

SCWDS BRIEFS

A Quarterly Newsletter from the
Southeastern Cooperative Wildlife Disease Study
College of Veterinary Medicine
The University of Georgia
Athens, Georgia 30602

Phone (706) 542-1741

FAX (706) 542-5865

Volume 34

April 2018

Number 1

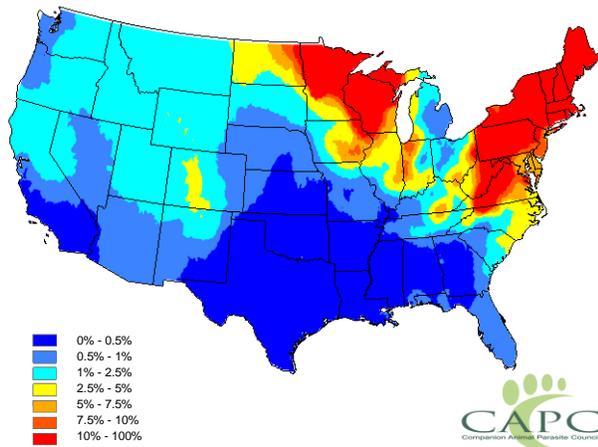


Figure 1. Distribution of *Borrelia burgdorferi* antibodies in domestic dogs from 2012-2017 showing the highest prevalence in the Northeast and Upper Midwest.

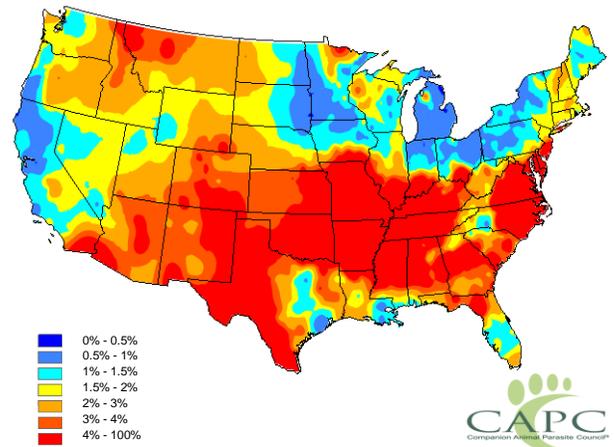


Figure 2. Distribution of *Ehrlichia* spp. antibodies in domestic dogs from 2012-2017. The assay used for detection of antibodies detects at least three ehrlichial species. All three are expected to occur throughout the southern U.S.

Tracking Ticks and Tick-borne Diseases

Researchers at SCWDS have investigated ticks and tick-borne pathogens for decades, because they are the second most important vector of human pathogens (after mosquitos) regarding the number and virulence of pathogens transmitted. Ticks also are important vectors of domestic and wild animal pathogens, many of which are of economic importance for animal industry among domestic and wild animals. In recent years in the U.S., numerous new tick-borne pathogens have been recognized including Heartland virus, Bourbon virus, an unnamed *Ehrlichia* sp. from Georgia called Panola Mountain *Ehrlichia* sp., *Ehrlichia muris euclarensis* from the upper Midwest, and two *Borrelia* species, *B. miyamotoi* and *B. mayoni*, that share the same vector as *B. burgdorferi*, the causative agent of Lyme disease.

Over the years, SCWDS has investigated the better known tick-borne pathogens – *B. burgdorferi*, *Ehrlichia chaffeensis*, *E. ewingii*, and *Anaplasma*

spp. in vectors and wildlife hosts. However, recently we have collaborated with the Companion Animal Parasite Council (www.capcvet.org) and researchers at Clemson University to better understand the distribution and geographic spread of these pathogens by analyzing canine serologic data from veterinary diagnostic laboratories in the U.S. These data help us understand the distribution of known tick vectors because some pathogens use certain vectors. Ultimately, we are using the data to forecast the local risk of tick-borne pathogen activity in the following months or year. Maps of the distribution data can be found on the CAPC website broken down by dog/cat, month/year, and state/county (parish). Data also are being collected from Canada, an area that likely will become more interesting as Lyme disease spreads in the coming years.

One of the pathogens we track is *Borrelia burgdorferi* because of the importance of Lyme disease to people, dogs, and possibly horses.

This bacterium is transmitted by black-legged ticks (*Ixodes* spp.) with *I. scapularis* and *I. pacificus* of greatest concern for transmission to humans and pets in the U.S. Disease caused by the infection may affect several body systems in humans and dogs, but joint pain is observed most commonly. A variety of vertebrate hosts can become infected but small rodents, such as *Peromyscus leucopus*, are important reservoirs. These small rodents also are important in maintaining the larval and nymphal stages of *Ixodes* spp., whereas white-tailed deer (*Odocoileus virginianus*) serve as important hosts for adult ticks. Although *I. scapularis* is widespread throughout the eastern U.S., most human cases of Lyme disease occur in the upper Midwest and Northeast. Mapping of serologic data from dogs shows a similar distribution (Figure 1), and our recent research has shown that dogs are sensitive sentinels for identifying areas where *B. burgorferi* is being transmitted by ticks.

In the Southeast, one of the most common human and canine tick-borne diseases is ehrlichiosis, which is caused by at least four species of *Ehrlichia*. The diagnostic method used in our studies detects antibodies to *E. canis*, *E. ewingii*, or *E. chaffeensis*. Several ticks, including *R. sanguineus*, the American dog tick (*Dermacentor variabilis*), and the lone star tick (*Amblyomma americanum*), are responsible for transmitting the different *Ehrlichia* spp. These *Ehrlichia* spp. infect white blood cells and progenitor cells in bone marrow, which may result in bleeding abnormalities, although fever and poor appetite are more common. Unlike anaplasmosis, ehrlichiosis may present acutely or chronically, with arthritis, immune cell abnormalities, and bone marrow suppression occurring later in chronic infections. *Dermacentor variabilis* is widely distributed throughout the country. Similar to *Ixodes* spp., the larvae and nymphs feed on small rodents while adults feed on mammals, including humans, dogs, and medium- and large-sized wildlife. *Amblyomma americanum* ticks occur throughout the eastern U.S., with an expanding northern range reaching into the upper New England and Midwestern states. Larvae, nymphs, and adults generally feed on white-tailed deer, livestock, pets, and humans, and all three stages can be found on pets and humans. White-tailed deer are an important reservoir for *Ehrlichia* spp. Both tick species and these three pathogens are widespread in the southern U.S. (Figure 2).

Our maps show the wide distribution of these pathogens, and identify areas where prevention strategies are important to avoid infection with any tick-borne pathogen. Daily tick checks, showers, use of repellents, long pants and shirt sleeves, and proper removal of ticks are all important prevention strategies (also see <https://www.cdc.gov/features/stopticks/index.html>). Tick preventives also are important for our pets, because they share our environment and their health can be impacted by many of these pathogens. More information on ticks, their pathogens, and prevention for pets can be found here: <https://www.capcvet.org/guidelines/ticks/>. (Prepared by Jenna Gettings and Michael Yabsley).

Captive Cervid CWD Update, May 2018

Chronic wasting disease (CWD) has continued to be detected in captive cervid herds since our last update in April 2016. The United States Department of Agriculture - Animal and Plant Health Inspection Service - Veterinary Services (APHIS-VS) reports that CWD has been detected in 94 herds in 16 states since 1997 including 19 more captive herds since our April 2016 update. Following are chronological reports of new herd detections since then. Unless noted, all affected animals are captive white-tailed deer (WTD). This information came from APHIS-VS Cervid Health Program reports and official state agency press releases.

April 2016: CWD was confirmed in a captive doe in Medina County, Texas. Thirteen additional positive animals were detected in the herd through September 2016.

June 2016: A captive elk from a herd of two tested positive in Eagle County, Colorado. The other elk was euthanized and tested “not detected.”

Eight newly-identified captive cervid herds were confirmed with CWD in fiscal year 2017, which ran from October 1, 2016 - September 30, 2017:

November 2016: A doe in an Oconto County, Wisconsin shooting enclosure tested positive for CWD. An estimated 2,350 deer were held in the enclosure and a breeding facility at this location when a quarantine was ordered.

December 2016: CWD was confirmed in a buck in Buchanan County, Iowa. Two of 81 tested positive at depopulation (prevalence = 3.7%).

December 2016: CWD was confirmed in two does in Crow Wing County, Minnesota. The herd had been compliant with HCP since 2012 but was not yet certified.

January 2017: One doe tested positive in a Meeker County, Minnesota herd. It was a pen-mate of the two positive does in the affected herd in Crow Wing County. The Meeker County herd was depopulated with 4/14 testing positive (prevalence = 36%).

January 2017: CWD was confirmed in two of six deer heads submitted for testing by the owner of a Mecosta County, Michigan herd. No additional positives were found on depopulation in April 2017. (In March 2018, this owner was sentenced to 60 days in jail for each of two counts: failing to properly maintain fencing of the facility, and providing false information regarding the origin of two deer heads submitted for CWD testing. He also was ordered to pay \$775 in fines and costs and perform 80 hours of community service. The owner allegedly procured heads from a local deer processor rather than from his own herd.)

January 2017: CWD was confirmed in a buck shot in an enclosure in November 2016 in Franklin County, Pennsylvania. This deer was born on a HCP-certified breeding facility in Fulton County and was moved to the shooting enclosure in August 2016.

February 2017: CWD was confirmed in a captive doe from a Bedford County, Pennsylvania HCP-certified breeding herd. At depopulation, 27/157 tested positive for CWD (prevalence = 18%).

May 2017: CWD was confirmed in a doe in a Franklin County, Pennsylvania combined HCP-certified breeding operation and state-monitored shooting enclosure. This facility previously was quarantined as a CWD-exposed trace-back premises from an earlier 2017 positive in the same county.

May 2017: A buck in Medina County, Texas tested CWD-positive on rectal biopsy. It was euthanized and CWD was confirmed in obex and lymphoid tissue. This breeding herd is in the

immediate vicinity of two positive breeding facilities/release sites and one low fence ranch where CWD was detected in a free-ranging deer. An additional positive animal from this herd was confirmed when it was depopulated in October 2017.

So far in fiscal year 2018, which began October 1, 2017, CWD has been detected in nine new captive deer herds in five states, including five herds that were HCP-certified as being at low risk for having CWD:

October 2017: CWD was confirmed in three herds in Wisconsin: individual shooting enclosures in Shawano and Waupaca counties and a certified breeding facility in Iowa County that was the source of the positive animal in the Waupaca County enclosure.

November 2017: CWD was confirmed in a buck in Winona County, Minnesota, and a second positive animal was found later. This herd was enrolled in the HCP but was not certified. It was depopulated (with Federal indemnity) in February 2018 and 7/7 (100%) deer tested positive.

November 2017: CWD was found in a natural addition to a HCP-certified breeding herd in Mecosta County, Michigan.

January 2018: CWD was found in a buck in a Guernsey County, Ohio shooting enclosure one week after it arrived from a HCP-certified herd in Holmes County. The source herd was depopulated (with Federal indemnity) in February 2018, and 2/93 (2%) deer tested positive.

January 2018: CWD was found in two captive herds in Pennsylvania: a shooting enclosure in Bedford County enrolled in Pennsylvania's Herd Monitoring Program, and a HCP-certified breeding herd in Lancaster County. The Lancaster County herd had been under quarantine since December 2017, when the Wisconsin state veterinarian notified the Pennsylvania Department of Agriculture that this herd was the source of a deer in a Waupaca County, Wisconsin shooting enclosure that tested positive shortly after arriving from Pennsylvania. This is the first documentation of a CWD-positive animal shipped interstate from a HCP-certified herd; DNA testing was conducted to confirm that the deer was born and raised in the certified Lancaster County herd.

March 2018: CWD was confirmed in a deer in a HCP-certified breeding herd in Washington County, Wisconsin. An associated shooting enclosure in Bayfield County, Wisconsin was depopulated in April 2018 with no CWD detected to date; additional results are pending. (Prepared by Lauren Mulreany, Virginia-Maryland College of Veterinary Medicine, and John Fischer)

Minnesota Oversight of Captive Cervid Program Audited

In April 2018, the State of Minnesota Office of the Legislative Auditor (OLA) released its 2018 Evaluation Report titled “*Board of Animal Health’s (BAH) Oversight of Deer and Elk Farms.*” The evaluation was ordered in April 2017 by the Legislative Audit Commission. The OLA found that “*the Board of Animal Health has failed to enforce some laws relating to deer and elk farms. The board has not established clear expectations for deer and elk farm inventories, nor has it systematically analyzed compliance with state laws requiring chronic wasting disease testing.*” For example, about one-third of producers that reported dead deer or elk failed to submit tissues from at least one of those animals for CWD testing 2014 to 2017. Another example cited in the report concerned the detection of CWD in the Winona County herd in November 2017: “*Despite the fact that the fences (by the owner’s own admission) had been sagging for years, BAH had never mentioned fence issues on the farm’s annual inspection reports.*”

The OLA also found “*the board has a strained relationship with the Department of Natural Resources, which is responsible for managing Minnesota’s wild deer and elk*” and recommended that the two agencies draft a memorandum of understanding to facilitate communication and data sharing. On a more positive note, the OLA did report that BAH has improved its deer and elk program over the past several months under a new director. The complete report can be found at <http://www.house.leg.state.mn.us/comm/docs/96ef80d0-c6c1-422a-ae8e-81a987a0cd26.pdf>.

Fibromas in a Squirrel

In early April, a landowner in Jackson County, Kentucky, found a dead eastern gray squirrel (*Sciurus carolinensis*) with numerous skin nodules and submitted it to the Kentucky Department of

Fish and Wildlife Resources. The squirrel was shipped to SCWDS for examination.

On necropsy, the young squirrel was noticeably thin and was covered with numerous variably-sized, smooth, firm nodules in the skin of the head, legs, and flanks (Figure 1). Microscopic examination of the skin nodules revealed proliferation of cells that often contained large viral inclusion bodies consistent with poxviruses, and similar poxvirus-like lesions were seen in multiple areas of the lung. Fatty change was present in the liver, which is a common finding in animals that are in a negative energy balance. The lesions in this case, particularly those on the legs and feet, may have caused difficulty for the squirrel to forage, ultimately leading to starvation.



Figure 1.

Squirrel fibromatosis, or squirrel pox, is caused by squirrel fibroma virus, which is in the genus *Leporipox* and is related to the virus that causes Shope’s fibroma in cottontails. Transmission occurs through direct squirrel to squirrel contact or from exposure to a contaminated environment in nest cavities, as well as via the bites of mosquitos or fleas. Gross lesions in squirrels can affect a large portion of the body, but typically regress with time. However, mortality can occur if lesions interfere with normal foraging or predator evasion, or the virus spreads to visceral organs, such as the lung or liver. The latter can be common in immunosuppressed or juvenile squirrels.

Squirrel fibromatosis typically involves only one or a few individuals, but outbreaks affecting numerous squirrels also have been reported. Squirrel fibromatosis has been reported in other species including western gray squirrels (*Sciurus griseus*), fox squirrels (*S. niger*), and American

red squirrels (*Tamiasciurus hudsonicus*). Squirrel pox is not considered to be significant at the population level in gray squirrels in North America; however, disease induced by a different poxvirus has been associated with population declines of red squirrels (*S. vulgaris*) in the United Kingdom.

Squirrel fibroma virus is not considered to be infectious to people or to non-rodent or non-lagomorph domestic animals. However, squirrels can carry other zoonotic pathogens, and care always should be taken when handling diseased animals. SCWDS would like to thank the Kentucky Department of Fish and Wildlife Resources for submission of this case showing a classic wildlife disease. (Prepared by Kevin Niedringhaus)

Personnel Changes at SCWDS

It's been a while since we've updated you on the folks here at SCWDS, and we've had several changes in the interim. Dr. Heather Fenton left SCWDS last year after 3.5 years as Supervisor of the SCWDS Diagnostic Service. In addition to supervising our diagnostic service, Heather conducted deer herd health checks and wildlife disease workshops, trained pathology residents and graduate students, and assisted state wildlife agencies with surveillance for significant diseases such as white nose syndrome of bats, snake fungal disease, and others. She has returned to her native Canada where she is a wildlife veterinarian with the Government of the Northwest Territories - Department of Environment and Natural Resources, and is stationed in Yellowknife.

Dr. Nicole Nemeth, no stranger to SCWDS, returned in April. She was the first wildlife pathology resident in the shared training position established by SCWDS and the Department of Pathology at the University of Georgia (UGA) in 2010. After completion of her wildlife pathology residency at UGA in 2013, Nicole became an assistant professor at the University of Guelph in Ontario as well as an Associate of the Canadian Wildlife Health Cooperative. While there, Nicole worked on various infectious diseases of wildlife, including pathogen surveillance in free-ranging wild turkeys, West Nile virus pathogenesis in ruffed grouse, and transmission ecology of Powassan virus. She returned to SCWDS as

Supervisor of the SCWDS Diagnostic Service as a tenure-track assistant professor. Upon her return, Nicole said, "While I had a great experience working on wildlife diseases at the University of Guelph, I am thrilled for the opportunity to return to the University of Georgia and rejoin the SCWDS team and mission." Welcome back, Nicole!

Dr. John Bryan left SCWDS in February after three years as a Public Service Assistant/Wildlife Veterinarian at SCWDS. John worked primarily on feral swine issues and developed the "*Diseases of Feral Swine Brochure*." In addition, he assisted with deer herd health checks and wildlife disease workshops, worked in our diagnostic service, and assisted natural resource agencies with research animal use protocols and other aspects of wild animal welfare. John currently works as a private consultant in the field of wildlife welfare compliance and oversight. We wish him well in his new endeavors.

After 34 years with SCWDS, Dr. Joe Corn retired to emeritus status last year and now has much more time to spend with his family in their favorite outdoors pursuits. He began working as a Research Technician in 1984, obtained his PhD at UGA's Warnell School of Forestry and Natural Resources in 1995, and worked as a SCWDS Research Coordinator until joining the SCWDS faculty in 2001 as a Public Service Assistant. Joe ultimately was promoted to Senior Public Service Associate and along the way was a key supporter of SCWDS' cooperative agreements with the USDA-Animal and Plant Health Inspection Service. He has been involved in tropical bont tick eradication programs in the Caribbean, the Cattle Fever Tick Eradication Program in Texas, and in equine piroplasmiasis eradication efforts in several states. He provided assistance with tick control during the 1996 Olympic Games and the World Equestrian Games held in the USA in 2010 and 2018, and developed an ongoing tick and *Culicoides* spp. surveillance program in the Southeast. Joe provided support to state and federal agencies in prevention, preparedness, training, and emergency response for foreign animal diseases, and worked extensively on feral swine issues including disease surveillance and distribution mapping throughout the country. He conducted field studies on numerous disease agents affecting wildlife, humans, and/or domestic animals. Outside SCWDS, Joe served on numerous committees and working groups,

including the National Invasive Species Council-Invasive Species Advisory Committee, and chaired the U.S. Animal Health Association's Committee on Parasitic Diseases and the Subcommittee on Feral Swine. We miss Joe's calm demeanor and sense of humor but are fortunate that his emeritus status allows him to continue to assist SCWDS from time to time.

One of SCWDS' greatest ambassadors left us at the end of January: Ms. Cindy McElwee retired after nearly 21 years with SCWDS. Cindy was our Administrative Specialist and worked in the front office where she greeted everyone with a smile. Cindy was a major force in keeping SCWDS running smoothly. Her accomplishments defy listing but included everything from organizing numerous conferences at UGA and elsewhere and keeping SCWDS research teams in the field by making travel arrangements, renting houses, and facilitating expense reimbursements, to making certain that everyone was paid on time! She resolved everyone's problems, and if Cindy couldn't do it, then you knew it could not be done. Her work ethic, attention to detail, selflessness, boundless energy, and invariably cheery disposition made her a SCWDS institution. If you spent any time with Cindy, you felt special, and you laughed! In addition to her peerless handling of official duties, Cindy's management of special occasions, such as our annual Christmas lunch, and the goodies she provided, always were over the top. Cindy's accomplishments and attitude were recognized by the UGA College of Veterinary Medicine with a Staff Appreciation Award in 2016. SCWDS is not the same without Cindy, we miss her dearly, and we wish her nothing but the absolute best because she certainly deserves it.

Ms. Patricia Flaherty arrived in early January to become our new Administrative Specialist. She has been at UGA for over nine years, most recently at the UGA School of Law, and trained with Cindy for a month prior to Cindy's departure. With big shoes to fill, Patricia jumped right in and is ready to help with all of SCWDS' administrative needs. Please feel free to drop by to say "Hi" to Patricia or send her an email (paf@uga.edu). (Prepared by Sonia Hernandez)

SCWDS Folks Recognized

We are excited to share details on numerous awards that SCWDS students, staff, and faculty have received in recent months. SCWDS always has believed we have the best students but it isn't just us – others frequently recognize our students for their excellence and this year is no exception. Brianna Williams, a PhD student in Wildlife Ecology and Management in the Warnell School of Forestry and Natural Resources (WSFNR) whose research focuses on seabird health in Alaska, won the University of Georgia (UGA) Outstanding Teaching Assistant Award. This award is given to a graduate student who has demonstrated excellent teaching skills; Brianna was nominated by several faculty because of her dedication to teaching undergraduates in several classes. Another WSNFR PhD student, Christopher Cleveland, who works on the ecology of Guinea worms in the U.S. and Africa and assists The Carter Center with their Guinea worm eradication campaign, was awarded WSNFR's 2018 Ernest Provost Fellowship that recognizes a graduate student who demonstrates commitment to the management and wise use of forest resources. Chris also has been accepted to participate in two important workshops: Genomics of Disease in Wildlife at Colorado State University and the International Clinics on Infectious Disease Dynamics and Data Program (ICI3D) in Jacksonville, Florida.

Our students and staff also have represented SCWDS well at scientific conferences with several people receiving awards. Sarah Sapp, a PhD student in the Department of Infectious Diseases, is working on a One Health project related to the raccoon roundworm, *Baylisascaris procyonis*, which spans wildlife, domestic dogs, and people. She recently won the Research Recognition Award from The Wildlife Disease Association (WDA). The WDA's Scholarship Award this year went to Jenny Bloodgood, a DVM-PhD student in WSNFR and the College of Veterinary Medicine (CVM). Brianna Williams' presentation was selected as one of the two best speed talks at the recent annual meeting of the UGA student chapter of the WDA. At this meeting, the best poster award went to Kevin Niedringhaus, a

SCWDS PhD student in the CVM's doctorate program in Comparative Biomedical Sciences. He is researching the epidemiology of mange in black bears in the northeastern U.S. Stacey Vigil, a research professional and international expert on *Culicoides* identification, won the O.I. Snapp Award for the Best Regular Member Presentation at the 82nd Annual Meeting of the Georgia Entomological Society. This is the 2nd year in a row Stacey has brought this award home!

This year was another big year for recognition of SCWDS faculty for excellence in teaching, research, and service to the profession. Dr. Sonia Hernandez received the Xi Sigma Pi Herrick Professor of the Year Award from WSNR. While it is always nice to be recognized for teaching excellence – it is even more gratifying when you are nominated and voted on by the students themselves! Dr. Hernandez is no stranger to being honored for her hard work in and outside the classroom – she was one of last year's recipients of the Richard B. Russell Award for Excellence in Undergraduate Teaching, the university's highest early career teaching honor (<http://news.uga.edu/releases/article/russell-awards-17/>). She also has participated in UGA's Teaching Symposium for three years, was a UGA Writing Fellow, is currently a Senior Teaching Fellow, and this year was inducted into the UGA Teaching Academy, which works to promote teaching excellence, in part, by affirming teaching as significant, intellectual, scholarly work and by advancing models of teaching that foster deep and lasting understanding by students.

Dr. Michael Yabsley received a Creative Research Medal from UGA in April (<https://research.uga.edu/research-awards/2016/02/18/michael-j-yabsley/>). The Medal is awarded for outstanding research within the past five years

that focuses on a single theme, which for Dr. Yabsley is his work with *Dracunculus medinensis*, the human Guinea worm. In recent years, domestic dogs have emerged as important hosts for this parasite, and he is working with many collaborators to investigate the possibility that aquatic hosts (amphibians/fish) serve as paratenic or transport hosts. These data have allowed policymakers in endemic countries to implement targeted disease prevention strategies to assist with the eradication campaign for this parasite. These awards highlight the dedication SCWDS faculty members have to the training and teaching of our future generation of wildlife professionals while also conducting high-quality research that proves beneficial to the world we all share.

Dr. John Fischer, SCWDS Director, received the George Bird Grinnell Award for Distinguished Service to Natural Resource Conservation from the Wildlife Management Institute (WMI). Established in 1911 in response to dramatic declines of many wildlife populations, WMI is a professional conservation organization that works to improve the professional foundation of wildlife management. Dr. Fischer received the award at the 83rd North American Wildlife and Natural Resources Conference (<https://wildlifemanagement.institute/outdoor-news-bulletin/april-2018/dr-john-fischer-receives-2018-grinnell-award>). The award, established to honor a person who has dedicated his or her career to professional science, management, and conservation of natural resources, is WMI's highest individual honor and one of the most prestigious in the natural resource management profession. Dr. Fischer was recognized as a leading advocate for the protection of wildlife from the threat of disease and for his dedication to the application of science-based wildlife management policies and practices. (Prepared by Michael Yabsley)

SCWDS BRIEFS

Southeastern Cooperative Wildlife Disease Study
College of Veterinary Medicine
The University of Georgia
Athens, Georgia 30602-4393

Nonprofit Organization
U.S. Postage
PAID
Athens, Georgia
Permit No. 11

RETURN SERVICE REQUESTED



Information presented in this newsletter is not intended for citation as scientific literature. Please contact the Southeastern Cooperative Wildlife Disease Study if citable information is needed.

Information on SCWDS and recent back issues of the *SCWDS BRIEFS* can be accessed on the internet at www.scwds.org. If you prefer to read the BRIEFS online, just send an email to Jeanenne Brewton (brewton@uga.edu) or Michael Yabsley (myabsley@uga.edu) and you will be informed each quarter when the latest issue is available.