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

Spring 2025 — Volume 43 — Number 1

Eds. M. Ruder and B. Kurimo-Beechuk

Burrowing owl, M. Yabsley

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Mammal health updates

Rat lungworm- a novel threat?

Rat lungworm (RLW, *Angiostrongylus cantonensis*) is an important zoonotic parasite of humans and numerous species of mammals and birds, including many wildlife species in over 30 countries. The parasite is native to Asia, but it has been introduced in numerous other regions including Australia, South America, Africa, the Canary Islands, various islands in the Pacific, Caribbean, Indian Ocean and parts of the United States. In the US, it was first recognized in Hawaii in the late 1950s and since then, there have been significant numbers of cases reported in humans and dogs. In the southeastern US, this parasite has only been recognized for a relatively short period of time (since 1986 in Louisiana). Infection with RLW may cause encephalitis, resulting in disorientation, nausea, headache, vomiting, ascending paralysis, coma and death. Even with treatment, these symptoms may be permanent depending on the number of larvae and the extent of tissue damage.

The definitive hosts of RLW are rats, predominately *Rattus* species, and infected rats have been reported in Louisiana, Florida, Georgia and Oklahoma. Numerous intermediate hosts (aquatic and terrestrial mollusks) and paratenic hosts (amphibians, reptiles, crustaceans, and insects) have also been discovered in these same states. Infections in zoo animals have been documented among non-human primates such as lemurs, orangutans, and multiple species of New World monkeys. From 2011-2017, **12 human RLW cases have been reported in the U.S.** from Texas, Louisiana, Tennessee, Alabama, and, most recently, Florida, with three new cases this year.

Infection with RLW is a significant concern for zoo animals, but data on the impacts of RLW infection in wildlife are limited. In 2017, SCWDS **diagnosed** RLW infections in nine-banded armadillos from Louisiana and Florida, and a Virginia opossum from Florida. Other researchers have diagnosed infections in opossums and a woodrat in Louisiana. Recently, SCWDS diagnosed RLW infection in a novel host, the burrowing owl. Burrowing owls are small, long-legged owls that live in different types of open landscapes throughout North and South America, including grasslands, rangelands, agricultural areas, and deserts.

The population of burrowing owls in Florida represent a distinct subspecies that is classified as State Threatened by the **Florida Fish and Wildlife Conservation Commission (FWC)**. Historically, these owls occupied prairies throughout Florida north of the Everglades, but due to habitat loss, the Florida burrowing owl now has a highly patchy distribution, with some populations occurring in residential lawns and vacant lots in suburban environments. The increase in developed areas in Florida has expanded the diversity of threats faced by owls, including predation by domestic animals, anticoagulant rodenticide toxicosis, vehicular collisions, harassment, and infectious and parasitic diseases.

Beginning in the mid-2010s, biologists in southern

Mammal health updates


Burrowing owl, M. Yabsley

Florida sporadically reported neurologic disease in burrowing owl chicks. Since 2020, **six owls** submitted to the **SCWDS Research and Diagnostic Service** were diagnosed with RLW-associated encephalitis based on direct examination of the nematodes, genetic sequencing, and histological examination. An additional three owls were suspect cases based on clinical signs and histologic lesions, but lacked direct observation of the nematode or nematode DNA within brain samples. All of these cases occurred on Marco Island in southwest Florida, which is a concern because this highly urbanized island has one of the largest populations of burrowing owls in Florida, so widespread RLW-associated morbidity and mortality could be impactful across its range.

Rat lungworm infections in birds are rare with most cases being reported in Australia in free-ranging tawny frogmouths, captive cockatoos, and brolga. Prior to our detection in burrowing owls in Florida, the only previous avian report in the US was in a **captive African Pygmy falcon** in California. However, this case was not believed to have been acquired locally, but rather from feeding infected feeder geckos from Asia. It is unknown if the lack of reported avian infections is related to infrequent testing in dead birds, limited exposure, or low susceptibility. Experimentally, both domestic chickens and Japanese quail have been shown to be resistant to infection but how this information applies (or not) to other avian taxa is not clear.

The transmission route for RLW infection in burrowing owls remains unknown. SCWDS is currently investigating the diet of burrowing owls to identify potential transmission routes to the owls and other hosts in the Southeast. Our preliminary findings show that these owls consume a wide variety of insects, mollusks, reptiles, amphibians, and small mammals. SCWDS is working with the **Audubon Western Everglades**, FWC, and the **University of Florida** to better understand what species of intermediate and paratenic hosts (i.e., prey items) might be the primary risks for transmission. Given RLW's broad distribution throughout the Southeast, and its ability to utilize a diversity of species as intermediate and paratenic hosts, additional cases in wild, zoo, and companion animals are expected. Given its importance, RLW should be included in the list of potential causes of neurologic signs in mammals and birds.

Prepared by Michael Yabsley and Håkon Jones

New World screwworm outbreaks

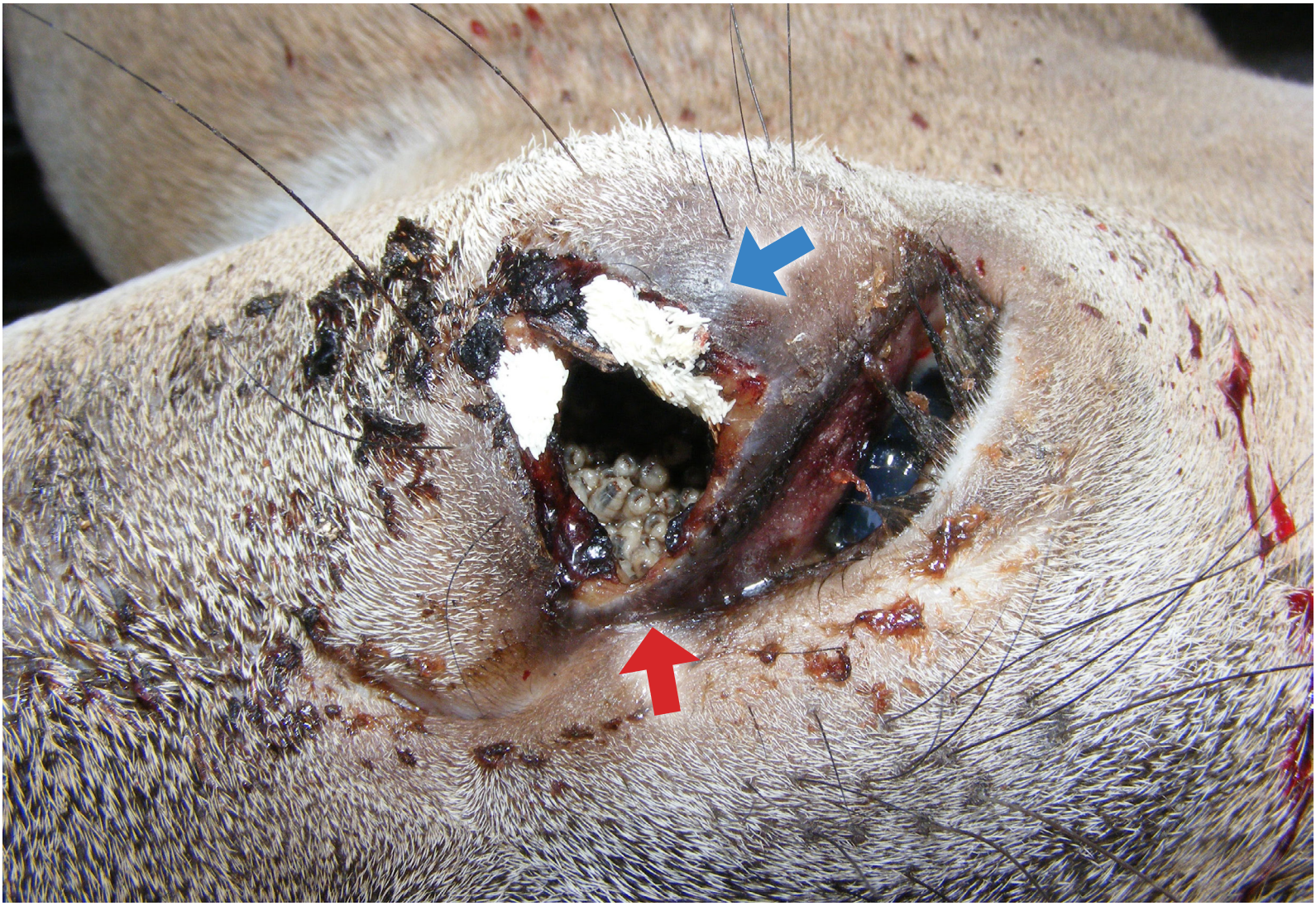
New World Screwworm (NWS, *Cochliomyia hominivorax*) is a parasitic fly native to the Western hemisphere whose larvae infest wounds of living, warm-blooded animals, causing severe tissue damage and death if untreated. Over the past few years, NWS has spread north from Panama, through Central America, to southern Mexico. While it has not reached the US, people who live and work around animals in the southern tier of US states are encouraged to stay alert as early detection and reporting can help stop outbreaks from spreading.

Severe NWS infestation in a key deer from 2016. Notice the dense layer of larvae along the wound margins (orange arrow) and the deeper, tightly packed and organized layer of deeper larvae (teal arrow). A bright white egg mass is also visible (blue circle). The skull is exposed and multiple adult flies can be seen in the image. Photo credit USFWS/Gibbs

NWS was eradicated in 1966 from the US and Central America through the release of male flies that were **sterilized with irradiation**. The **U.S. Department of Agriculture-Animal Plant Health Inspection Service (USDA-APHIS)** collaborates with Panama to maintain a barrier zone in eastern Panama, the Panama-United States **Commission for the Eradication and Prevention of Screwworm (COPEG)**. In 2016, NWS was detected in the endangered Key deer population in the Florida Keys (images left, and on the following page) and subsequently eradicated using a multipronged approach that included the sterile male fly approach and robust interagency cooperation between state and federal wildlife and agricultural agencies. In 2023, NWS detections in Panama increased from 25 cases/year to more than 6,500 cases in a single year. Since then, NWS has moved north into Costa Rica, Nicaragua, Honduras, Guatemala, Belize, and El Salvador, and has now reached southern Mexico, about 700 miles from the US border. In November 2024, after a positive detection of NWS in southern Mexico, USDA closed the border for live animal trade; trade resumed in February 2025 after a comprehensive pre-clearance inspection and treatment protocol was implemented. On May 11, 2025, the **US Secretary of Agriculture** suspended the import of live cattle, horses, and bison through the US ports of entry along the southern border due to the continued and rapid northward spread of screwworm in Mexico. On June 30, 2025, the Secretary of Agriculture announced risk-based port re-openings would begin as early as July 7, 2025, following extensive sterile NWS fly dispersal, collaboration with **Mexico's Department of Health, Food Safety and Food Quality (SENASICA)** on NWS response, and no northward movement of NWS since the border closure. However, this plan was

put on hold following a **new report** of NWS northward of the current sterile fly dispersal grid on July 9, 2025; southern ports of entry remain closed until further notice. Please visit **USDA-APHIS** for updated information.

Screwworms can infest livestock, wildlife, pets, and even humans. Female screwworm flies lay their eggs in or at the edges of open wounds of living, warm-blooded hosts. The eggs hatch and the larvae (maggots) eat the healthy, living tissue. This is different from more commonly seen native fly larvae infestations, in which the larvae consume dead and decaying tissue. More flies lay eggs in the already



Male key deer during 2016 NWS outbreak, with a severe infestation on the face. Notice densely packed larvae associated with the pre-orbital gland (red arrow) and bright white egg masses along the wound margins (blue arrow). Photo credit USFWS/Gibbs

larvae-infested wounds, producing more larvae and making the wound bigger and deeper. In domestic livestock, NWS can infest skin wounds that occur as part of management (e.g., vaccination, castration, dehorning, branding, ear tagging) or more natural processes and/or body surfaces (e.g., small wounds, newborn umbilicus, vulva). In wildlife, NWS similarly can exploit natural opportunities (e.g., small skin lacerations, tick bite wounds, velvet antler shedding, antler casting, newborn umbilicus). Adult screwworm flies can travel more than 100 miles in search of hosts.

An infested animal may demonstrate irritated or depressed behavior, head-shaking, isolation from other animals, hiding in unusual places, and open wounds with discharge and a foul odor. Wounds vary

considerably and may be swollen, may be small holes but have deep areas of severe tissue damage filled with maggots, and/or they may cover a large area on the body. The screwworm larvae can vary in size and color from off-white to gray, yellow-orange, and pink and may be easily confused with native blowfly larvae. Often, masses of bright white eggs may be visible along the wound margins, as in the image on the previous page. Identification of screwworm larvae and flies should be made by entomologists, parasitologists, or other trained professionals. It is important to consider that animals infested with NWS may concurrently be infested with native blowfly larvae, complicating diagnostic investigations.

NWS infestations are considered a foreign animal disease by the USDA and swift interagency communication and cooperation will be critical to mounting an effective response. Wildlife health professionals in southern border states (CA, AZ, NM, TX) currently should be on alert for signs of screwworm in animals. Suspected animal cases should be reported immediately to the State Wildlife Health Expert or Veterinarian, State Animal Health Official (SAHO), and USDA Area Veterinarian-In-Charge (AVIC). Biosecurity considerations are important and moving live or dead animals can potentially move NWS to new areas. For suspected cases, officials may ask you to take up-close photos of the wound with fly larvae and collect 1-5 larvae (from live or very recently euthanized animals) of different sizes and appearance. Larvae should be collected using forceps, especially from deep in the wound, and placed in a leak-proof container with at least 70% ethyl or isopropyl alcohol. If warranted based on the photos, the officials may request submission of the larvae for identification.

Suspected human cases should be reported to your healthcare provider, or the local/state health department. Additional information about NWS in humans can be found **here**, and more images **here**.

Prepared by: Ellen Haynes, Samantha Gibbs (USFWS), Michael Yabsley, Nicole Nemeth

GPS-collared white-tailed deer from a CWD study in Arkansas, L. Bertin

CWD and deer feeding risks

A recent **study** led by researchers at **Mississippi State University (MSU)** identified evidence of chronic wasting disease (CWD) prions on deer feeders and increased rates of deer visitation and deer-to-deer contact at feeders, providing further justification for bans or restrictions that state wildlife management agencies place on supplemental deer feeding to slow the spread of CWD. Such regulations are important to lower the risk of transmission of certain pathogens (e.g., CWD) and lower the risk of unnatural aggregations of wildlife species. Researchers from MSU, **Mississippi Department of Wildlife, Fisheries and Parks**, **University of Minnesota**, and the **USDA-APHIS** set up and maintained 13 feeders from September 2022 through March 2023 in northern Mississippi in an area with an approximate CWD prevalence of 30% in white-tailed deer (WTD). Supplemental feeding of deer had been banned in this area for four years prior to the study. Seven deer feeders allowed full access of all wildlife, including deer, and three feeders were fenced to exclude WTD but allow access of raccoons and other small wild animals through small holes in the fencing at ground level. Three feeders serving as environmental controls were fully fenced and not filled with feed.

The spouts of the gravity-fed feeders were swabbed to detect prions at set up and at six-week intervals during the study. The swabs were tested for the presence of prions by real-time quaking–induced conversion assay (RT-QuIC). Prions were detected on six out of seven deer-accessible feeders and two out of three raccoon-accessible feeders six weeks after set up, and on all ten deer and raccoon feeders within 12 weeks. Two of the environmental control feeders tested positive for prions at set up but not at any point later in the trial. Possible explanations for this include accidental contamination during feeder set up, swabbing, or laboratory testing. Regardless, the authors are confident that repeated prion detection on deer and raccoon feeders during the study indicated the presence of prions.

Swabbing and testing of feeders also occurred on private property at two sites where CWD was recently detected for the first time and several of these deer feeders were in use by landowners

White-tailed deer from a CWD study in Arkansas, L. Bertin

at the time of testing. At one private property site, CWD was detected in a free-ranging, male WTD during November 2023. This CWD detection was approximately 240 kilometers (km) (or 149 miles) from the nearest previously reported CWD detection. Testing of five feeders on this property within two weeks of detecting the aforementioned CWD-positive deer did not yield any prion-positive feeder swab samples. However, testing eight other feeders on the property three months later yielded one prion-positive swab sample. A second private property site (a 1.6 km^2 single high fence enclosure) had the first CWD-positive WTD detected on the property during February 2024, two months prior to sampling for the study. This property was approximately 20 km (or 12.4 miles) from another known CWD-positive WTD. Prions were detected on three of six feeders swabbed two months after the first detection of CWD in deer in the facility.

Investigators also evaluated relative transmission risks at the 13 feeders that they set up, as well as at six wildlife food plots and at seven oak trees, which are a natural source of mast (acorns). Using camera traps, they evaluated rates of weekly visitation by WTD and contact between individuals at these 26 sites and found that both visitation and contact rates were highest at the deer feeders. Visitation rates at feeders were 12 times those of oak trees and twice those of food plots, while deer-to-deer contacts at feeders averaged two per week and nearly zero at food plots and oak trees. They also found that raccoons visited feeders more frequently than food plots or oak trees.

The findings of CWD prions on deer feeders and raccoon feeders (those excluding WTD) where CWD is established and on feeders at sites where CWD recently was detected for the first time, as well as increased rates of weekly deer visitation and deer-to-deer contact, suggest that there is an increased risk of prion exposure at deer feeders compared to food plots and oak trees. These results provide ample justification for banning or severely restricting supplemental deer feeding in order to mitigate the enhanced risk of CWD (and other infectious diseases) transmission.

Prepared by John Fischer

Diagnostic Case Highlight

Lymphoproliferative disease in a wild turkey

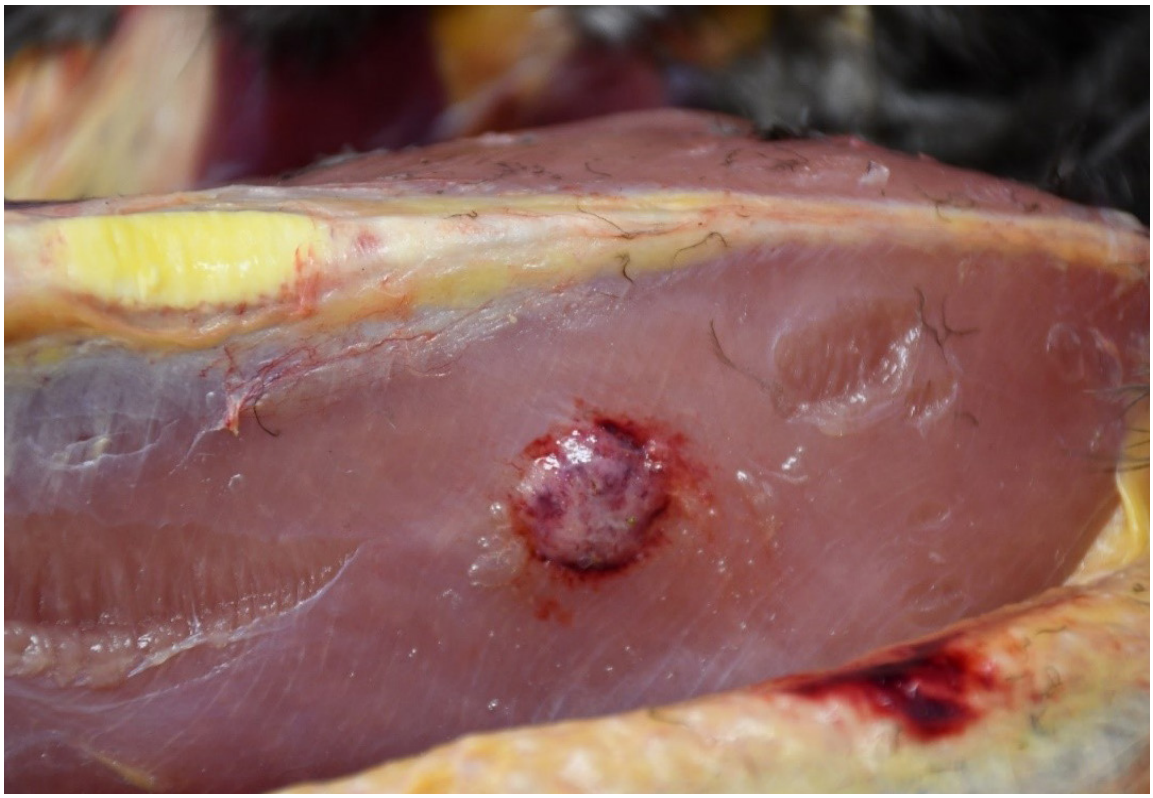
In wild turkeys, lymphoproliferative disease (LPD) is associated with retroviruses such as lymphoproliferative disease virus (LPDV) and reticuloendotheliosis virus (REV). Clinical signs and lesions associated with avipoxvirus and bacterial infections may mimic LPD and are important to distinguish. The significance of LPDV in wild turkeys is unknown, and the mechanisms of retrovirus transmission are unknown.

Wild turkey, SCWDS

In December 2023, **West Virginia Division of Natural Resources (WV DNR)** submitted a wild turkey carcass to SCWDS for postmortem examination. The turkey had been observed lingering around a pond on private property and lacked fear of humans, and thus was dispatched. Gross examination revealed multiple unusual masses (e.g., smooth, round, varied sizes) in the skin and underlying muscle, as seen in the images above and on page 10. Some of these had overlying crusts while others were ulcerated. Lesions also were noted along the surface of both lungs, and many, small, pale foci were throughout the liver and spleen, along with severe spleen enlargement in the image on page 11. Microscopic evaluation of the skin revealed central areas of dead (necrotic) cells mixed with, and surrounded by, high numbers of crowded, cancerous lymphocytes (a type of white blood cell). Incidentally, this wild turkey also had a trilobed liver, which has been historically described as a rare developmental abnormality in domestic turkeys. This turkey was in good nutritional condition, indicating a more recent (acute) disease process that likely would have been fatal if the turkey was not dispatched.

The lesions in this wild turkey are characteristic of lymphoproliferative disease (LPD), a now widely recognized disease of wild turkeys that is

LPD in a wild turkey



Large nodule (i.e., tumor in the pectoral muscle of a wild turkey with LPD. Photo credit SCWDS

often first noticed due to skin tumors, but also can involve tumors on internal organs. LPD is caused by infection with oncogenic retroviruses, including lymphoproliferative disease virus (LPDV) and reticuloendotheliosis virus (REV). Both viruses can cause very similarly-appearing disease (i.e., LPD). Thus, in these cases, we perform molecular testing on samples to assess for the presence of one or both viruses (coinfections with these viruses are occasionally detected). In this case, samples of skin mass, bone marrow, spleen, and liver underwent retrovirus screening via polymerase chain reaction (PCR). LPDV genetic material (nucleic acid) was detected in skin mass, spleen, and bone marrow, suggesting a causative role of this virus in disease. This was further supported by lack of detection of REV nucleic acid in any of the samples. To rule out bacterial infection as a cause or contributor to disease, samples of liver and skin masses were submitted for aerobic bacterial culture to the Athens Veterinary Diagnostic Laboratory, but did not yield significant bacterial growth. A sample of spleen was submitted to the SCWDS Parasitology Laboratory to screen for blood parasites, and DNA from *Haemoproteus* spp. and *Leucocytozoon* spp. were detected in the sample. However, these are both common hemoparasites in wild turkeys and there was no microscopic evidence of disease associated with either blood parasite infection.

LPDV commonly infects wild turkeys, as high prevalence has been documented in many regions of the U.S. and Canada, but disease (which has numerous stages of progression) is much less commonly documented. LPDV and REV co-infections are somewhat common among wild turkeys, although the significance compared to single infections with either virus is unclear. Co-infected turkeys do not appear to develop disease at a higher rate. Likewise, when lesions are seen in co-infected birds, they do not seem to be more severe than those caused by a single infection. In wild turkeys with LPDV-associated disease, skin nodules on the head, neck, legs, and feet are often the most visible lesions, and likely cause irritation, pain, and potential mobility issues. Such lesions can be confused with avian pox skin lesions (another viral-induced disease) but are easily distinguished by histology and PCR testing. We often see pox skin lesions concurrently with LPDV detection, suggesting a potential synergistic role in pox disease development, although this has not been proven. Other LPD clinical signs may be associated with the specific location of tumor formation, such as difficulty breathing and general weakness. Eventually, as

LPD in a wild turkey

Tri-lobed liver (left side of image) and enlarged spleen (top right side of image) of a wild turkey with LPD exhibiting widespread, small, tan nodules throughout the tissues. Photo credit SCWDS

with many cancers, LPD may culminate in emaciation and death. LPDV transmission mechanisms in the wild are poorly understood. Under experimental conditions, both oral and turkey-to-turkey transmission occurred but only in a small percentage of cases. Further experimental work at SCWDS suggested that skin breaches (possibly insect bite or small cuts) may be a potential route of infection, although this requires further investigation. Thus far, no domestic turkey LPDV detections or LPD cases have been reported in the U.S. or Canada. However, natural outbreaks of LPDV have been reported in domestic birds in Europe and Israel. The susceptibility of domestic birds to wild turkey-origin LPDV strains and risk of spill-over to domestic flocks is currently unknown.

Prepared by Bailie Sorah, Robert Stilz, and Nicole Nemeth; special thanks to Colin Carpenter of WVDNR for submitting this case


Okeefenokee swamp, B. Kurimo-Beechuk

It's an exciting time at SCWDS as we welcome Dr. Ania Majewska to the SCWDS team and extend congratulations to multiple SCWDS faculty members as the recipients of teaching and research excellence awards.

We are excited to welcome **Dr. Ania Majewska** to SCWDS. Ania received her MS in Wildlife Biology from the University of Montana and a PhD in Ecology from Odum School of Ecology at the University of Georgia (UGA). Ania fits seamlessly into SCWDS, as she has a rich background in instruction, wildlife biology, pollinator health, infectious disease ecology, and more. She has been an Assistant Professor in the Department of Physiology and Pharmacology in the College of Veterinary Medicine (CVM) for several years. Ania now has a joint appointment with this department and the Department of Population Health (and SCWDS), and we are fortunate to have her officially join SCWDS. We look forward to our member agencies getting to know and work with Ania. In addition, several SCWDS faculty recently have been recognized for teaching and research excellence.

Dr. Chris Cleveland received both the John M. Bowen Award of Excellence in Animal Biomedical Research awarded by University of Georgia's CVM, and the **Fred C. Davison Early Career Scholar Award** awarded by the UGA. Chris is an associate professor in the Department of Population Health and has served SCWDS in various roles since 2012 when he started as a research technician. Chris approaches wildlife disease research through a One Health approach that integrates ecology, epidemiology and wildlife biology.

Dr. Michael Yabsley was awarded the Zoetis Award for Excellence in Research by University of Georgia's CVM and the Outstanding Teaching Award by Warnell. Michael joined SCWDS in 2000 as a graduate student and is also an Arnett C. Mace Jr. Distinguished Professor of wildlife disease with a joint appointment between the Warnell School of Forestry and Natural Resources and the CVM (SCWDS). Michael's diverse wildlife disease research program focuses on the natural history of parasites in wildlife, zoonotic diseases, ticks and tick-borne pathogens, and much more.

Dr. Sonia Hernandez is the recipient of the **2025 Richard Reiff Award for Campus Internationalization** awarded by UGA's Office of


Okeefenokee swamp, B. Kurimo-Beechuk

Global Engagement. Sonia joined SCWDS in 2008 and is a Josiah Meigs Distinguished Professor of wildlife disease in a joint appointment between the Warnell School of Forestry and Natural Resources and the CVM (SCWDS). In addition to a robust wildlife health research program centered on anthropogenic influences on the ecology of diseases in wildlife, Sonia is a gifted instructor. She teaches multiple undergraduate, graduate, and veterinary courses including a study abroad Conservation Medicine and Biology course in Costa Rica.

Dr. Dave Stallknecht was honored at the **11th International Symposium on Avian Influenza**, held in Newfoundland, Canada during June 2025. The symposium, held only every four years, was dedicated to Dave for his significant and career-long contributions to understanding avian influenza ecology. Dave was first hired at SCWDS as a research technician in 1978 and retired in 2023 after more than 40 years of service. Fortunately, Dave still serves as Professor Emeritus and continues to work (daily!) on the ecology of avian influenza viruses in wild birds.

Welcome Ania, and congratulations to Chris, Michael, Sonia, and Dave!

Prepared by Mark Ruder and Betsy Kurimo-Beechuk

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Parting views from the Southeast

Common gallinules, B. Kurimo-Beechuk