# 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 35** **October 2019** **Number 3**


**Figure 1**. Emaciated doe swimming between levees. Photo credit: Ricky Flint, MDWFP

## Record Mississippi River Flood Impacts Wildlife

Floods are one of the great forces of nature that can have devastating impacts on ecosystems, including human and animal populations. One recent example is the devastation that occurred along the South Mississippi Delta. May 2018 to April 2019 was the wettest 12-month period along the Mississippi Delta since 1895, resulting in a flood event lasting greater than 150 days. Record rainfall flooded the Mississippi River, and back-to-back rains and snow melt prevented the river from recovering. Approximately 775,000 acres were flooded, including the Yazoo backwater region and seven Wildlife Management Areas in Mississippi. Rural communities and farmers were devastated by this flood, as were local wildlife populations.

In the South Delta, many animals were displaced from home ranges to higher ground; many were left stranded on levee systems for extended periods, where they experienced resource scarcity, exposure, and stress. During the flood, biologists with Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) and researchers at Mississippi State University (MSU) took action to assess the impact of the floods on wildlife populations by conducting live and mortality counts, and marking individuals to study long-term effects. The short- and long-term impacts on the

Continued…

local flora and fauna remain unclear but initial observations by MDWFP biologists are cause for concern. Over time, loss of access to sufficient browse resulted in severe emaciation in white-tailed deer (Figure 1), and local populations experienced reduced fawn recruitment and adult survival. In fact, mortality counts conducted by MDWFP biologists documented over 500 dead deer along their 26 mile transect. Without access to dry nesting sites, wild turkey, turtles, alligators, and many songbird species, also experienced reduced reproductive success. Certain species, such as red-eared sliders, became more vulnerable to predation as gravid females were exposed on levees as they searched for suitable nesting sites. Squirrels, rabbits, and other small mammals also were likely negatively impacted. Although many of these species are expected to recolonize the impacted areas from surrounding regions over time, it remains unclear how certain wildlife habitats, especially hardwood forests, will respond to extended flooding. Biologists anticipate some degree of secondary succession as new plants colonize areas of sporadic hardwood tree mortality; also shifts in plant communities may cause vertebrate populations to fluctuate as the ecosystem recovers. Some wildlife species that adapt well to high water, such as black bears and raccoons, may be minimally affected; however, the full impacts will not be appreciated until further data are collected over the next few years.

Wetland and aquatic ecosystems also have been impacted, but long-term effects are difficult to predict. Flooding has made a large portion of crops such as corn, rice, and soybeans, unavailable for waterfowl, but the birds may instead benefit from the ample wetland habitat, stimulation of aquatic plant growth, and replenishment of nutrients in oxbow lakes and sloughs. Previous studies also suggest that most game fish species such as bass, crappie, and bream benefit from high water levels and often achieve high spawning rates due to increased habitat and food resources. However, flooding may also facilitate spread of invasive plant and animal species such as silver carp. Flooding can also alter dissolved oxygen and other important water quality parameters through the introduction of chemical pollutants, pesticides, run-off, and organic and nitrogenous wastes.

Natural disturbance events, including fires, floods, and storms, can be crucial for helping ecosystems maintain natural habitat heterogeneity, species diversity, and productivity; for example, flooding helps renew resources via silt production and can prevent woody encroachment of marshes. In the Yazoo Backwater Area of the South Delta, where wildlife are adapted to seasonal flooding, wildlife managers can anticipate flooding effects and make informed management decisions based on ecological context, such as timing and intensity of floods. However, normal flood patterns are likely being altered by climate change, as well as human infrastructure, such as dams, levees, and agriculture, that may cause less frequent but more severe flooding events. In addition, this year's flood has been the longest and most severe in Mississippi since the Great Flood of 1927, so it is challenging to predict long-term consequences to the ecosystems.

Additional concerns are related to the potential impact on infectious diseases, such as chronic wasting disease (CWD). In Mississippi, CWD was first detected in Issaquena County during the winter of 2018. Subsequent flooding left much of the CWD management zone under water, leading to concern that focal aggregation of deer on levees and long-distance dispersal of others may impact the transmission and spread of CWD. To limit the impact of starvation among stranded deer, the decision was made to temporarily lift the ban on supplemental feeding of wildlife, a policy that was originally enacted to lower the risk of CWD transmission and spread within the CWD management zone. Temporary supplemental feeding permits were issued, and feed sites established to address population-level starvation as the flood extended into the summer months. Due to the chronic and insidious nature of CWD, the impact of these events on CWD transmission and environmental prion contamination in this region may never be fully understood. Another significant disease risk associated with flooding in this region is anthrax. This rapidly progressive and fatal disease occurs when anthrax spores brought to the surface of soil and vegetation by flood waters are ingested by animals. No reports of suspected anthrax cases have been observed to date.

Water levels along the Mississippi River dropped below the floodplain in July 2019, finally bringing an end to the record-duration flood and allowing wildlife to disperse more naturally. While flooding is a natural event, the scale, severity, and duration of this flood set it apart from others, and the associated habitat alteration will likely cause



Continued…

lasting impacts. Long-term monitoring by MDWFP and MSU will provide important data that can be used to characterize the long-term effects of the flood. (Prepared by Casie Lee, University of California-Davis veterinary student; William McKinley, MDWFP; Nicole Nemeth; and Mark Ruder).

## A Busy Year with HD Diagnostics

Hemorrhagic disease (HD) in white-tailed deer is nothing new, but the viruses and the epidemiologic patterns continue to change. Historically, we have had a limited number of bluetongue virus (BTV) and epizootic hemorrhagic disease virus (EHDV) serotypes in the United States and more predictable disease patterns. Rarely did large scale mortality events extend into the northern U.S. as has been observed in recent years (e.g., 2007, 2012, and 2017). This year, we have isolated EHDV and/or BTV in several states where it is expected (Alabama, Arkansas, Georgia, Kansas, Louisiana, Missouri, North Carolina, Virginia) but also in numerous states where HD has historically been less commonly, or rarely, detected (Idaho, Indiana, Kentucky, North Dakota, West Virginia, Wisconsin). This year, HD has also been reported in Minnesota for the first time, which further extends the northern range of this disease.

Cases received by SCWDS for HD diagnostic testing usually peak during September, and the season typically ends during November in most geographic locations. The full scale of this year's activity will become apparent over the next month as diagnostic testing is completed. Currently, we have tested more than 300 animals and while EHDV-2 has been the predominant virus detected, we have also detected EHDV-1 and BTV-2. It is typical for EHDV-2 to be the dominant serotype but we also expect to detect a variety of other viruses, which may include exotic serotypes as occurred in 2018 when BTV-18 and BTV-24 were detected from white-tailed deer samples submitted from Florida.

The activity we are seeing this year is consistent with two regional trends that deserve attention. HD is being detected in more northerly locations (Minnesota, North Dakota, and Wisconsin this year) and is being detected more frequently in states where HD outbreaks are historically rare. For example, deer mortality from HD has now been confirmed in West Virginia for four consecutive years (2016 - 2019), an abrupt change from the 3-5 year cycle historically observed in the state. To fully understand HD activity, we greatly rely on the information that our state collaborators provide in the annual HD questionnaire. Please continue to help build upon this long-term data set; without such data the trends that we are observing nationally would be difficult to detect, confirm, or understand. Look for final results of this season's virus detections in a future issue of the SCWDS BRIEFS. (Prepared by Dave Stallknecht)

## Research update: *Theileria* parasites in cervids and Asian longhorned tick surveillance

Since the initial report of the exotic Asian longhorned tick (*Haemaphysalis longicornis,* ALHT) in the United States in 2017, SCWDS has been involved in a collaborative research effort to understand host associations, geographic distribution, and disease risks associated with this species. Although ALHT is native to East Asia, it has become invasive in Australia, New Zealand and several south Pacific Islands largely due to its parthenogenetic ability (males are not required for reproduction), broad habitat use, and wide range of avian and mammalian hosts. In the U.S., this exotic tick was first reported from a sheep in New Jersey with no travel history, but subsequent investigations of archived ticks revealed that specimens of ALHT collected as early as 2010 had been previously misidentified as the native rabbit tick, *H. leporispalustris*. Since surveillance efforts by multiple agencies and institutions began, ALHT has been detected in 12 states and on 20 different vertebrate host species (3 avian and 17 mammalian, including humans). SCWDS maintains a website (https://scwds.shinyapps.io/haemaphysalis/) with county-level and host species reports of ALHT and continues to conduct regional ALHT surveillance through collaborations with SCWDS member state agencies and other agencies. Please contact us (see below) if you are willing to collect and submit ticks.

In the native range and parts of the invasive range (e.g., Australia), ALHT is a vector of numerous bacterial, protozoal, and viral pathogens that affect both people and animals. Of particular importance is the haemoprotozoan parasite, *Theileria orientalis.* This parasite causes bovine theileriosis



Continued…

and certain genetic subtypes (e.g. the Ikeda subtype) are a major concern for the agricultural industry. For example, in Australia, *T. orientalis* Ikeda subtype results in an estimated economic loss up to ~$20 million Australian dollars annually. Although other subtypes typically associated with low pathogenicity (e.g., Buffeli) have been previously reported in the U.S., the Ikeda subtype remained unreported until 2017, when several cattle in northern Virginia presented with weakness, icterus, and anemia and ultimately died. Examination of blood smears led to a presumptive diagnosis of anaplasmosis or piroplasmosis. A blood sample from this cow was sent to SCWDS for molecular analyses and the exotic *T. orientalis* Ikeda subtype was detected. This finding led to a larger investigation of additional cattle from that herd. Details of the outbreak investigation were recently published in the journal *Emerging Infectious Diseases* and can be freely accessed here (https://wwwnc.cdc.gov/eid/article/25/9/19-0088_article). Following the identification of *T. orientalis*, ALHT was detected infesting the same cattle herd in the spring of 2018. In Australia and Asia, ALHT is a major vector of *T. orientalis*, but has not yet been documented as a vector of *T. orientalis* in the United States. Also, the range of health effects of this parasite on cattle in the United States has yet to be determined, but further surveillance for *T. orientalis* is being conducted by researchers in Virginia.

In the U.S., white-tailed deer (WTD) are hosts for several genotypes/species of *Theileria* (often called *T. cervi*), as well as other haemoparasites (e.g., *Babesia odocoilei* and *Plasmodium odocoilei*). Our work, as well as work of others, have found that deer are also commonly infested with ALHT. To determine the ability of cervids to serve as reservoirs for *T. orientalis*, researchers at SCWDS have begun a survey for *Theileria* spp. in wild cervids. To date, our surveillance efforts utilizing archived and prospective WTD blood or spleen samples from across the southeastern United States have detected a high prevalence of endemic piroplasm parasites (341/350, 97%), but no exotic *T. orientalis* have been detected in deer. Additional sampling, especially in areas where ALHT are established are currently underway. Results of this research will provide critical insight into the potential for WTD to serve as reservoirs of exotic *T. orientalis*. Finally, SCWDS has been conducting surveillance for ALHT at the index farm in Virginia. Any ALHT ticks collected from the environment (i.e., that have not fed on a host) will be tested for *Theileria* spp. infections. We typically avoid testing ticks collected off of possible *Theileria* hosts because these ticks may be positive simply due to the blood ingested from the hosts.

If you are able to submit cervid samples (blood or spleen) for *Theileria* testing or ticks for ALHT surveillance, please contact Alec Thompson at alec.thompson@uga.edu. (Prepared by Alec Thompson and Michael Yabsley).

## Turtle Trafficking Ring Discovered in Florida

On October 18, 2019, The Florida Fish and Wildlife Conservation Commission (FWC) issued a press release reporting the discovery of a large-scale turtle trafficking operation. Two suspects have been charged with poaching and selling thousands of Florida's native turtles for overseas markets, including the Asian pet trade.

In February 2018, the FWC began an undercover surveillance operation after receiving a tip. Their investigation revealed that traffickers were illegally catching and selling wild turtles to large-scale reptile dealers and distributors, who then sold the animals to international buyers. One of the suspects reportedly directed poachers to illegally collect large numbers of turtles from the wild to meet the demand of a buyer linked to the Asian market. Poachers first targeted turtles in their known habitats, mainly in Lee County, Florida. Once local populations were depleted, the suspects met the growing demand by working with other wildlife traffickers around Florida and the United States.

A search warrant served on August 12, 2019, revealed the suspects possessed hundreds of illegally collected turtles totaling $200,000 in estimated value, as well as a skull and shell from a Kemp's Ridley sea turtle. Unfortunately, the FWC discovered the scale of the trafficking ring was much larger, as more than 4,000 turtles had already been illegally collected and sold over a 6-month period. Turtles were sold for up to $300 each, with resale values of up to $10,000 each in Asia. The targeted species included Florida box turtles, eastern box turtles, striped mud turtles, Florida mud turtles, chicken turtles, Florida softshell turtles, Gulf Coast spiny softshell turtles, spotted turtles and diamondback terrapins.



Continued…

After the seizure, the FWC worked to return captured turtles to the wild. Once biologists completed health evaluations and species identifications, more than 600 turtles were released, 300 of which are now part of a long-term monitoring program by the Sanibel-Captiva Conservation Foundation. Non-native turtles were transferred to the care of a captive wildlife licensee.

Illegal wildlife trade generates an estimated $19 billion annual income in the United States. The Florida case highlights why legal protections exist for native turtles, which face numerous threats including trafficking, habitat destruction, and disease. This event represents "the state's largest seizure of turtles in recent history," according to the press release, and is likely to have long-term effects on Florida's turtle populations.

"Wild turtle populations cannot sustain the level of harvest that took place here," stated Dr. Brooke Talley, the Reptile and Amphibian Conservation Coordinator for the FWC. "This will likely have consequences for the entire ecosystem and is a detriment for our citizens and future generations."

The original press release can be found at: https://myfwc.com/news/all-news/turtle-traffic/.
(Prepared by Natalie Stilwell)

## Bone Tumor in a Deer

During the spring of 2017, a concerned landowner in Upshur County, WV contacted the WV Division of Natural Resources (WVDNR) after observing an adult, female white-tailed deer in poor physical condition with deformities on the head. Biologists with WVDNR responded to the call and dispatched the deer. A field necropsy was performed, revealing numerous masses protruding from the skull, jaw, shoulder, ribs, vertebrae, and pelvis. Tissues from the emaciated, pregnant doe were submitted to SCWDS for evaluation.

Postmortem examination at SCWDS revealed that the masses consisted of proliferations of bone ranging in size from <1 cm diameter to as large as 34 x 16 x 12 cm; the largest mass obscured the right side of the face and eye (Figure 1). The hard, white masses originated from bone, including the skull, pelvis (Figure 2), the right scapula, and the right 3rd and 4th ribs. Microscopically, the masses were consistent with bone tumors called "osteochondromas", which are benign tumors that typically appear on the face and skull. While osteochondromatosis has previously been described in white-tailed deer, the presentation in this deer is unusual in that multiple tumors affected not only the bones of the head, but also peripheral bones throughout the body. The disease presentation observed in cervids resembles the pattern of multiple osteochondromatosis in felids. In humans, horses and dogs, multiple osteochondromatosis is characterized by boney masses that stop growing once the animal reaches skeletal maturity.

**Figure 1. Tumor obliterating the right side of the head**

**Figure 2. Tumors protruding from the right pelvic bone**

Another interesting aspect of this case was the doe's ability to maintain pregnancy, despite having multiple, large, disfiguring masses that interfered with vision, compressed the brain, and likely impacted mobility. If the deer had lived until the end of the gestational period, birth would have been impeded by masses along the pelvis that obscured the birth canal. Osteochondromas are typically slow growing and sporadic. Although striking in appearance, they do not cause immediate harm to the animal's health unless the tumor size and location interferes with biologic functions. The tumors can become large enough to impede the deer's ability to eat, drink, walk, or see. The underlying cause or predisposing factors



Continued…

associated with osteochondromas in deer remain unclear but the tumors do not likely have any health significance at the population level. Cases of cervid osteochondromatosis have rarely and sporadically been submitted to SCWDS (6 cases since 2000), the most recent, another case from WV submitted in 2018. (Prepared by Martha Frances Dalton and Mark Ruder)

## Changing SCWDS Faces: Recent Departures

The SCWDS family tree, with branches all over the world, continues to grow. Over the last year and a half, we have had several students and staff leave SCWDS to either advance or begin their careers.

Dr. Charlie Bahnson arrived at SCWDS in 2015 and recently completed his PhD in the Comparative Biomedical Sciences (CBS) Program at the College of Veterinary Medicine. Dr. Bahnson's PhD research focused on avian influenza in wild birds, and he also served SCWDS member agencies as a wildlife disease diagnostician on our Diagnostic Service. During the fall of 2018, he started his new position as Wildlife Veterinarian for the North Dakota Game and Fish Department and is an example of another SCWDS graduate now working for a state wildlife agency.

Dr. Martha Frances Dalton recently completed her residency in anatomic pathology-wildlife emphasis with SCWDS and the Department of Pathology. Dr. Dalton recently achieved board-certification by the American College of Veterinary Pathologists and returned to her home state of Mississippi in October to start a position as Assistant Clinical Professor of Pathology at the Mississippi Veterinary and Research Diagnostic Laboratory at Mississippi State University.

Troy Koser recently completed his MS degree with SCWDS and the Warnell School of Forestry and Natural Resources (WSFNR). His USDA-funded project focused on surveillance strategies for tick vectors in the Southeast. He recently started a PhD project at Montana State University's Fish and Wildlife Management Program.

Dr. Kevin Niedringhaus recently completed his PhD in the CBS Program in the College of Veterinary Medicine, where his research focused on understanding the emergence and spread of sarcoptic mange in American black bears. Dr. Niedringhaus joined SCWDS in 2014 and also served as a wildlife disease diagnostician during his time here. He recently started a residency in anatomic pathology-wildlife emphasis at the University of California-Davis School of Veterinary Medicine.

Maddy Pfaff completed her MS research with SCWDS and the WSFNR. Her USDA-funded research project examined tick ecology in the Southeast. Maddy took a position as a wildlife biologist back in her home state with the Illinois Department of Natural Resources.

Dr. Sarah Sapp recently completed her PhD in the Department of Infectious Diseases at UGA's College of Veterinary Medicine. Her research at SCWDS focused on the zoonotic raccoon roundworm, *Baylisascaris procyonis.* In the summer of 2018, she started work as a microbiologist with the CDC's Division of Parasitic Diseases Branch in the Center for Global Health.

David Shaw first joined SCWDS as a wildlife biologist in 2013 and worked throughout the U.S. and Caribbean as field crew leader for a USDA-funded arthropod surveillance project. David recently took a position as an Agricultural Specialist with the Department of Homeland Security, U.S. Customs and Border Protection Agency in Atlanta.

Dr. Kishana Taylor completed her PhD research with SCWDS and the Biomedical Health Sciences Institute at UGA. Her research explored the development of laboratory transmission models for epizootic hemorrhagic disease virus. Dr. Taylor is currently a post-doctoral research associate at the University of California-Davis.

As a research unit at a land grant university, training the next generation of wildlife and animal health professionals is an important part of what SCWDS does and our faculty and staff are passionate in helping fuel this effort. We are proud of our former employees and students who are now contributing to the broader wildlife conservation, agricultural, and public health communities. We look forward to watching their continued growth and expect great things. We have also welcomed many new people to SCWDS in the past year and will highlight these individuals in a future issue. (Prepared by Mark Ruder)



Continued…

## SCWDS Awards and Recognition

For the 2nd year in a row, a SCWDS student has brought home the Wildlife Disease Association's Student Research Recognition Award. This year, Christopher Cleveland won for his dissertation research on his studies on guinea worm/*Dracunculus* in wildlife, domestic animals, and humans. This award is given annually to a student with the most outstanding research as selected by the WDA awards committee. Chris served as the plenary speaker for the student session during this year's annual WDA International Conference in Tahoe City, CA, during which he awed the audience on his tales of worms that live under your skin and grow to 3 feet long.

Dr. Becky Poulson was recently promoted to faculty and is now an Assistant Research Scientist at SCWDS. Dr. Poulson first joined SCWDS as a research technician in 2007 and later began working on her PhD, which she completed in 2016. As a wildlife virologist, Dr. Poulson helps to lead a talented avian influenza research group at SCWDS and also supports many other projects with our state and federal partners. We are proud of Becky's first 12 years at SCWDS and look forward to her continued contributions to SCWDS and wildlife health!

Dr. Melanie Kunkel is a PhD student at SCWDS and the Comparative Biomedical Sciences Program in the College of Veterinary Medicine. Her PhD research focuses on West Nile virus in upland gamebirds. She recently received a scholarship from the American Woodcock Society and the Michael Dew Scholarship Fund, which is awarded to a SCWDS graduate student.

Alec Thompson is a PhD student at SCWDS and the Interdisciplinary Disease Across Scales (IDEAS) Program, and his research centers on multiple aspects of the Asian longhorned tick. Alec recently received competitive scholarship awards from the World Association for the Advancement of Veterinary Parasitology, as well as the University of Georgia Graduate School.

Brianna Williams is a PhD student at SCWDS and the Warnell School of Forestry and Natural Resources. Brianna recently received the TWS Wildlife Diseases Working Group Student Travel Grant, as well as the Georgia Chapter of TWS Student Travel Grant. She used the awards to travel to this year's annual TWS Conference in Reno, NV, where she presented her dissertation research, "Assessing Influenza A Virus Infection and Exposure in a Breeding Seabird Colony on Middleton Island, Alaska."

We are very proud of our faculty and students who continue to do great things and who always do a wonderful job representing SCWDS and the University of Georgia.

# 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 https://vet.uga.edu/scwds. 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.