SCWDS BRIEFS

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

Summer 2023 — Volume 40 — Number 2

Eds. M. Ruder & B. Kurimo-Beechuk

In this issue

White-tailed deer, Deb Carter

Signup to receive SCWDS BRIEFS!

Subscribe to our digital BRIEFS by emailing:

SCWDSBRIEFS-request@listserv.uga.edu

Contact us:

Tel 706-542-1741/Fax 706-542-5865

scwds@uga.edu

SOUTHEASTERN COOPERATIVE WILDLIFE DISEASE STUDY

SCWDS BRIEFS

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

Summer 2023 ___ Volume 40 ___ Number 2

Cervid Health Updates

MN DNR Captive Cervid Management

The Minnesota legislative process this year produced significant changes to the management of captive Cervidae facilities. The changes went into effect July 1, 2023. In addition to transference of management authority from the Minnesota Board of Animal Health (MBAH) to the Minnesota Department of Natural Resources (MDNR), there were important changes to fencing requirements, prohibition of new registration of captive white-tailed deer (WTD) facilities, movement of chronic wasting disease (CWD)-infected captive WTD, and importation of live captive cervids, detailed below. It should be noted that MBAH retained authority over captive cervid species other than WTD.

Sections 1-7 below are found in Minnesota Statutes 2022, section 35.155; while Sections 8-12 are from Minnesota Statutes 2022, section 35.156.

Sec. 1. was amended to allow licensed hunters to kill escaped captive cervids. If escaped for more than 72 hours, the hunter may possess the animal. Hunters must notify MDNR within 24 hours of harvest and escaped animals must be tested for CWD. The possessor of the animal is responsible for proper disposal of animals that test positive for CWD. The owner is liable for any additional costs associated with escaped captive cervids that are infected with CWD.

Sec. 2. was amended to prevent physical contact between captive cervids and free-ranging cervids. The MBAH or commissioner of natural resources may determine whether fencing is adequate and may compel corrective action. If a fence deficiency allows entry or exit by captive or wild cervids, the owner must immediately repair the deficiency. All other deficiencies must be repaired within a reasonable time, as determined by the MBAH, not to exceed 14 days. The effective date is delayed until September 1, 2024.

Sec. 3. was amended to prevent the MBAH from allowing any new registrations for possessing captive live WTD. Existing valid registrations may be sold or transferred to an immediate family member once only.

Sec. 4. was amended to prevent movement of captive WTD from a herd that tests positive for CWD from any premises to another location. Subdivision 11 (2) of this section requires the owner to depopulate the premises of cervids after the federal indemnification process has been completed or, if an indemnification application is not submitted, within 30 days. This section also was amended to require facility fences to be maintained for 10 years following detection of CWD, be posted with biohazard signs, not raise captive cervids on the premises for 10 years and disclose in writing the CWD status to any buyers of the premises. Any animal over 6 months of age from a farmed cervid herd that dies or is slaughtered must be tested for CWD.

Sec. 5. was created to add language about civil liability resulting by the owner's sale or unlawful disposal of captive cervids if the herd owner knew or reasonably should have known that the cervids were infected with or exposed to CWD.

Sec. 6. was amended to prevent importation of live cervids from a state or province where CWD has been detected in captive or wild cervid populations in the last 5 years unless the animal has been tested with a validated live animal test. Live cervids or cervid semen must originate from a herd that has been subject to a state-, federal-, or provincial-approved CWD herd certification program and that has reached a status equivalent to the highest certification. This subdivision does not apply to the interstate transfer of animals between two facilities accredited by the Association of Zoos and Aquariums.

Sec. 7. was amended to allow MDNR to contract with the MBAH and must develop an inter-agency agreement defining roles and responsibilities.

Sec. 8. Statutes 2022, section 35.156, was amended to require an annual report to the legislature concerning receipt and expenditure of any federal funds for purposes of CWD.

Sec. 9. was amended to require that the MBAH and the commissioner of natural resources must consult the Minnesota Center for Prion Research and Outreach at the University of Minnesota and incorporate peer-reviewed scientific information when administering and enforcing section 35.155 and associated rules pertaining to CWD and captive cervids.

Sec. 10. was amended by adding a subdivision to read: "The Board of Animal Health must promptly notify affected local units of government and Tribal governments when an animal in a captive cervid herd tests positive for CWD."

Sec. 11. was amended to require the MBAH to have each captive WTD possessed by a person registered under section 35.155 be tested for CWD using a noninvasive live-animal test, which has been determined by the USDA capable of accurately detecting CWD, offered by a public or private diagnostic laboratory. A validated live-animal test is required when moving captive WTD six months old and over from any premises within the state within 12 weeks of movement. The MBAH may institute additional live-animal CWD testing protocols. Live-animal testing results must be submitted to both the commissioner of natural resources and the MBAH in the form required by both agencies.

Sec. 12. transferred some duties concerning captive WTD:

(a) responsibility for administering and enforcing the statutes and rules listed in clauses (1) and (2) below for captive WTD are, except as provided in paragraph (c) below, transferred pursuant to Minnesota Statutes, section 15.039, from the MBAH to the commissioner of natural resources: (1) Minnesota Statutes, sections 35.153 to 35.156; and (2) Minnesota Rules, parts 1721.0370 to 1721.0420.

(b) The Board of Animal Health retains responsibility for administering and enforcing the statutes and rules listed in paragraph (a), clauses (1) and (2), for all other captive cervid species.

(c) Not withstanding Minnesota Statutes, section 15.039, subdivision 7, the transfer of personnel will not take place.

According to the **MDNR website**, there are 125 registered captive WTD facilities in Minnesota with a total of 3,325 deer. Changes in state law (**Chapter 60--H.F.No. 2310 Article 7**) enacted in 2023 transferred management authority of captive WTD from MBAH to MDNR. The MDNR had regulatory authority over captive WTD producers until 2005, when the Legislature transferred that authority to MBAH. In 2021, the Legislature granted co-authority to MDNR and MBAH.

The original version of this article was published in the **Outdoor News Bulletin**. Visit the **Minnesota Session Laws for the 2023 Regular Session** for more information.

Prepared by William Moritz and Matt Dunfee (Wildlife Management Institute), and John Fischer

USDA Seeks Comments On CWD

The U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS) is seeking comment on the chronic wasting disease (CWD) Herd Certification Program (HCP) Standards. In July 2023, USDA-APHIS-VS announced a series of five virtual listening sessions held July - September, during which registered participants representing various interests were able to provide verbal comments.

White-tailed deer, Deb Carter

The purpose of the listening sessions was for USDA to receive input regarding the potential revision of the CWD Herd Certification Program Standards, yet still working within the requirements of the current regulations (9 Code of Federal Regulations parts 55 and 81). Although the listening sessions are completed, written comments can be provided (due Monday, November 13, 2023 by 6:00 pm EST).

Aside from comments regarding the overall direction of the HCP, USDA also requests information related to specific questions that may be under consideration for future revisions. Most notable is the use of selective breeding and predictive genetics in approaches to prevent and manage CWD in farmed cervids.

Based on the agenda for each listening session, these specific questions are as follows:

> Should electronic ID (EID) be required and if so, should EID implants be required?
>
> Should reuse of instruments between herds and/or animals be prohibited?
>
> Should test and remove herd plans be allowed? If so, should they only be allowed in combination with selection for less susceptible animals?
>
> Should we move away from whole herd depopulation and focus primarily on selective breeding based on predictive genetics?
>
> Should APHIS provide indemnity only for positive and suspect animals and highly susceptible exposed animals based on predictive genetics scores rather than doing whole herd depopulation for white-tailed deer and other species as genetic susceptibility testing becomes available for them?

Wildlife managers, wildlife health professionals, and others in the natural resource community are encouraged to submit written comments to **Dr. Hillary McManama** (Cervid Health Staff, Strategy and Policy, Veterinary Services, USDA-APHIS) by email (**CWD@usda.gov**) and/or mail (**c/o Ms. Melanie Rouse, 4700 River Road Unit 43, Riverdale, MD 20737**). The written document should refer to **Docket No. APHIS-2023-0042**. Additional information on the HCP and the listening sessions can be accessed on the **USDA website**.

Prepared by Mark Ruder

HPAI: Viral Spread & Evolution

Highly pathogenic avian influenza A viruses of clade 2.3.4.4b (hereafter HP H5N1 IAV) underwent a marked geographic expansion in 2021 among both wild birds and domestic poultry across Asia, Europe, and Africa. As reported in previous issues of the **SCWDS BRIEFS**, by the end of 2021, HP H5N1 IAV was detected in North America, signifying further intercontinental spread. The movement across the United States, genetic reassortment, and zoonotic transmission potential of HP H5N1 IAV were recently assessed as part of a collaboration between researchers at SCWDS, St. Jude Children's Research Hospital, and USDA National Veterinary Services Laboratories. This work was **recently published in Nature Communications** and was supported by funding, in part, through the NIH, NIAID Centers of Excellence in Influenza Research and Response, from which SCWDS has received competitive research funding for over 15 years.

Viruses detected in submissions from SCWDS member states in early 2022 were sequenced as part of this study and represent some of the earliest reported detections of HP H5N1 IAV in the United States. A

Bald eagle, Deb Carter

subset of these – viruses identified in bald eagles from Florida (FL) and North Carolina (NC), a red-shouldered hawk from NC, and a lesser scaup from Georgia – were then characterized further through our collaborative network. Specifically, the genotypic, phenotypic and antigenic properties of each virus, along with their

Red-shouldered hawk, B.Kurimo-Beechuk

pathogenicity and transmission potential were assessed in both chicken and ferret animal models. The chicken model is used to help characterize an influenza virus as low vs highly pathogenic. Ferret models are used to evaluate degree of virus adaptation to mammals, as well as potential for contact and aerosol transmission- two important characteristics for viruses with pandemic potential.

For some viruses analyzed, the genotypes showed different degrees of genetic reassortment with low pathogenicity (LP) IAVs of North American wild bird origin, retaining Eurasian origin H5 and N1 genes but with diverse internal gene combinations. The viruses that occurred as a result of this genetic mixing had increased replication rates. Infection of ferrets with these genetic reassortant HP H5N1 IAVs (containing several internal genes from North American LP IAVs) resulted in rapid weight loss (**Figure 1 A and B**), lethargy, and, alarmingly, severe neurologic involvement. For comparison, HP H5N1

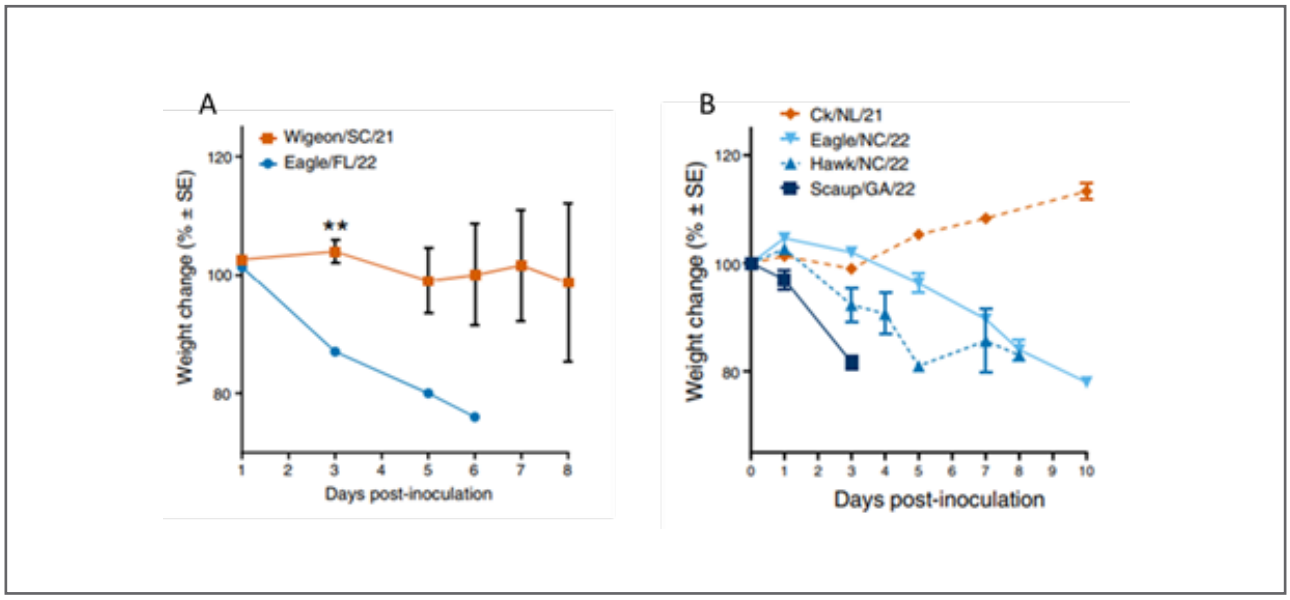
IAVs detected by USDA in an American wigeon from South Carolina and by Canadian authorities in a chicken in Newfoundland early in the outbreak that retained fully Eurasian genetic makeups (i.e., no reassortment with North American IAVs) did not exhibit these more pathogenic properties in animal models.

Fortunately, all of the HP H5N1 IAV tested in this study retained avian-like receptor binding specificity, did not possess molecular markers of mammalian adaptation, and were not shown to be capable of onward transmission in the ferret model. In-depth analyses such as those reported here allow researchers to monitor the zoonotic potential of these continually changing pathogens and identify changes that might signify an increased likelihood of sustained transmission in mammals, including humans.

The tendency for current HP H5N1 IAV to reassort with wild bird origin LP IAV, as well as to target the central nervous system of both birds and mammals warrants continued research aimed at understanding the spread and evolution of these viruses in North America. Work such as that presented here highlights the critical link between SCWDS' member states and federal partners with collaborative research efforts aimed at being better prepared to deal with emerging threats.

As always, SCWDS is available to assist in HP H5N1 IAV-related work. As we move through the autumn southward migration of waterfowl and other avian species, communicate with us about your plans for targeted IAV surveillance (e.g., swab-based live, serology-live, or dead bird/mammal sampling) and specific needs you might have.

The figure below depicts the percent weight change of inoculated ferrets with (**A**) fully Eurasian HP H5N1 IAV from an American wigeon (orange) or Eurasian/North American reassortant HP H5N1 IAV isolated from a bald eagle (blue), and (**B**) Eurasian/North American reassortant HP H5N1 IAV isolated from a bald eagle, red-shouldered hawk, and lesser scaup (all in shades of blue), compared to a fully Eurasian virus from a Newfoundland chicken (same genotype as the American wigeon in **panel A**).



Prepared by Becky Poulson and Dave Stallknecht

Diagnostic Case Highlight

Mortality event in American robins in Louisiana attributed to ethylene glycol toxicosis

A mortality event involving at least 44 adult American robins found in a residential backyard in Natchitoches Parish, Louisiana occurred on February 25, 2023.

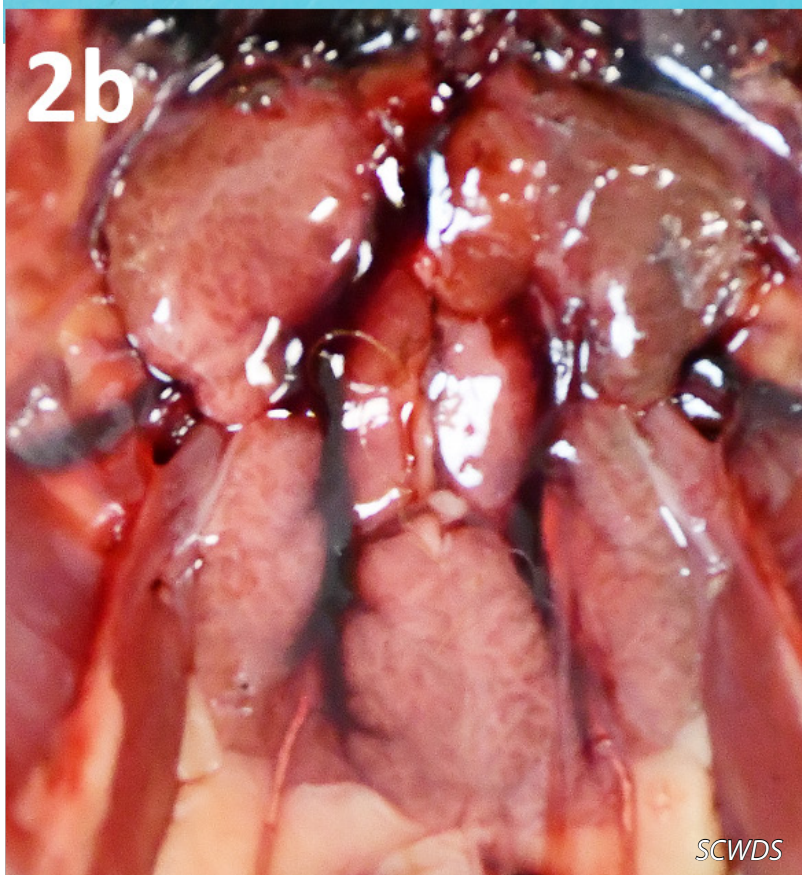
Five of the approximately 44 American robin carcasses found in a residential backyard in Natchitoches Parish, Louisiana on February 25, 2023 were collected by the Louisiana Department of Wildlife and Fisheries staff (LDWF) and submitted to SCWDS for diagnostic evaluation.

All robins were in good nutritional and feather condition (**Figure 1**). The proventriculus (stomach equivalent) often was empty; the ventriculus contained black, fibrous material (suspect vegetation); and the intestines contained tan, mucoid material. These robins also had diffusely enlarged spleens (splenomegaly) (**Figure 2a**) and less commonly, pale kidneys (**Figure 2b**). Tissues of three of the robins were examined microscopically, all of which had evidence of severe kidney damage including widespread cell degeneration and death associated with large, needle-shaped crystals (**Figure 3a**).

When viewed microscopically under specialized (polarized) light, these crystals shone brightly (i.e., exhibited birefringence or double light refraction; **Figure 3b**). The shape and birefringence of these crystals are characteristic of calcium oxalate crystals, and the presence of high numbers of these crystals with associated kidney damage is characteristic of ethylene glycol toxicosis. In addition, the spleens were inflamed with changes

suggestive of red blood cell damage.

Additional diagnostic testing included a glycol and salt screen of pooled kidney samples from the three more extensively evaluated robin carcasses; testing was performed at the California Animal Health and Food Safety (CAHFS) Laboratory in Davis, CA. While ethylene glycol was not detected in the sample, the calcium concentration was markedly elevated at 10,000 ppm (reporting limit 0.3 ppm), which is consistent with ethylene glycol toxicosis.



Since ethylene glycol is metabolized rapidly in the body, lack of detection does not rule it out as a cause of disease or death, and thus, the combination of microscopic kidney lesions with characteristic crystals, high level of calcium in the kidneys, and the history of rapid (acute) death in these robins implicates ethylene glycol toxicosis as the cause of death.

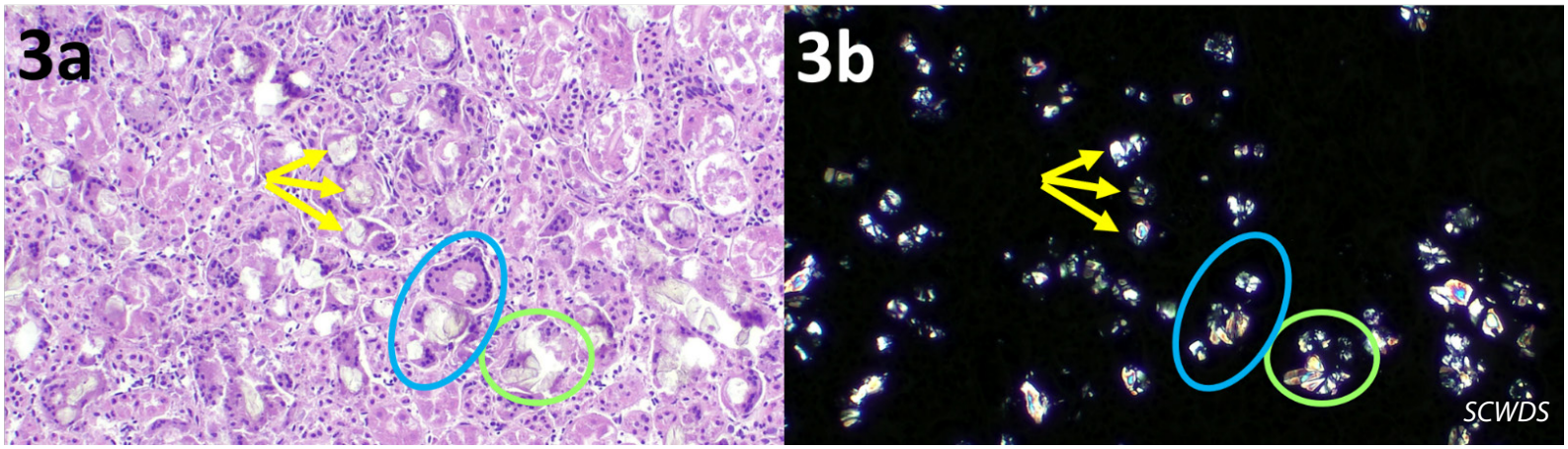
Additional laboratory testing performed at SCWDS included molecular analyses (polymerase chain reaction [PCR] and sequencing) for protozoans in spleen samples from all five robins. Genetic material of *Plasmodium unalis* TUMIG03 (a red blood parasite) was detected by PCR test in samples from four of the five robins.

In general, *Plasmodium* species are the causative agents of avian malaria, which is a mosquito-borne disease that is commonly detected in a variety of bird species. Severity of disease is variable based on the organism, parasite load, and host species. For example, *Plasmodium* infection can cause fatal disease in penguins, with outcomes more variable (including subclinical) among some migrating songbirds.

Although *P. unalis* has not been commonly associated with disease in robins, the markedly enlarged spleens in the robins may have been due to this infection, as there was microscopic evidence suggestive of red blood cell damage from intracellular structures (consistent with blood parasites). This finding may represent subclinical or low-grade chronic disease and not the overt cause of death, which is attributed to ethylene glycol toxicosis in this case. Regardless, monitoring for avian malaria in passerines and other native bird species is important to better understand potential impacts or potential increases in vector activity in some regions with changing climatic conditions.

Ethylene glycol is a colorless, odorless liquid compound that is the main ingredient in antifreeze and also is used in some hydraulic brake fluids and

inks. Due to its sweet taste, it is commonly ingested by animals, including both wildlife and domestic animals, in which it is considered highly toxic. Humans are also susceptible to fatal outcomes following ingestion. While ethylene glycol is not directly toxic to tissues, it is rapidly metabolized in certain organs through a pathway that produces toxic metabolites including glycolic acid and oxalic acid. Glycolic acid decreases blood pH (i.e., metabolic acidosis), which can severely and adversely affect function of the brain, heart, and other organs. Oxalic acid is toxic to kidney cells (specifically the renal tubular epithelium) and also precipitates into calcium oxalate crystals, which cause mechanical damage to the kidney.



Toxicosis most often is attributed to accidental ingestion, with an estimated 10,000 domestic dogs and cats poisoned annually, and is often fatal. In domestic species, it has been demonstrated that death can occur not only from kidney failure but from neurologic, heart and lung functional impairment with high dose exposures.

The prevalence of ethylene glycol toxicosis in wildlife is not well known, but fatalities have been reported in numerous species, including ducks, vultures, and a California condor. Ethylene glycol is sometimes used as toxic bait for feral pigeons, which may result in poisoning of non-target species. Accidental environmental contamination with ethylene glycol from spills, runoff or improper disposal of products containing the compound can negatively impact marine and aquatic wildlife.

Use of antifreeze products composed of propylene glycol (instead of ethylene glycol) is preferable to minimize harmful effects on animals and the environment. This alternative is less toxic than ethylene glycol, though still potentially toxic when ingested. Further, increasing awareness of the toxic effects of antifreeze and other relevant products is important to preventing both domestic animal and wildlife deaths. SCWDS is grateful to the LDWF staff for submitting this interesting case.

Prepared by Alyssa Williams (Long Island University), Aidan O'Reilly, Michael Yabsley, Kayla Garrett, Rusty Berry (LDWF), Nicole Nemeth

SOUTHEASTERN COOPERATIVE WILDLIFE DISEASE STUDY

SCWDS BRIEFS

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

Summer 2023 ___ Volume 40 ___ Number 2

SCWDS Annual Publications July 1, 2022 - June 30, 2023

- Allen SE, SL Vigil, CM Jardine, T Furukawa-Stoffer, N Colucci, A Ambagala, MG Ruder, NM Nemeth. **New distribution records of biting midges of the genus *Culicoides* (Diptera: Ceratopogonidae) Latreille, *Culicoides bergi* and *Culicoides baueri*, in Southern Ontario, Canada.** Journal of Medical Entomology, 2022. **DOI:10.1093/jme/tjac047**
- Allen SE, SL Vigil, T Furukawa-Stoffer, N Colucci, A Ambagala, DL Pearl, MG Ruder, CM Jardine, and NM Nemeth. **Abundance and diversity of Culicoides Latreille (Diptera: Ceratopgonidae) in southern Ontario, Canada.** Parasites and Vectors, 2023. **DOI:10.1186/s13071-023-05799-w**
- Chong DLA, B McHale, KB Garrett, and MJ Yabsley. **What's bugging the greater sage grouse? Fatal systemic Haemosprodiosis in a free-ranging greater sage-grouse (*Centrocercus urophasianus*).** Journal of Wildlife Diseases, 2023. **DOI:10.7589/JWD-D-22-00066**
- Clarke LL, DG Mead, MG Ruder, EW Howerth, and D Stallknecht. **North American arboviruses and white-tailed deer (*Odocoileus virginianus*): Associated diseases and role in transmission.** Vector Borne and Zoonotic Diseases, 2022. **DOI:10.1089/vbz.2022.0005**
- Cleveland CA, Dallas TA, Vigil S, Mead DG, Corn JL, and Park AW. **Vector communities under global change may exacerbate and redistribute infectious disease risk.** Parasitology Research. 2023. **DOI:10.1007/s00436-023-07799-2**
- Coker SM, EK Box, N Stilwell, EA Thiele, JA Cotton, E Haynes, MJ Yabsley, and CA Cleveland. **Development and validation of a quantitative PCR for the detection of Guinea worm (*Dracunculus medinensis*).** PLOS Neglected Tropical Diseases, 2022. **DOI:10.1371/journal.pntd.0010830**
- Cunningham MW, Wolf DP, Sayler KA, Milleson M, Bankovich B, Schueller P, Haley BS, Stura S, Yabsley MJ. **Distribution of Baylisascaris procyonis in raccoons (*Procyon lotor*) in Florida, USA.** Journal of Wildlife Diseases, 2023. **DOI:10.7589/JWD-D-22-00115**
- Doub EE, AT Thompson, AL Korns, CA Cleveland, MJ Yabsley, and MG Ruder. **Immobilization of raccoons (*Procyon lotor*) with nalbuphine, medetomidine, and azaperone.** Journal of Wildlife Diseases, 2023. **DOI:10.7589/JWD-D-22-00159**
- Frederick JC, Thompson AT, Sharma P, Dharmarajan G, Ronai I, Pesapane R, Smith RC, Sundstrom KD, Tsao JI, Tuten HC, Yabsley MJ, Glenn TC. **Phylogeography of the blacklegged tick (*Ixodes scapularis*) throughout the USA identifies candidate loci for differences in vectorial capacity.** Molecular Ecology, 2023. **DOI:10.1111/mec.16921**
- Garrett K, J Brown, RKA Grunert, J Hunte, MG Ruder, K Van Why, MJ Yabsley, CA Cleveland. ***Echinococcus* species infections among wild canids in Pennsylvania, USA.** Journal of Wildlife Diseases,

2023. **DOI:10.7589/JWD-D-22-00042**

- Grunert RKA, Kunkel MR, Radisic R, Nemeth NM, Burrell CE, Shender LA, Guzman-Vargas V, Cunningham MW, Yabsley MJ. **Notoedric mange (*Notoedres centrifera*) in two species of free-ranging rabbits from Florida, USA.** Veterinary Parasitology Regional Study and Reports, 2022. **DOI:10.1016/j.vprsr.2022.100748**
- Haynes E, CA Cleveland, KB Garrett, RKA Grunert, JA Bryan II, M Sidouin, PT Oaukou, BNR Ngandolo, and MJ Yabsley. **Characterization of the genetics and epidemiology of a *Brugia* sp. in domestic dogs in Chad, Africa.** Veterinary Parasitology: Regional Studies and Report, 2022. **DOI:10.1016/j.vprsr.2022.100784**
- Haynes E, S Coker, MJ Yabsley, KD Niedrighaus, AM Ramey, GG Verocai, GV Hilderbrand, K Joly, DD Gustine, B Mangipane, WB Leacock, AP Crupi, and CA Cleveland. **Survey for selected parasites in Alaska brown bears (*Ursus arctos*).** Journal of Wildlife Diseases, 2023. **DOI:10.7589/JWD-D-22-00070**
- Haynes E, KB Garrett, EK Box, H Zirimwabagabo, PT Oaukou, K Abernathy, MJ Yabsley, and CA Cleveland. **Using point-of-view cameras (Crittercams) to document potential risk behaviors for Guinea worm (*Dracunculus medinensis*) transmission in domestic cats in Chad, Africa.** Applied Animal Behavior Science, 2022. **DOI:10.1016/j.applanim.2022.105796**
- Hazelrig CM, Gettings JR, Cleveland CA, Varela-Stokes A, Majewska AA, Hubbard K, Burton KW, Yabsley MJ. **Spatial and risk factor analyses of vector-borne pathogens among shelter dogs in the Eastern United States.** Parasitology Vectors, 2023. **DOI:10.1186/s13071-023-05813-1**
- Kandeil A, Patton C, Jones JC, Jeevan T, Harrington WN, Trifkovic S, Seiler JP, Fabrizio T, Woodard K, Turner JC, Crumpton JC, Miller L, Rubrum A, DeBeauchamp J, Russell CJ, Govorkova EA, Vogel P, Kim-Torchetti M, Berhane Y, Stallknecht D, Poulson R, Kercher L, Webby RJ. **Rapid evolution of A (H5N1) influenza viruses after intercontinental spread to North America.** Nature Communications, 2023. **DOI:10.1038/s41467-023-38415-7**
- Kent CM, AM Ramsey, JT Ackerman, J Bahl, SN Bevins, AS Bowman, WM Boyce, CJ Cardona, ML Casazza, TD Cline, SE De La Cruz, JS Hall, NJ Hill, HS Ip, S Krauss, JM Mullinax, JM Nolting, M Plancarte, RL Poulson, JA Runstadler, RD Slemons, DE Stallknecht, JD Sullivan, JY Takehawa, RJ Webby, RG Webster, DJ Prosser. **Spatiotemporal changes in influenza A virus prevalence among wild waterfowl inhabiting the continental United States throughout the annual cycle.** Scientific Reports, 2022. **DOI:10.1038/s41598-022-17396-5**
- Kunkel MR, RD Berghaus, JA Martin, DG Mead, MG Ruder, and NM Nemeth. **Storage time and temperature of filter paper strips affect anti-West Nile virus antibody detection in 2 galliform species.** Journal of Veterinary Diagnostic Investigation. 2023. **DOI:10.1177/10406387231170795**
- Kunkel MR, JD Brown, L Williams, KD Niedringhaus, H Fenton, MG Ruder, NM Nemeth. **Comparison of pathology and immunohistochemistry in natural and experimental West Nile virus infections in ruffed grouse (*Bonasa umbellus*).** Journal of Wildlife Diseases, 2022. **DOI:10.7589/JWD-D-22-00047**
- Kunkel MR, MJ Casalena, DG Mead, M Blake, RD Berghaus, KG Adcock, JA Martin, MG Ruder, and NM Nemeth. **Susceptibility of wild turkeys (*Meleagris gallopavo*) to experimental West Nile virus infection.** Avian Pathology, 2022. **DOI:10.1080/03079457.2022.2123732**
- Kunkel MR, DG Mead, MG Ruder, and NM Nemeth. **Our current understanding of West Nile virus in upland game birds.** Wildlife Society Bulletin, 2022. **DOI:10.1002/wsb.1269**
- Lane M, M Kashani, JL Barratt, Y Qvarnstrom, MJ Yabsley, KB Garrett, and RS Bradbury. **Application of**

a universal parasite diagnostic test to biological specimens collected from animals. International Journal for Parasitology: Parasites and Wildlife, 2023. **DOI:10.1016/j.ijppaw.2022.12.003**

- McMillan JR, GL Hamer, RS Levine, DG Mead, LA Waller, TL Goldberg, ED Walker, JD Brawn, MO Ruiz, U Kitron, and G Vazquez-Prokopec. **Multi-year comparison of community- and species-level West Nile virus antibody prevalence in birds from Atlanta, Georgia and Chicago, Illinois USA 2005 – 2016.** American Journal of Tropical Medicine Hygiene, 2022. **DOI:10.4269/ajtmh.21-1086**
- Nemeth NM, MG Ruder, RL Poulson, R Sargent, S Breeding, MN Evans, J Zimmerman, R Hardman, M Cunningham, S Gibbs, and DE Stallknecht. **Bald eagle mortality and nest failure due to clade 2.3.4.4 highly pathogenic H5N1 influenza A virus.** Scientific Reports, 2023. **DOI:10.1038/s41598-023-27446-1**
- Niedringhaus KD, JP Dumbacher. Dunker F, Medina S, Lawson B, Fenton HMA, Higley JM, Haynes E, and Yabsley MJ. **Apparent prevalence, diversity, and associated lesions of periorbital nematodes in a population of barred owls (*Strix varia*) from Northern California, USA.** Journal of Wildlife Diseases, 2023. **DOI:10.7589/JWD-D-21-00186**
- Niedringhaus KD, M Gordon, MJ Yabsley, J Gai, FA Uzal, and KD Woolard. **Fatal balamuthiasis in a Siberian tiger and a literature review on detection options for free-living amoebic infections in animals.** Journal of Veterinary Diagnostic Investigation, 2023. **DOI:10.1177/10406387231160771**
- Runstadler JA, Lowen AC, Kayali G, Tompkins SM, Albrecht RA, Fouchier RAM, Stallknecht DE, Lakdawala SS, Goodrum FD, Casadevall A, Enquist LW, Alwine JC, Imperiale MJ, Schultz-Cherry S, Webby RJ. **Field Research Is Essential to Counter Virological Threats.** Journal of Virology, 2023. **DOI:10.1128/jvi.00544-23**
- Sanjuán CG, Aguirre JI, Villaverde S, Banda E, Hernandez SM, Yabsley MJ. **Surveillance for gastrointestinal, subcutaneous, and ectoparasites of invasive North American raccoons (*Procyon lotor*) in central Spain.** Veterinary Parasitology Regional Studies and Reports, 2022. **DOI:10.1016/j.vprsr.2022.100793**
- Shapiro HG, G D'Angelo, MG Ruder, EF Pienaar. **Engaging stakeholders in wildlife disease management: Hunters' willingness to adopt and support biosecurity actions to prevent the spread of rabbit hemorrhagic disease.** Conservation Science and Practice, 2023. **DOI:10.1111/csp2.12858**
- Shapiro HG, MG Ruder, EF Pienaar. 2023. **Down the rabbit hole: domestic rabbit owners' perceptions of rabbit hemorrhagic disease virus 2.** EcoHealth, 2022. **DOI:10.1007/s10393-022-01622-7**
- Swanepoel L, Loyola A, Flowers J, Lewbart GA, Garrett KB, Yabsley MJ. **Infection with a novel pentastome (*Raillietiella* sp.) in a juvenile endangered Galápagos tortoise (*Chelonoidis niger*).** Veterinary Parasitology Regional Studies and Reports, 2022. **DOI:10.1016/j.vprsr.2022.100782**
- Thiemann R, MF Dalton, H Rose, B Baughman, A Butler, K Adcock, N Nemeth, N Armour. **An investigation of the cause of wild turkey mortality in Mississippi.** Avian Diseases, 2022. **DOI:10.1637/aviandiseases-D-22-00007**
- Thompson AT, SA White, EE Doub, P Sharma, K Frierson, K Dominguez, D Shaw, D Weaver, SL Vigil, DL Bonilla, MG Ruder, MJ Yabsley. **The wildlife of ticks: Using passive surveillance to determine the distribution and wildlife host range of ticks and the exotic *Haemaphysalis longocornis*, 2010-2021.** Parasites and Vectors, 2022. **DOI:10.1186/s13071-022-05425-1**
- Williams KE, ND Hooven, JT Hast, CL Casey, NM Nemeth, A Weyna, MT Springer, JJ Cox. **Congenital vertebral malformation in a neonatal elk (*Cervus canadensis*) in Kentucky, USA.** Journal of Wildlife Diseases, 2023. **DOI:10.7589/JWD-D-22-00126**

- Weyna AAW, KD Niedringhaus, MR Kunkel, HMA Fenton, MK Keel, AH Harding-Webb, C Bahnson, R Radisic, B Munk, S Sánchez, NM Nemeth. **Listeriosis with viral coinfections in 8 gray foxes, 8 wild turkeys, and 2 young cervids in the southeastern United States.** Journal of Veterinary Diagnostic Investigation, 2022. **DOI:10.1177/10406387221104830**
- Weyna AAW, Ruder MG, Dalton MF, Bahnson C, Keel MK, Fenton H, Ballard JR, Nemeth NM. **Distinctive gross presentation in free-ranging white-tailed deer (*Odocoileus virginianus*) with Rabies.** Journal of Wildlife Diseases, 2022. **DOI:10.7589/JWD-D-21-00176**
- Yabsley MJ, SM Coker, CN Welch, KB Garrett, M Murray, R Grunert, JS Seixas, WM Kistler, SE Curry, HC Adams, CS Nakatsu, L Swanepoel, ST Wyckoff, TM Koser, E Kurimo-Beechuk, E Haynes, and SM Hernandez. **A single haplotype of Haemoproteus plataleae is widespread in American white ibis (*Eudocimus albus*) from urban and rural sites in southern Florida.** International Journal for Parasitology: Parasites and Wildlife, 2023. **DOI:10.1016/j.ijppaw.2023.06.010**
- Yabsley MJ and AT Thompson. ***Haemaphysalis longicornis* (Asian longhorned ticks).** Trends in Parasitology, 2023. **DOI: 10.1016/j.pt.2022.12.007**

White ibis, B.Kurimo-Beechuk

SOUTHEASTERN COOPERATIVE WILDLIFE DISEASE STUDY

SCWDS BRIEFS

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

Parting views from the Southeast

White-tailed deer fawn, Adam Edge