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WILDLIFE HEALTH
PROGRAM NEWSLETTER

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KENTUCKY DEPT. OF FISH & WILDLIFE RESOURCES

WILDLIFE HEALTH PROGRAM

Wildlife Health Alert: Echinococcus multilocularis in Kentucky

The Kentucky Department of Fish and Wildlife Resources' Wildlife Health Program is issuing a wildlife health alert to highlight the detection of the parasite Echinococcus multilocularis in Rowan County. This marks the first known instance of *E. multilocularis* in Kentucky.

The infected animal was an adult female coyote that was extremely emaciated and co-infected with canine heartworm. Tissues were collected and reserved for Echinococcus screening. Testing conducted by the Southeastern Cooperative Wildlife Disease Study confirmed the presence of E. multilocularis in the coyote.

E. multilocularis, also known as the small fox tapeworm, is a zoonotic tapeworm that predominantly affects canids such as red and gray foxes, coyotes, and domestic dogs. With a complex life cycle, it relies on canids as definitive hosts and rodents as intermediate hosts. *E. multilocularis* poses a significant risk to humans, who are aberrant or dead-end hosts and do not contribute to the parasite's life cycle. People can contract *E. multilocularis* by accidentally ingesting its eggs found in the feces or on the fur of wild and domestic canines, or in contaminated food and water. Infections of *E. multilocularis* in people can lead to alveolar echinococcosis, a severe and potentially life-threatening disease if left untreated.

Clinical signs in infected canids and dogs are often absent or mild, but can include abdominal pain, weight loss, weakness, and signs of liver disease.

Suspected cases of *E. multilocularis* can be reported to Kentucky Department of Fish and Wildlife Resources by calling the Information Center at 1-800-858-1549 from 8 a.m. to 4:30 p.m. (Eastern) on weekdays or submitted online.

Recommendations

The Wildlife Health Program requests that wildlife management professionals and providers in wildlife health, domestic animal health, and public health remain vigilant for the presence of *E. multilocularis* in affected animals or people at risk of contracting the parasite.

Report Sick or Dead Wildlife

If you suspect wildlife in your care or possession to be infected with *E. multilocularis*, report the animal online to the Wildlife Health Program or call the Information Center at 1-800-858-1549 from 8 am. to 4:30 p.m. (Eastern) on weekdays.

Seeking Carcass Submissions

To monitor for the presence of the *E. multilocularis* parasite, the Wildlife Health Program is collecting carcasses of red and gray foxes, coyotes, and muskrats from Rowan County and its neighboring counties. Kentucky Fish and Wildlife staff can directly email Dr. Christine Casey or Kate Williams if they have a carcass to contribute. For those outside the department, please coordinate a pickup by emailing wildlifehealth@ky.gov.

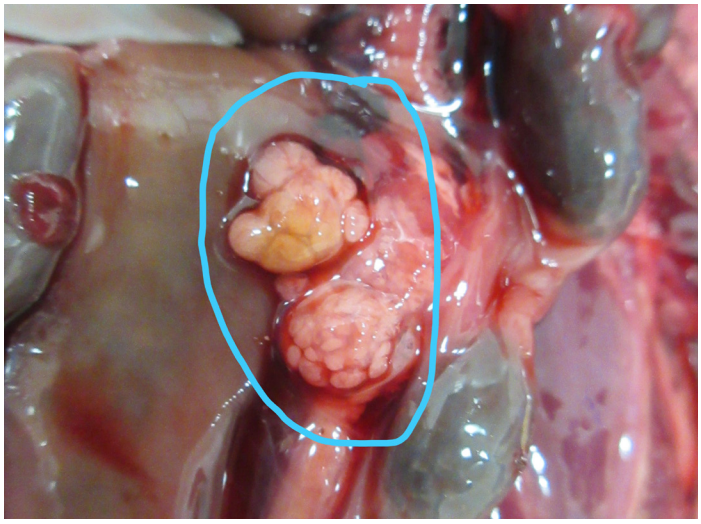

Photo Courtesy Michigan Department of Natural Resources

Cysts caused by *E. multilocularis* in the abdominal cavity of a muskrat.

Summer Cases of Hemorrhagic Disease

Hemorrhagic Disease (HD) is a vector-borne viral illness caused by strains of Orbiviruses, primarily transmitted by specific species of biting midges or flies. The disease predominantly affects white-tailed deer. Elk may also be exposed to HD viruses, however instances of them contracting the disease and becoming symptomatic are rare.

HD is caused by two viruses: epizootic hemorrhagic disease virus (EHDV) and bluetongue virus (BTV). BTV is typically associated more with cattle but can spillover and cause HD in cervids. Both viruses share similar symptoms, including fever, swelling of the head and neck, nasal discharge, lethargy, and ulcers in the mouth and throat. In severe cases, afflicted animals will experience hemorrhaging, leading to internal organ damage and eventual death. Deer that succumb to HD are often discovered near water sources like rivers, streams, or ponds. This proximity is due to the breeding habitats of the specific species of biting midges (Culicoides spp.) that transmit the HD viruses, and the tendency of deer to seek relief from symptoms such as fever and dehydration.

In Kentucky, HD is most prevalent during late summer and early fall, when populations of biting flies surge, resulting in localized deer die-offs. Cases tend to be clustered in areas where environmental conditions favor the breeding and proliferation of these vector insects, especially during hot, dry summers following a wet spring. Significant outbreaks over larger regions typically occur every 5-10 years as antibodies to the viruses in the general population wane from previous exposures, such as in 1997, 2002, 2003, 2007, 2012, and 2017.

Cases of hemmorhagic disease can be reported to Kentucky Department of Fish and Wildlife Resources by calling the Information Center at 1-800-858-1549 from 8 a.m. to 4:30 p.m. (Eastern) on weekdays or reported online.

Prevention and control options for HD are limited but managing deer herds at moderate to low densities through recreational hunting, including the harvesting of antlerless deer, can help mitigate its impact. While HD outbreaks are concerning, previous occurrences have shown that they do not severely impact local deer populations long-term , and outbreaks typically subside with the arrival of colder weather.

Photo Courtesy Steve Hillebrand, USFWS

Wild Turkey Health Assessment

During the 2023–2024 turkey trapping season, Kentucky Fish and Wildlife staff continued their efforts to assess the health of wild turkeys throughout the state. They collected a total of 64 blood samples and 65 oropharyngeal swabs from 35 male and 31 female turkeys across 10 counties. Although short of targeted sampling goals, this effort provided valuable data on various pathogens, including Lymphoproliferative Disease Virus (LPDV), West Nile Virus, Reticuloendotheliosis Virus (RAV), Mycoplasma, Toxoplasmosis, Avian Influenza, and several hemoparasites. The goal is to sample 300 wild turkeys statewide, which will further enhance the understanding of turkey health in the upcoming 2024–2025 season.

Photo KDFWR

Diagnostic Case Highlight • By Chase Carey

In March 2024, the Wildlife Health Program received its second American mink (Neovison vison) carcass since 2019. The adult male mink, discovered by a landowner in Bourbon County, was found in a severely lethargic state and died shortly thereafter.

Necropsy at the Southeastern Cooperative Wildlife Disease Study (SCWDS) revealed severe emaciation, including moderate muscle atrophy, pale multifocal liver discoloration, and severe adipose depletion in the bone marrow. The stomach was empty, with only mucoid brown digesta found in the small intestine, and there was a lack of subcutaneous or visceral fat stores, suggesting a lack of food ingestion. Kidney analysis revealed multifocal, mineralized hard masses, suggesting chronic dehydration.

The most significant finding was moderate to severe inflammation and cellular damage (i.e., neuronal necrosis) in the brain attributed to infection with highly pathogenic avian influenza (HPAI). These brain lesions, along with the observed clinical signs, are consistent with reports of HPAI in other wild mammals. Swabs collected and submitted to the SCWDS Virology Laboratory detected HPAI via PCR testing. As regulated disease samples, additional confirmatory testing was carried out by USDA APHIS National Veterinary Services Laboratory. HPAI infections are often acute and rapidly progressing, suggesting that the mink was already in a state of nutritional depletion worsened by the infection. However, SCWDS was unable to confirm this or estimate the chronicity of the HPAI infection in this case due to cellular decomposition.

Photo Courtesy Tom Koerner, USFWS

The last notable finding was aspiration pneumonia, suggesting the mink inhaled a foreign material into its lungs, causing inflammation. Upon necropsy, the lungs revealed multifocal dark red mottling. The aspiration pneumonia likely stemmed from the mink's weakened state due to emaciation and HPAI infection, which is known to affect mammalian respiratory systems.

While pneumonia might have been present, the extensive aspiration reaction and inflammation made it difficult to detect.

HPAI has been detected in various mesocarnivore species such as red foxes, raccoons, striped skunks, coyotes, and Virginia opossums, likely from scavenging on affected bird carcasses. While reports of HPAI-infected wild mink are rare, most infections are reported in farmed mink operations, leaving the potential impact of this emerging disease on wild mink populations uncertain. Concerns also include the overall health impacts on these species, given that rabies and canine distemper virus (CDV) are common findings in mesocarnivores and can occur as a co-infection with HPAI. Brain samples from the mink were tested for rabies virus and CDV at the Athens Veterinary Diagnostic Laboratory, with neither being detected.

HPAI as a disease of wild mammals and mesocarnivores is an emerging infectious disease concern that wildlife health officials across the country will continue to monitor closely.

Tackling Zoonotic Threats: Insights From Grant Funded Initiatives

Activities highlighted in this section are funded through the U.S. Fish and Wildlife Service's Zoonotic Disease Initiative (ZDI) grant.

The Wildlife Health Program advanced its ZDI-funded grant initiatives this summer with the addition of Chase Carey, a short-term wildlife veterinary intern from North Carolina State University, whose role supported the implementation of two new surveillance projects.

The first project focused on amphibian and reptile pathogen screening, aquatic animal health, and toxicology. The Wildlife Health Program, in partnership with the University of Tennessee's Amphibian Disease Laboratory, aims to screen for pathogens such as Ranavirus, Batrachochytrium dendrobatitdis (Bd), and Batrachochytrium salamandrivorans (Bsal) using environmental DNA (eDNA) extracted from water samples. The non-invasive nature of this method significantly reduces the need for capturing and swabbing target species, thereby streamlining the process and minimizing wildlife disturbance.

The second project launched this summer was a tick surveillance pilot study. This study involved collecting ticks from five wildlife management areas across Kentucky to assessthe distributions of tick species, the prevalence of vector-borne diseases, and examine how prescribe fire influences disease transmission and host species dynamics. Tick sampling will continue at various times until 2026, at which time the findings from this study will be consolidated and shared with Kentucky Fish and Wildlife staff. Findings will also be shared with the Kentucky Department for Public Health, providing critical insights to improve public health management and intervention strategies.

Photo Courtesy Kate Williams

Wildlife Disease Fact Sheets and Flyers

The Wildlife Health Program offers downloadable fact sheets and flyers on wildlife disease and prevention. Access these resources in the "Educational Resources" section of the following webpages:

- Avian Influenza
- Canine Distemper
- *E. multilocularis*
- Rabies
- Ticks

Clean, Drain, and Dry to Protect Kentucky Waters and Wildlife

More than 100 aquatic invasive species have been identified in Kentucky, comprising non-native species introduced to the state from other parts of the U.S. or globally. Key invasive species include various carp species, zebra mussels, several crayfish species and multiple aquatic plants like hydrilla, curly pondweed and Eurasian watermilfoil. These species often hitch a ride on boats and gear, spreading through sand, mud, and water. Dumping fish from aquariums, discarding unused bait in waterways or intentionally stocking fish illegally further exacerbates the issue.

How You Can Help

- **Clean:** Remove plants, mud, and debris from boats and gear. Use high-pressure, hot water if possible, and scrub with a stiff brush.
- **Drain:** Empty all water from devices such as motors and live wells.
- **Dry:** Allow equipment to dry completely in the sun for at least five days or wipe thoroughly with a towel.

Aquatic invasive species disrupt ecosystems by out-competing native species for resources, altering habitat structures, degrading water quality, and changing nutrient cycling. They can also act as carriers of pathogens that can infect native wildlife. For example, the invasive hydrilla plant is linked to the transmission of a bacterium that produces a neurotoxin responsible for avian vacuolar myelinopathy, a fatal neurological disease that affects raptors and waterfowl. Invasive species may also introduce new pathogens or parasites to native populations, exposing them to diseases for which they have no natural defenses. This can lead to population declines or even extinctions.

Photo Courtesy Stop Aquatic Hitchhikers

Large wall of Hydrilla.

Prevention is the best defense against aquatic invasive species. To report sightings of aquatic invasive species in Kentucky, contact Aquatic Invasive Species Coordinator, Jeffrey Herod, at jeffrey.herod@ky.gov with the location of where the aquatic invasive species was found and a photograph of it along with your telephone number or email address.

Research Highlights

In states across the U.S., CWD transmission and detectability depends on numerous factors, such as the transport and captivity of cervids, environmental conditions, deer populations, intra-state surveillance and intervention, and actions taken by neighboring states. Analyzing this large, complex array of data is crucial. New large-scale regional models utilizing machine learning could significantly enhance state agencies' ability to identify high-risk counties and understand the factors driving these predictions.

The SOP4CWD project, which includes Kentucky Fish and Wildlife as a partner, has tested various machine learning models using data from 12 Southeastern and Midwestern states collected during 2019-2020. While the top-performing model provides valuable insights into regional trends, it should not be used in isolation for planning surveillance activities due to the potential for false positives. However, as modeling and technology advance, SOP4CWD expects these machine learning models to improve, enhancing our capacity to predict emerging high-risk CWD areas. Stay tuned for updates!

SOP4CWD: cwhl.vet.cornell.edu/project/sop4cwd

Learn More: doi.org/10.1038/s41598-024-65002-7

Ahmed MS, Hanley BJ, Mitchell CI, Abbott RC, Hollingshead NA, Booth JG, Guinness J, Jennelle CS, Hodel FH, Gonzalez-Crespo C, Middaugh CR, Ballard JR, Clemons B, Killmaster CH, Harms TM, Caudell JN, Benavidez Westrich KM, McCallen E, ***Casey C****, O'Brien LM, Trudeau JK, Stewart C, Carstensen M, McKinley WT, Hynes KP, Stevens AE, Miller LA, Cook M, Myers RT, Shaw J, Tonkovich MJ, Kelly JD, Grove DM, Storm DJ, Schuler KL. 2024. Predicting chronic wasting disease in white-tailed deer at the county scale using machine learning. Scientific Reports 14: 14373*

This study uses Google Trends to predict tickborne disease risks in the U.S. by analyzing searches related to outdoor activities and tick-related terms. Based on these insights, the study recommends targeted communication strategies to promote health behaviors to spread preventative messages.

Learn More: doi.org/10.3389/fpubh.2024.1410713

Yang CX, Baker L, McLeod-Morin A. 2024. Trending ticks: Using Google Trends data to understand tickborne disease prevention. Frontiers in Public Health 12:1410713

Between April 1 and July 21, 2022, highly pathogenic avian influenza A (H5N1) virus of the Eurasian lineage Goose/Guangdong clade 2.3.4.4b infected 67 wild terrestrial mammals across the United States. Infected animals showed neurological symptoms. The most common lesions observed were necrotizing meningoencephalitis (brain inflammation with tissue death), interstitial pneumonia (lung inflammation), and myocardial necrosis (heart tissue death). Genetic analysis of viral sequences from 48 animals indicated that these infections came from wild birds, confirming that the virus spilled over from birds to mammals.

Learn More: doi.org/10.3201/eid2912.230464

Elsmo EJ, Wünschumann A, Beckmen KB, Broughton-Neiswanger LE, Buckles EL, Ellis J, Fitzgerald SD, Gerlach R, Hawkins S, Ip HS, Lankton JS, Lemley EM, Lenoch JB, Killian ML, Lantz K, Long L, Maes R, Mainenti M, Melotti M, Moriarty ME, Nakagun S, Ruden RM, Shearn-Bochsler V, Thompson D, Torchetti MK, Van Wettere, AJ, Wise AG, Lim AL. 2023. Highly pathogenic avian influenza (H5N1) virus clade 2.3.4.4b infections in wild terrestrial mammals, United States, 2022. Emerging Infectious Diseases 29:12

Photo Courtesy James Gathany, CDC

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Through the Wildlife Health Program, Kentucky Fish and Wildlife is dedicated to safeguarding the health of Kentucky's wildlife and fostering resilient ecosystems that support the well-being of both wildlife and people for generations to come.