PHOTO BY BREANNA GREEN

White-tailed deer, like this buck, are released after morphometric and biological data are collected. At release, each deer has paint applied to their back to ensure they are not recaptured.

Toxoplasma gondii in White-Tailed Deer

A Hidden Risk for Human Health?

ARTICLE BY KENDALL BANCROFT, MICHAEL CHERRY and ALYNN MARTIN

Zoonotic diseases—diseases that can be spread from animals to humans—are a significant concern in public health. In fact, about 60–75% of all human infectious diseases originate from animals.

This includes well-known threats like the bubonic plague, which decimated populations in medieval Europe, as well as more recent concerns such as leptospirosis and Lyme disease. As human activities such as land conversion and urban expansion bring us closer to wildlife habitats, the likelihood of contact and disease transfers increases.

Human-wildlife interaction is at the core of this risk. As humans use more wildlife products and wild habitats, the likelihood of diseases crossing the species barrier grows. People, who have increased exposure to animals such as those who work in the livestock industry or the military, face the highest risk.

TOXOPLASMOSIS–WHAT IS IT?

While many of the more severe zoonotic diseases, especially those with high fatality rates, are well known, there are lesser known but widespread disease-causing agents that are transmitted from animals to people. Many of these do not result in high mortality rates but can cause lifelong health complications and reduced quality of life.

One example is *Toxoplasma gondii*, the parasite responsible for causing toxoplasmosis. *Toxoplasma gondii* is a particularly complicated parasite because it can infect any warm-blooded species—including humans, livestock and wildlife—without causing obvious signs or symptoms during the initial infection.

Once an individual is infected, it is thought to be a chronic, life-long infection, with more serious and difficult-to-diagnose symptoms occurring later in life. In humans, these include behavioral changes, mood swings and personality disorders, eye disease and memory loss with dementia-like symptoms.

It's estimated that one-third of the global population—and more than 40 million people in the United States, alone—may be infected with this parasite. Most people infected with *T. gondii* show no symptoms

PHOTO BY ETHAN MENZEL

A doe, captured using a net gun, will be transported back to the central processing center for work up and data collection.

It's estimated that one-third of the global population—and more than 40 million people in the United States, alone—may be infected with this parasite. Most people infected with *T. gondii* show no symptoms, but for those who are immunocompromised or pregnant, the infection can lead to serious health problems, including miscarriage and severe illness or death. Toxoplasmosis is considered one of the top causes of foodborne illness in the United States and has also been designated as a neglected parasitic infection by the Centers for Disease Control and Prevention.

The life cycle of *T. gondii* is complex and involves multiple hosts (or, different animals). Felids, such as domestic cats, are needed to complete the life cycle. Cats shed the parasites in their infectious life stage through their feces, which can then contaminate the environment.

The infectious agents are hardy and can survive in soil and water for months or even years. These infectious agents can be unintentionally consumed by other animals or humans, resulting in infection. For example, domestic cat litter boxes are thought to be a main source of human exposure

and infection. In non-cat hosts, the parasite forms cysts in tissues, which can be passed onto species that consume the meat including predators, scavengers or even humans causing additional infections.

THE ROLE OF WHITE-TAILED DEER

White-tailed deer, a popular game species, are among the animals that can harbor *T. gondii*, posing a risk to hunters and those who mishandle or consume undercooked venison. According to research, *T. gondii*'s prevalence in deer populations varies widely across North America. Some studies have identified infection rates as high as 80% in some regions. This variability is influenced by several factors, including the density of wild cat populations, landscape characteristics and proximity to urban areas where domestic cats exist.

The risk of wild game meats being a *Toxoplasma* infection source in humans was highlighted by an outbreak in Michigan, where nine men developed toxoplasmosis after eating undercooked venison. Symptoms ranged from flu-like discomfort to more severe issues like vision problems.

THE TEXAS CONNECTION

Despite the risks, little research has been conducted on the prevalence of *T. gondii* in white-tailed deer in Texas, where deer hunting is not just a popular pastime but also a significant contributor to the local economy. In the 2023-2024 hunting season, nearly 760,000 hunters harvested around 740,000 white-tailed deer in Texas, producing more than 37 million pounds of venison.

Given the importance of white-tailed deer in Texas, it's crucial to understand the prevalence of *T. gondii* here to mitigate potential risks to hunters and consumers. Research examining *T. gondii* prevalence in five distinct populations of white-tailed deer across South Texas is underway. These populations inhabit a range of environments, ranging from urban and suburban centers with high cat densities to more remote, rural locations.

Understanding the prevalence of *T. gondii* in white-tailed deer and the factors that influence it is essential for developing effective public health strategies

WHY THIS MATTERS

Understanding the prevalence of *T. gondii* in white-tailed deer and the factors that influence it is essential for developing effective public health strategies. For example, ranches in South Texas that are close to urban areas and have high densities of wild cats such as bobcats may present a higher risk for *T. gondii* transmission. This information can form the basis of an information campaign directed to hunters and the public on the importance of properly handling and cooking venison to reduce the infection risk.

Moreover, this research has broader implications for wildlife management and conservation. By identifying the environmental and biological factors that drive *T. gondii* prevalence in deer populations, we can better understand the interconnectedness of ecosystems and the potential impacts of human activities on disease dynamics.

FINAL THOUGHTS

As we continue to explore and enjoy the natural world, it's important to recognize that our health is deeply intertwined with the health of the wildlife around us. While the risks posed by *T. gondii* and other zoonotic diseases may seem distant, they are present in the environments we interact with daily. By staying informed and taking simple precautions—like thoroughly cooking wild game—we can continue to enjoy our outdoor traditions while protecting our health and the health of our communities.

In a world where the boundaries between human and animal habitats are increasingly blurred, understanding and mitigating the risks of zoonotic diseases is more important than ever. As research in this field continues, we gain valuable insights that can help safeguard our health and preserve the delicate balance of our shared ecosystems.