2002-2004. *Vector Borne and Zoonotic Diseases* 6(1): 73-82.

_____Gibbs, S.E.J., A.E. Ellis, D.G. Mead, A.B. Allison, J.K. Moulton, E.W. Howerth, and D.E. Stallknecht. 2005. West Nile virus detection in the organs of naturally infected blue jays (*Cyacotta cristata*). *Journal of Wildlife Diseases* 41(2): 354-362.

_____Hanson, B.A. D.E. Swayne, D.A. Senne, D.S. Lobpries, J. Hurst, and D.E. Stallknecht. 2005. Avian influenza viruses and paramyxoviruses in wintering and resident ducks in Texas. *Journal of Wildlife Diseases* 41(3): 624-628.

_____Keel, M.K. and J.G. Songer. 2006. The comparative pathology of *Clostridium difficile*-associated disease. *Veterinary Pathology* 43 (3): 225-240.

_____Luttrell, M.P. and D.G. Mead. 2005. Infectious and toxic diseases of songbirds. Pp. 165-178. In: *Landscape Epidemiology, Spatial Distribution and Utilization of Remote Sensing Technology*. S.K. Majumday, D.E. Huffman, F.J. Brenner, and A.I. Panah (Editors). Easton, PA, The Pennsylvania Academy of Science.

_____Murphy, M.D., E.W. Howerth, N.J. MacLaughlin, and D.E. Stallknecht. 2005. Genetic variation among epizootic hemorrhagic disease viruses in the southeastern United States: 1978-2001. *Infection, Genetics and Evolution* 5: 157-165.

_____Perry, N.D., B.A. Hanson, W. Hobgood, R.L. Lopez, C.R. Okraska, K. Karem, I.K. Damon, and D.S. Carol. 2006. New invasive species in southern Florida: Gambian rat (*Cricetomys gambianus*). *Journal of Mammalogy* 87(2): 262-264.

continued...

_____Peterson, A.T., M. Papes, M.G. Reynolds, N.D. Perry, B.A. Hanson, R.L. Regnery, C.L. Hutson, I.K. Damon, and D.S. Carroll. 2006. Native-range ecology and invasive potential of cricetomys in North America. *Journal of Mammalogy* 87(3): 427-432.

_____Tate, C.M., D.G. Mead, M.P. Luttrell, E.W. Howerth, V.G. Dugan, U.G. Munderloh, and W.R. Davidson. 2005. Experimental infection of white-tailed deer with *Anaplasma phagocytophilum*, etiologic agent of human granulocytic anaplasmosis. *Journal of Clinical Microbiology* 43(8): 3595-3601.

_____Ward, M.R., D.E. Stallknecht, J. Willis, M.J. Conroy, and W.R. Davidson. 2006. Wild bird mortality and West Nile virus surveillance: Biases associated with detection, reporting, and carcass persistence. *Journal of Wildlife Diseases* 42(1): 92-106.

_____Yabsley, M.J. and S.E.J. Gibbs. 2005. Infectious and parasitic diseases of small mammals. Pp. 345-373. In: *Landscape Epidemiology, Spatial Distribution and Utilization of Remote Sensing Technology.* S.K. Majumday, J.E. Huffman, M.J. Brenner, and A.I. Panax (Editors). Easton, PA: The Pennsylvania Academy of Science.

_____Yabsley, M.J. and S.E.J. Gibbs. 2006. Description and phylogeny of a new species of *Eimeria* from double-crested cormorants (*Phalacrocorax auritus*) near Fort Gaines, Georgia. *Journal of Parasitology* 92: 385-388.

_____Yabsley, M.J. J. Romines, and V.F. Nettles. 2006. Detection of *Babesia* and *Anaplasma* species in rabbits from Texas and Georgia, USA. *Vector-Borne and Zoonotic Diseases* 6: 7-13.

_____Yabsley, M.J., T.M. Work, and R.A. Rameyer. 2006. Molecular phylogeny of *Babesia poelea* from brown boobies (*Sula leucogaster*) from Johnston Atoll, Central Pacific. *Journal of Parasitology* 92: 423-425.

_____Yabsley, M.J., T.C. Quick, and S.E. Little. 2005. Theileriosis in a white-tailed deer (*Odocoileus virginianus*) fawn. *Journal of Wildlife Diseases* 41(4): 806-809.

_____Yabsley, M.J., W.R. Davidson, D.E. Stallknecht, A.S. Varela, P.K. Swift, J.C. deVos, Jr., and S.A. Dubay. 2005. Tick-borne organisms in mule deer (*Odocoileus hemionus hemionus*) and white-tailed deer (*Odocoileus virginianus*) from the western United States. *Vector-Borne and Zoologic Diseases* 5(4): 351-362.

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