

ANNUAL REPORT

2024



Promoting the health and conservation of reptile, amphibian, mammalian, invertebrate, and avian populations in the wild and under human care through epidemiology research and veterinary medicine





DIRECTOR'S MESSAGE

What a fantastic year we had! This year we expanded our team with a second Illinois Zoological and Wildlife Health Management Resident with the Forest Preserves of Cook County, the largest Veterinary Summer Fellow cohort, and the most molecular assays performed in the history of WEL.

I continue to be grateful and amazed to be a part of this great team. I get to show up everyday and enjoy amazing science being performed by fantastic people.

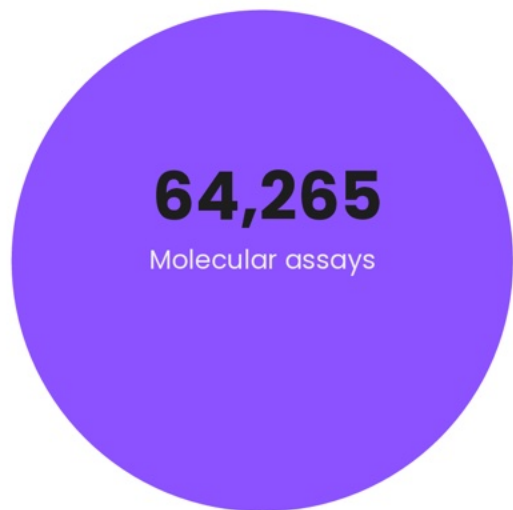
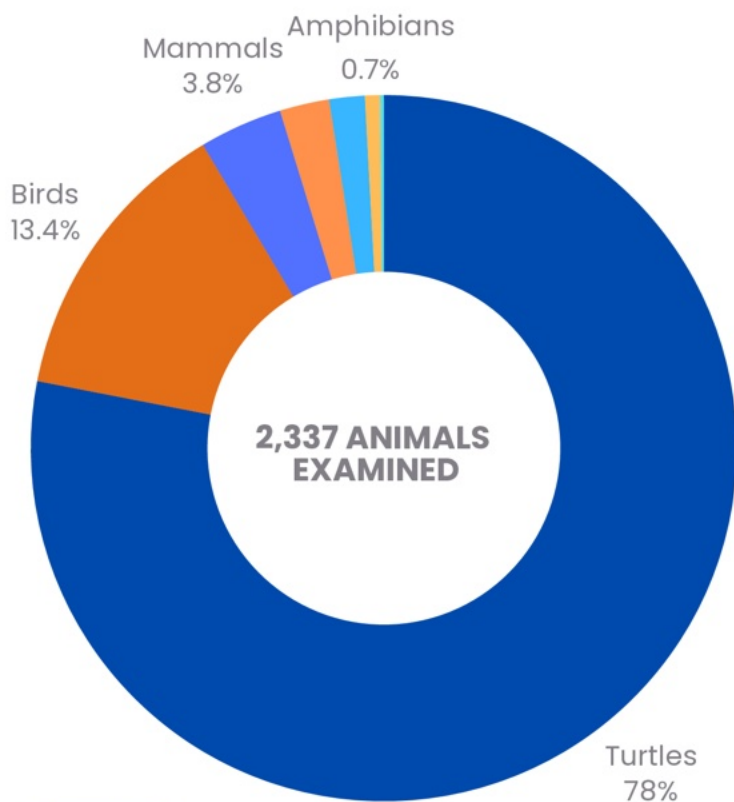
This year continued as a collaboration between numerous entities. Brookfield Zoo Chicago remains a key partner in all we are able to do and this report could largely be the BZC conservation medicine report. The Forest Preserves in Chicagoland are integral to all conservation work in northern Illinois and this report highlights all that we are able to accomplish together. We thank our numerous funders and supporters

As we look forward to 2025, continued exciting research and conservation projects. In 2025, we will see two team members getting their PhD, the first IZWHMR resident completing the program, and numerous veterinary students becoming doctor colleagues.

A handwritten signature in black ink that reads "Matt Althoff". The signature is written in a cursive, flowing style.



CONSERVATION AROUND THE WORLD



4139





IMPACT REPORT

ADVANCING THE FIELD

Our team published peer-reviewed manuscripts, wrote book chapters, presented at international conferences, and developed new techniques for assessing wildlife health

24

Manuscripts

29

National and International Presentations

36

Graduate and Veterinary students trained

ACKNOWLEDGEMENTS

Numerous supporters including Illinois Department of Natural Resources, Brookfield Zoo Chicago, Forest Preserved of Cook County, Lake County Forest Preserve District, Forest Preserve District of Kane County, Walder Foundation, Morris Animal Foundation, Wild Animal Health Fund, AZA SAFE Program, San Diego Zoo Global Wildlife Alliance

PROJECTS

State Wildlife Grant

Assessing health of herptiles in Illinois

OUTCOME

Advanced knowledge of health factors in conservation

AZA SAFE Turtle Confiscation Crisis

Characterizing pathogen threats to re-introduction

Identified appropriate testing strategies to improve initial response

HPAI in Punta San Juan

Describe epidemiology of HPAI in Peruvian wildlife

Characterized trends and mortality rates due to virus in multiple taxa

FPCC Wildlife Health

Assess health of all wildlife in Cook county

Characterized trends and mortality rates due to virus in multiple taxa

Walder Foundation

Assess health of all turtles in Chicagoland

Identified viruses and bacteria in new species, performed lots of exams

Morris Animal Foundation

Monitor ornate box turtles over a field season

Described trends in health and determined baseline survival rate at multiple sites in Illinois



Cook County Wildlife



The first ACZM compliant residency program focused on free-ranging wildlife continues to be very successful.

In 2024, over 1000 animals were examined by a veterinarian or veterinary student, consisting of reptiles, invertebrates, mammals, and birds representing over 70 species!

- The second resident, Dr. Eliza Baker started in July!
- Drafted a manuscript on the role the invasive red-eared slider plays in poor health outcomes for native species
- First health evaluation of a wood cock in Illinois
- Presented at 2 international conferences: Wildlife Disease Association and American Association of Zoo Veterinarians.
- Mentored veterinary student summer fellows developing critical teaching skills.

Mussels



This summer we were able to expand on our previous mussel health assessment work by partnering with researchers from the US Fish and Wildlife Service to perform next-generation sequencing of mussel hemolymph. identify normal viral load and diversity of freshwater mussel species in Cook County.



Raptors

Illinois is home to four species of falcons and eight species of hawk, with many other raptors including eagles, osprey, harriers, and owls also living or migrating through Illinois. The Forest Preserves of Cook County performs health assessments every year on free-ranging raptors to better understand the population, diseases, and health status of these raptors. This year, we assessed 102 raptors including 86 American kestrels, 9 red tailed hawks, 3 osprey, one red shouldered hawk, one northern saw-whet owl, two barred owls, and one great horned owl.

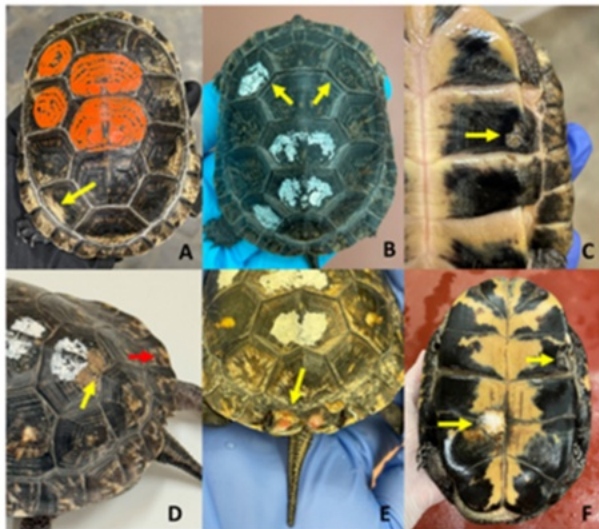
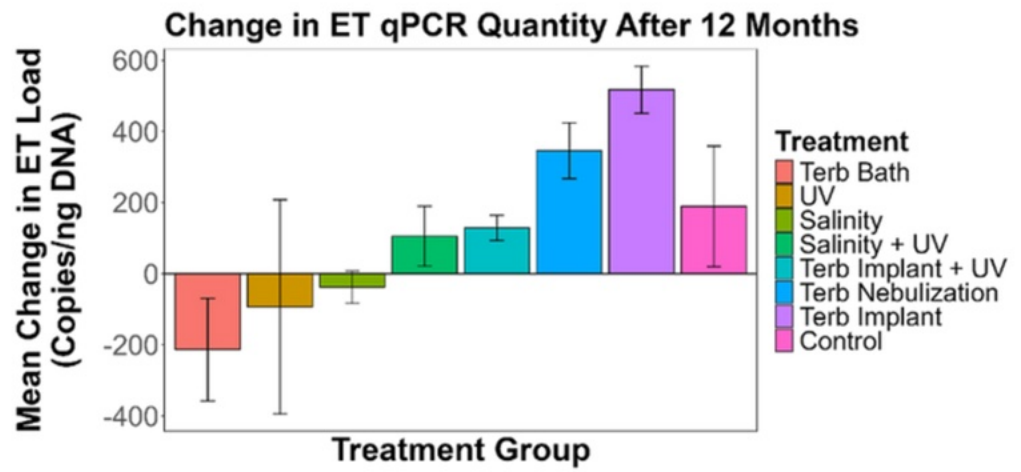
EMYDOMYCES OUTBREAK

Great strides were made in 2024 for treatment options of Emydomyces in Blanding's turtles led by Dr. Kaitlin



79%

NEGATIVE STATUS AT 27 MONTHS



GOALS

1. Establish criteria for release of *E. testavorans* negative animals,
2. Develop monitoring and surveillance plans for wild and captive head-start turtles,
3. Identify methods to reduce false negative detection rates
4. Develop treatment options.

Turtle Wellness

Turtles were the main taxa we saw this year and the total number of encounters with turtles was the highest we've ever seen. Our caseload from turtles is triple that of all other species combined.

Turtle Health Assessments are critical to identifying abnormalities and novel pathogens across the landscape. In 2024, expansion of aquatic turtle health assessment has led to the discovery of new viruses and better characterization of the epidemiology of others.

All our summer fellows: Kate, Marg, Surina, Shari, Maddy, Maddie, Erika, Jaime, Javelis, and Carly were fantastic in helping save the turtles all over the state



ADD COMPONENTS

- Investigate host response with bloodwork
- Habitat comparisons
- Experimental studies
- Increase pathogen profile

EPIDEMIOLOGY

- Perform large scale surveys
- Identify trends over years

MANAGEMENT

- Identify points of action
- Ongoing response
- Modify changes and repeat

INITIAL RESPONSE

- React to threat or mortality
- Single pathogen survey
- Develop an assay





Turtles are the most endangered vertebrate taxa on the planet, and they are tremendous sentinels of ecosystem health. They've been the centerpiece of our labs investigations. Funding has been provided for various portions of this project by the Illinois Departments of Natural Resources, Walder Foundation, and Morris Animal Foundation.



We continued health assessments on box turtles into its 17th year. This is the largest health study on box turtles in the world and we've been able to add to the tremendous body of work with 125 captures of eastern box turtles.



The aquatic turtle work in Chicagoland primarily funded by the Walder foundation continued with a very successful year



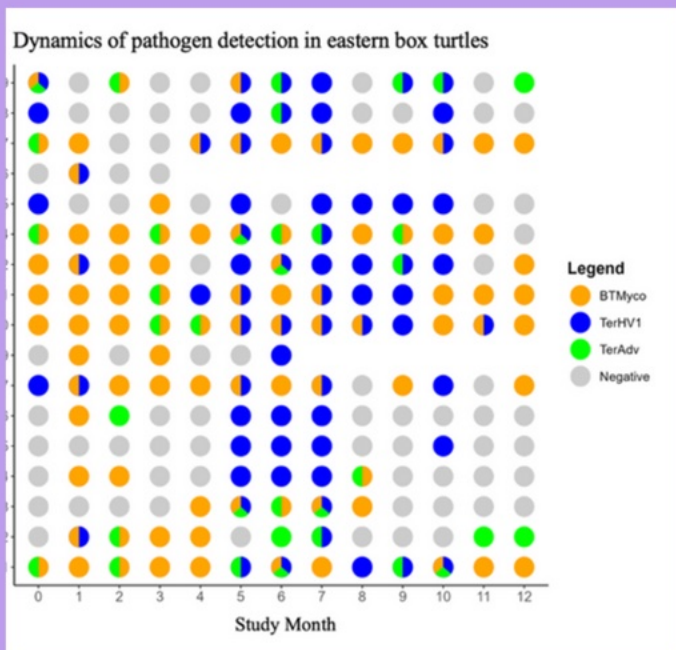
The newest work was partially funded by the Morris Animal Foundation in ornate box turtles. The first ever longitudinal health assessment in this species. We put radiotransmitters on >50 turtles from all across Illinois and examined them monthly. Look forward to results in 2025!



Turtle Confiscation Crisis



The illegal trade in North American freshwater turtles is a threat to conservation. AZA and TSA partnered to combat this threat and WEL is a proud partner assisting with ranavirus-related health concerns. Maris Daleo, PhD candidate in the lab, is working on helping to understand the epidemiology of pathogens in potential release of these animals. She presented the complex nature of pathogen shedding and identified for the first time that adenoviruses seem to be lifelong infections in turtles and shed intermittently over time.





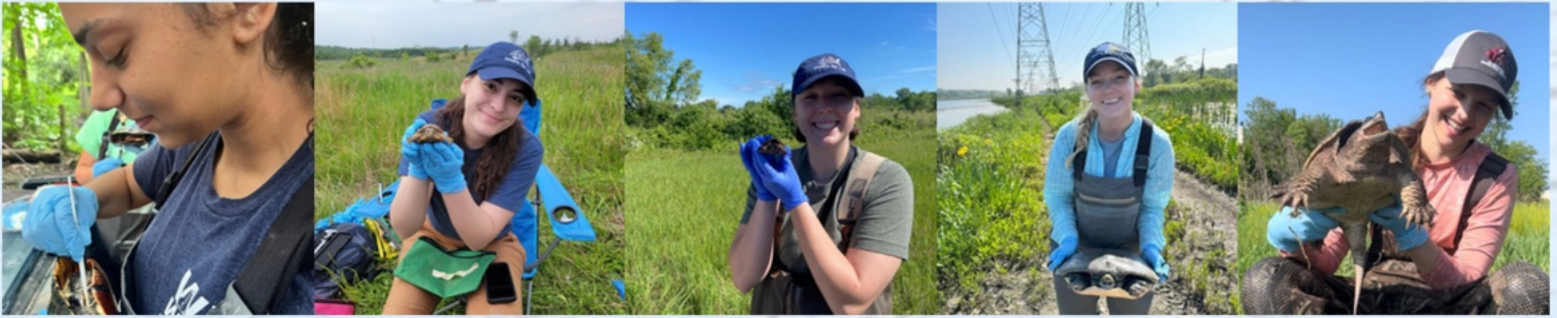
Punta San Juan

In 2024, the additive effects of Highly Pathogenic Avian Influenza (HPAI) and the El Niño event caused havoc on the wildlife at Punta Sana Juan. Wildlife populations were the lowest that they have been since we first became involved.

HPAI has caused deaths of millions of birds and mammals worldwide. In 2024, mortalities in birds and marine mammals occurred. However, the collaborative and long-standing collaborations allowed the rapid response for data collection. This effort will hopefully lead to information that saves wildlife in the future.

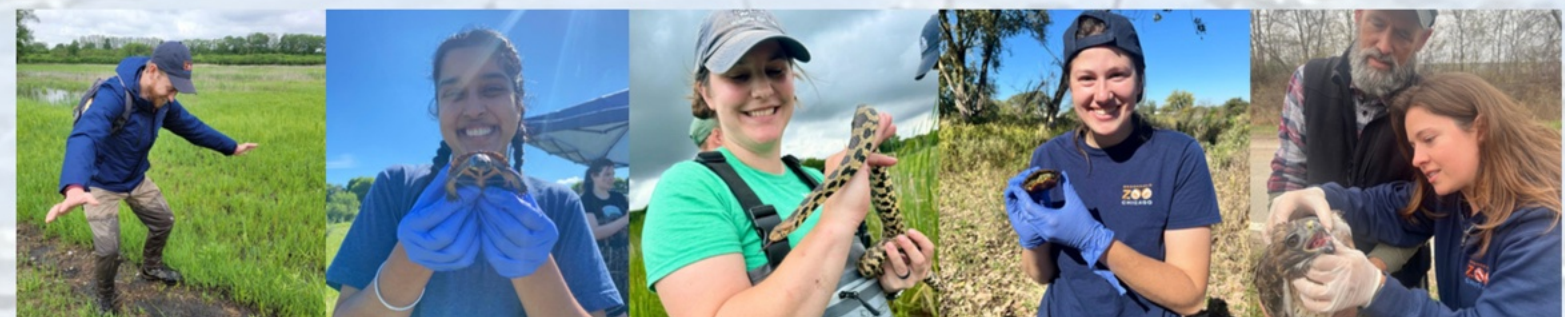


Teaching and Training



Teaching and Training is a critical mission of the lab. This year over 30 students were involved in projects in the lab learning about study design, techniques and approaches, and scientific writing.

All WEL summer fellows get a primary project that involves assisting with study design, execution, and take a primary role on writing a manuscript.



Communication and Outreach

INSTAGRAM



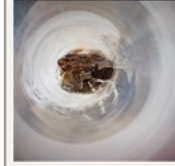
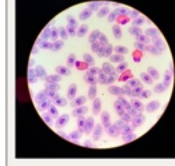
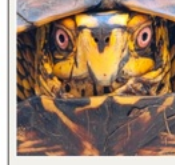
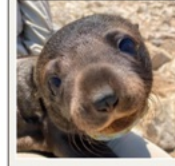
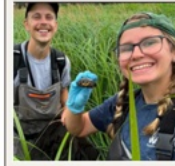
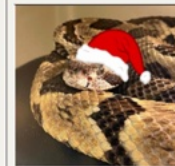
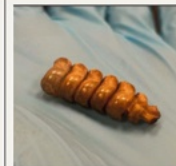
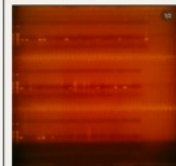
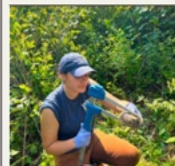
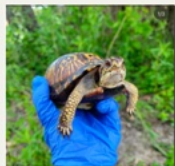
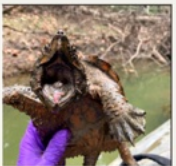
@WILDLIFEPILAB



Viral post!
57K views!

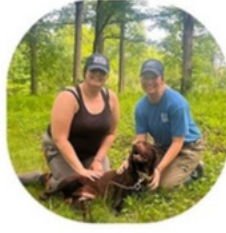
Front
Page!!

for turtles infected with
rare fungus



Summer blogs by Veterinary fellows CHECK THEM OUT!!

Eastern Box Turtle Team



Maris: I am a DVM/PHD student in WEL entering the third year of my PhD which focuses on the health of raptors

Ornate Box Turtles



Erika is a rising second-year DVM student who is interested in zoological

Cook County Aquatics Team



Jaime is a rising second-year veterinary student researching vitamin D and

Lake County Aquatics's Team



Javelis is a rising second-year vet student from Puerto Rico interested in

Kane County Aquatics's Team



Carly is from southern Illinois and an upcoming second year at the University

Walder Turtle Project's Team



My name is Maddy, a first year with the Wildlife Epi Lab this year! I am interested

EFFECTS OF DIPOTASSIUM AMINETETRAACETIC ACID AND LITHIUM HEMATOPHAGOUS VALUES IN BLANDING'S HYDOIDEA BLANDINGII), PAINTED TURTLES (PICTA), AND COMMON SNAPPING TURTLES (SERPENTINA)
 Maura Ryan, BS, Amy N. Schnelle, DVM, MS, DACVP, William Adamovicz, DVM, PhD, and Matthew C. Allender, DVM, MS, PhD,
Terrapene ornata (Agassiz 1857) – Orante Box Turtle, Plains Box Turtle, Western Box Turtle, Desert Box Turtle, Tortuga de Caja Ornamentada
 Daniel F. Hughes¹, Matthew C. Allender¹, Neil P. Bernstein¹, John B. Iverson¹, Cameron Koltzoff¹, Bradley T. Martin¹, Walter E. Meshaka, Jr.¹, and Benjamin M. Reif¹

and validation of a quantitative PCR assay for adenovirus
 Laura Adamovicz^{1,2,3,4,5,6}, Maris Daleo^{1,2,3,4,5,6}, Amber Sim^{1,2,3,4,5,6}, DVM, PhD, Kristin Stanford, PhD, Sherry Cox, MS, PhD, Kath Kennymac Durante, DVM, Allison Wright, MS, DVM, Megan G. Curtis, MS, Joha C. Garrison, MS, Stacey Lance, PhD, Adam Ma Pohlly, DVM, MS, DACVP, Brina Gartlan, DVM, Keleci Fredrickson, MS, Jodie Moorehead, DVM, and Laura Adamovicz, DVM, P. C. Allender, DVM, MS, PhD, DACZM
 Terrestrial and Aquatic Chelonian Species in Illinois, USA
 Kristin Anderson¹, Laura Adamovicz^{1,2,3,4,5,6}, Karen Terio², Alexis Davidson¹, Maura Ryan¹, Michelle Waligora¹, Kayla Schroder¹, Samantha Bradley¹, Carley Lionetto¹, Kristin Anderson¹, Aubrey Engel¹, William Graser¹, Chris Anchor¹, Gary Glowacki¹, and Matthew C. Allender^{1,2,3,4,5,6}

Evaluating the Efficacy of Disinfectant Methods against *Emydoidea testavorans*, a Fungus Associated with Shell Disease in Freshwater Aquatic Turtles
 Nicholas C. Liszka^{1,4}, Laura Adamovicz^{1,2}, Kaitlin A. Moorhead¹, Maris J. Daleo^{1,2}, Kamila Grochowski¹, and Matthew C. Allender^{1,2,3,4,5,6} ¹Wildlife Epidemiology Laboratory, University of Illinois College of Veterinary Medicine

Otard gammaherpesvirus 1 in South American fur seals (*Arctocephalus australis*) and a novel related herpesvirus in free-ranging South American sea lions (*Otaria byronia*): Prevalence and effects of age, sex, and sample type
 Karisa N. Tang^{1,2,3,4,5,6}, Michael J. Adkesson^{1,2,3,4,5,6}, Susana Cárdenas-Arayza^{4,5,6}, Laura Adamovicz^{1,2,3,4,5,6}, Alissa C. Deming^{1,2,3,4,5,6}, James F. X. Welleshan^{1,2,3,4,5,6}, April Childers^{1,2,3,4,5,6}, Galaxia Cortes-Hinojosa^{1,2,3,4,5,6}, Kathleen Colegrove^{1,2,3,4,5,6}, Jennifer N. Langan^{1,2,3,4,5,6}, Matthew C. Allender^{1,2,3,4,5,6}
 Developing and validating a multiplex hydrolysis probe-based quantitative PCR assay for the detection of four pathogens in chelonians

Development and validation of a quantitative real-time PCR assay for the detection of four pathogens in chelonians
 Maris J. Daleo^{1,2,3,4,5,6}, Matthew C. Allender^{1,2,3,4,5,6}

Blood Cell Counts in Prairie Lakes (*Crotalus viridis*)
 Emily Whitmore¹, Amy Schnelle¹, Megan Colburn¹, Yvonne Wong¹, Jennifer Reilly¹, Laura Adamovicz^{1,2}, Krista Keller¹, Matthew C. Allender^{1,2}
 Analytical Variability and Agreement of Leukocyte Quantification Methods in Inland Bearded Dragons (*Pogona vitticeps*)
 Yvonne Wong¹, Amy Schnelle¹, Megan Colburn¹, Jennifer Reilly¹, Laura Adamovicz^{1,2}, Krista Keller¹, Matthew C. Allender^{1,2}
 Biological processes underlying host mycosis (snake fungal disease) inferred from tissue-specific transcriptome analyses
 Samarth Mathur^{1,2,3,4,5,6} | Ellen Hayes^{1,2,3,4,5,6} | Matthew C. Allender^{1,2,3,4,5,6} | H. Ute Gibzi^{1,2,3,4,5,6}

Development and Validation of a Diagnostic Assay for Abnormalities in the Gopher Snake (*Pituophis melanoleucus*)
 Kiersten N. Nelson^{1,2,3,4,5,6}, Adam J. McFall^{1,2,3,4,5,6}
 Factors Predicting Apparent Ophidiomycosis in Wild Brown Gophers (*Pituophis melanoleucus*)
 David L. Haskins^{1,2,3,4,5,6}, M. Kyle Brown^{1,2,3,4,5,6}, Kristina Meichner^{1,2,3,4,5,6}, Austin L. Coleman^{1,2,3,4,5,6}, and Matthew C. Allender^{1,2,3,4,5,6}
 Wildlife Epidemiology Laboratory, University of Illinois College of Veterinary Medicine, Urbana, Illinois 61802, USA
 Brookfield Zoo, Chicago Zoological Society, Brookfield, Illinois 60513, USA
 responding author (email: haskinsj44@gmail.com)

Distribution and Host Range of *Myxosporidia* in Eastern Box Turtles (*Terrapene carolina*) in Cape Cod, Massachusetts
 Matthew C. Allender and Laura A. Adamovicz
 Myxosporidiosis and its relationship to white spot disease in eastern box turtles (*Terrapene carolina*) in Cape Cod, Massachusetts
 Matthew C. Allender, DVM, MS, PhD, DACZM, Annie M. Adden, BS, Carolyn Cray, PhD, Stacey Lance, PhD, Adam McFall, BS, Matthew C. Allender, DVM, MS, PhD, DACZM, Annie M. Adden, BS, Carolyn Cray, PhD, Stacey Lance, PhD, Adam McFall, BS, Matthew C. Allender, DVM, MS, PhD, DACZM

Comparing the Effects of Lithium Heparin and Dipotassium Ethylenediaminetetraacetic Acid on Hematologic Values in Prairie Rattlesnakes (*Crotalus viridis*) and Lake Erie Water Snakes (*Nerodia sipedon insularum*)
 Kennymac Durante, DVM, Laura Adamovicz, DVM, PhD, Ellen Hayes, DVM, PhD, Amy N. Schnelle, DVM, MS, DACVP, and Matthew C. Allender, DVM, MS, PhD, DACZM

Survey for Canine Influenza in Coyotes (*Canis latrans*) in Illinois, 2000–23
 M. Winter^{1,2,4,6}, Chris Anchor², Stanley D. Gehrt³, Jennifer Lane^{1,4,6}, Brookfield Zoo Chicago, 3300 Golf Rd., Brookfield, Illinois 60513, ²Forest Pres, ³Illinois Department of Natural Resources, ⁴University of Illinois at Urbana-Champaign, ⁵Wildlife Epidemiology Laboratory, University of Illinois College of Veterinary Medicine, ⁶Wildlife Epidemiology Laboratory, University of Illinois College of Veterinary Medicine

PUBLICATIONS AND PRESENTATIONS



WILDLIFE EPIDEMIOLOGY LAB

Director

Dr. Matt Allender

Co-Director, Diagnostic Development and Surveillance

Dr. Laura Adamovicz

WEL Research Technician

Amber Simmons

Crystal Moreno

Graduate Fellows

Dr. Kaitlin Moorhead

Maris Daleo

ACZM Residents

Dr. Zach Ready (IZAAR)

Dr. Amanda Wong (IZCAR)

Dr. Danielle Lang (IZAAR)

Dr. John Winter (IZWHMR)

Dr. David Minich (IZAAR)

Dr. Eliza Baker (IZWHMR)

Dr. Maya Iyer (IZAAR)

Dr. Annie Le (IZCAR)

2024 Summer Veterinary Fellows

Shari Markowitz

Marg Bednarek

Surina Birk

Kate Deppe

Carly Etter

Maddie Brookings

Maddy Kasbaum

Erika Suniga

Javelis Castro-Marin

Jaime Lyke

Veterinary Research Team Members

Turtle, Snake, and Beardie Teams

Kami Grochowski, Marg Bednarek, Varun Seth, Dylan Burke, Fayth Kim, Kristin Higgins, Nick Lizka, Jacob Dalen, Sam Johnson, Surina Birk, Katelyn Deppe, Maddie Brookings, Erika Suniga, Carly Etter, Maddy Kasbaum, Jaime Lyke, Ryland Darling

Box Turtle Team 2023

Jennifer Cortes, Mackenzie Holm, Kelly Giles, Maggie baurely, Mackenzie Wells, Justine Sullivan, Emily Jorgenson, Gunnar Maddock, Katelyn Smoot, Jordan Polito, Hannah Pearson, Samantha Smith, Joseph Caffarini, Robin Banasek, Hannah Koller, Alexis Markley, Lizzy Madeiros, Lucy Fischer, Nina Pasquini

Social Media

Maddie Brookings
