USGS WISCONSIN COOPERATIVE WILDLIFE RESEARCH UNIT

FISCAL YEAR 2025
(October 1, 2024-September 30, 2025)



Coop members celebrating the small successes during chronic wasting disease fieldwork near Dodgeville, Wisconsin.
Left photo: Retrieving a malfunctioning deer GPS-video collar after a scheduled drop-off by searching areas the deer used before collar communications failed months earlier.
Right photo: Locating bones in thick vegetation in order to sample soil from older deer carcass sites for prion detection.

ANNUAL REPORT

USGS WISCONSIN COOPERATIVE WILDLIFE RESEARCH UNIT

Room 204 Russell Labs
1630 Linden Drive
University of Wisconsin-Madison
Madison, WI 53706

COOPERATING AGENCIES:

U.S. Geological Survey
University of Wisconsin
Wisconsin Department of Natural Resources
Wildlife Management Institute
U.S. Fish and Wildlife Service

October 1, 2024-September 30, 2025

MISSION STATEMENT
OF THE
WISCONSIN COOPERATIVE WILDLIFE RESEARCH UNIT

The Cooperative Units Program of the U.S. Geological Survey has been an integral part of the Department of Wildlife Ecology at the University of Wisconsin-Madison since 1972. With direction from the Coordinating Committee, the Unit's research has been conducted on a wide variety of wildlife topics in cooperation with federal agencies, the University, the Wisconsin Department of Natural Resources, and various private organizations. The Unit's research spans the range from problem-oriented projects designed to provide cooperators with useful information on resource issues to basic scientific discovery to move the state of knowledge forward.

Work has been carried out in both terrestrial and aquatic environments. Major areas of present research include the effects of agriculture on wildlife populations, wildlife disease issues, and global climate change. The Unit, along with cooperating scientists, has the expertise to investigate environmental problems from the cellular to the landscape level. Current Unit personnel have research interests that include population ecology, community ecology, disease ecology, and landscape ecology. Future project selection is primarily dependent on the needs of the cooperators and the availability of funds.

PERSONNEL AND COOPERATORS

Coordinating Committee

Sammy King (formerly Cyndy Loftin)	Eastern Region Supervisor, Cooperative Research Units U.S. Geological Survey, Reston, VA
Timothy Van Deelen	Chair, Department of Forest and Wildlife Ecology University of Wisconsin-Madison
Scott Hull (Office of Applied Science) and Jasmine Batten (Bureau of Wildlife Management)	Representatives, Wisconsin Department of Natural Resources, Madison, WI
William Moritz	Representative, Wildlife Management Institute, Johnstown, OH
position unfilled (formerly Bradly Potter)	Representative, U.S. Fish and Wildlife Service, East Lansing, MI

Unit Staff

Wendy Turner	Unit Leader, Wildlife
Christian Che-Castaldo	Assistant Unit Leader, Wildlife
position unfilled (formerly Carolyn Rindahl, Elizabeth Burkhalter supporting functions)	Administrative Assistant, University of Wisconsin-Madison

ACADEMIC PERSONNEL

Academic Staff

Marie Gilbertson (Wendy Turner) (Scientist II). Marie is a quantitative ecologist studying deer movement ecology and CWD transmission in southwest Wisconsin and is the veterinarian overseeing our deer captures. Her project investigates the impact of CWD infection on deer movement behavior, and the impact of deer movements and contacts on CWD spread.

Bilgecan Sen (Christian Che-Castaldo) (Scientist I) Bilgecan is a quantitative ecologist building predictive models of deer movement and abundance. His project investigates the ability of the Snapshot Wisconsin camera trap network to reliably estimate unbiased abundance-based metrics from camera trap data.

Post-doctoral Researchers

Amélie Dolfi (Christian Che-Castaldo). Amélie is developing movement models using integrated step-selection analyses and agent-based approaches to simulate movement by white-tailed deer and other species in different landscapes. These simulated datasets will be used to validate density or abundance estimates based on Snapshot Wisconsin camera trap data. (*End date September 2025*)

John Draper (Wendy Turner, co-mentored by Dan Walsh at MT-W-CRU). John is leveraging historical information maintained by state agencies to evaluate impacts of CWD management activities on white-tailed deer population and disease dynamics, and to establish a framework that will improve coordination and information exchange. (*End date December 2024*)

Graduate Students

Completed degrees

Stephanie Katircioglu (Wendy Turner) (M.S., Wildlife). Stephanie studied prion accumulation in soils at deer scrapes and food plots and white-tailed deer behaviors that shed prions and expose deer to prions in the environment. (*May 2024*)

New and continuing graduate students

Kimberlie Vera (Wendy Turner) (Ph.D., Wildlife). Kimberlie is studying anthrax transmission dynamics in a guild of herbivorous mammals, investigating how environmental variation affects host physiology, movement patterns, anthrax exposure risk and predation risk.

Nurul Islam (Wendy Turner) (Ph.D., Wildlife) Nurul is studying white-tailed deer behaviors based on accelerometers and video camera collars to understand chronic wasting disease transmission risk in southwest Wisconsin.

Michael Menon (Wendy Turner, co-mentored with Timothy Van Deelen) (Ph.D., Wildlife). Michael is studying spatio-temporal patterns of wolf predation on white tailed deer and CWD dynamics in northern Wisconsin.

Elijah Smith (Wendy Turner) (Ph.D., Comparative Biomedical Sciences). Elijah is studying chronic wasting disease (CWD) prions and how the conformation of prion molecules affects the transmission of CWD, clinical progression, and environmental degradation.

Aaron Groves (Wendy Turner) (M.S., Wildlife). Aaron is studying coyote and bobcat movement ecology, predation/scavenging of white-tailed deer, and effects on chronic wasting disease spread.

Visiting Students

Bijit Khadka (Christian Che-Castaldo) (Ph.D., Wildlife, advised by Timothy Van Deelen and Jon Pauli). Bijit is building a reproducible data pipeline and spatial databases of permit data collected for federally listed species managed by the U.S. Fish and Wildlife Service, specifically freshwater mussels and bats. (*End date December 2025*)

NEW PROJECTS ($550,301 in funding)

Mechanisms of chronic wasting disease transmission (RWO-151)

Investigators: *Wendy Turner, Wisconsin Cooperative Wildlife Research Unit; Allen Herbst, USGS NWHC; Elijah Smith, Wisconsin Cooperative Wildlife Research Unit*
Funding: *USGS National Wildlife Health Center, $365,846*
Expected Completion: *December 31, 2029*

Chronic wasting disease (CWD) is a fatal neurologic disease of wildlife in the deer family (Cervidae), for which there is no cure or treatment. This disease is a major concern for the health of cervid populations in affected regions of North America. The causative agent of CWD is an infectious protein, called a prion, that is transmitted both directly, from infected to susceptible hosts in close contact, and indirectly, through exposure to long-lived infectious prions shed into the environment by infected hosts. In enzootic regions, disease prevalence often exceeds 30% of animals in the population. With time, this means that millions of infected cervids will be shedding infectious prions into the environment and exposing other mammals, including other wildlife, humans, and domestic animals to a risk of disease spillover. Yet, many fundamental questions critical to managing this important wildlife disease remain unanswered, including aspects of prion variation, prion survival in the environment, CWD transmission, disease processes in infected hosts, and spillover risk to other species. This award supports a graduate student research assistantship at the University of Wisconsin, to perform CWD research in collaboration with the National Wildlife Health Center. With guidance and mentorship, the student will develop experiments to address knowledge gaps around CWD that focus on CWD prion detection, CWD prion strain variation, CWD transmission in cervids, the susceptibility of sympatric species and the fate of CWD prions in ecosystems.

Leveraging commercial satellite data to characterize Pacific walrus responses to a changing Arctic

Investigators: *Christian Che-Castaldo, USGS, Wisconsin Cooperative Wildlife Research Unit*
Funding: *NASA, $184,455*
Expected Completion: *June 31, 2027*

Pacific walrus (*Odobenus rosmarus divergens*) are important benthic predators in Arctic marine ecosystems and hold a place of substantial cultural and economic importance to many coastal Arctic communities. The future of this species, however, is uncertain due to rapid global change. Moreover, effective monitoring has proven logistically difficult, with significant costs and danger associated with traditional approaches. This proposed work seeks to use a leading-edge, AI-based approach in conjunction with commercial satellite imagery to develop a monitoring framework for Pacific walrus. The overall objectives of this work are to leverage the unique capabilities of the 3-m spatial resolution PlanetScope commercial satellite data product to 1) deliver trusted information on the spatiotemporal distribution of walrus and 2) to determine how walrus distributions are responding to a changing Arctic, in support of the NASA Earth Science to Action goals. This project will use deep learning-based models, to automate the classification of walrus in PlanetScope imagery from the North Pacific region

collected over the last decade. These models will be used to identify walrus at 70 locations across the North Pacific. This will provide a record of the spatiotemporal distribution of this species across their range, leveraging the high spatial resolution and rapid revisit time of PlanetScope.

ONGOING PROJECTS ($3,119,772 in funding)

Advancing trail camera monitoring through simulation

Investigators: *Christian Che-Castaldo, USGS, Wisconsin Cooperative Wildlife Research Unit; Jennifer Stenglein, Office of Applied Science, Fish Wildlife and Parks Division, Wisconsin Department of Natural Resources; Amélie Dolfi, Wisconsin Cooperative Wildlife Research Unit*

Funding: *Wisconsin, DNR $349,559*

Expected Completion: *March 31, 2027*

The Snapshot Wisconsin trail camera network provides continuous photo data across Wisconsin to understand the status of wildlife populations. Distribution, relative abundance indices, sex and age ratios, and abundance estimates can all be derived from trail camera data. However, Snapshot Wisconsin trail cameras are set up non-randomly – along trails and in locations that are at the discretion of volunteer trail camera monitors – and are spaced far apart relative to most home range sizes of Wisconsin's wildlife. Additionally, wildlife move and interact on a heterogenous landscape and do not conform to the assumptions of many trail camera modeling methods that assume random and independent animal movement. Variable detection probability of individuals and differences in camera viewshed all complicate the ability to get accurate estimates and metrics from existing trail camera modeling methods.

The best way for us to understand how the Snapshot Wisconsin trail camera network can provide accurate estimates and metrics for a variety of wildlife species is to have known populations. We do not have the ability to census our actual wildlife populations statewide, but a realistic simulation of Wisconsin and its wildlife could be used to provide known populations over which to test various models and estimators. Integrated step-selection analyses coupled with agent-based approaches provide rules (e.g., movement, affinity for a group) to individuals that play out on a simulated landscape to be able to observe population processes and dynamics. This could be a promising approach.

The models created by this project will provide a known animal population for researchers to use as 'truth' when developing the correct methods for occurrence, abundance indices, sex and age ratio metrics, and abundance estimates from Snapshot Wisconsin trail camera data. Additionally, the individual-based model can be used to simulate changes in animal populations to build understanding of how well the methods and metrics used can track population trend, a product of high value in wildlife decision-making.

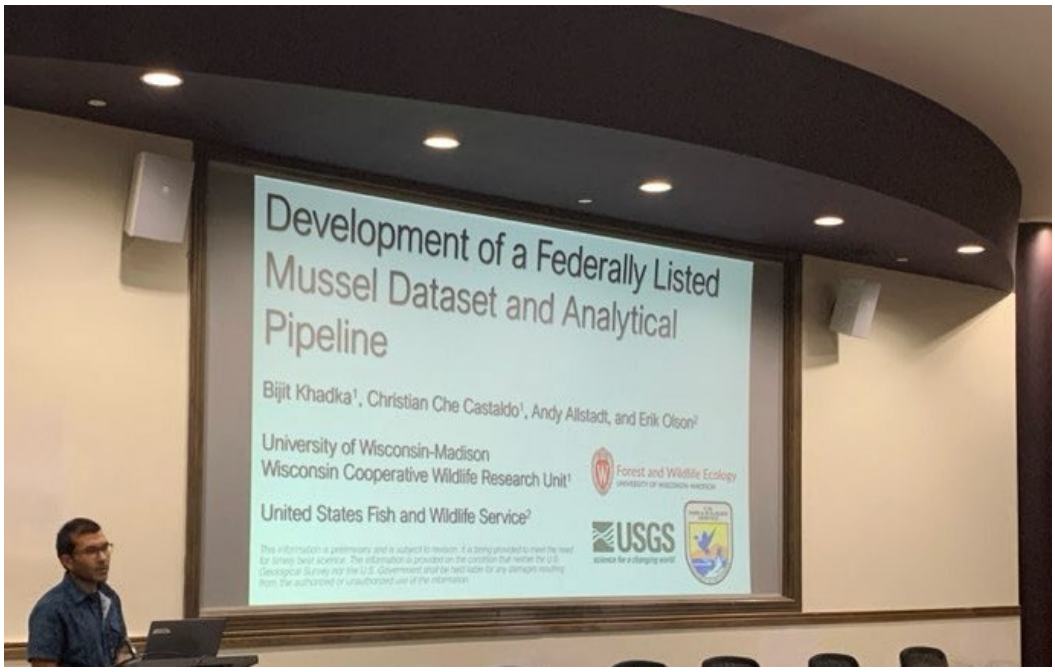
Building ecological data pipelines for listed species permit data

Investigators: *Christian Che-Castaldo, USGS, Wisconsin Cooperative Wildlife Research Unit; Erik Olson, Midwest Regional Headquarters, USFWS; Andy Allstadt, Midwest Regional Headquarters, USFWS; Bijit Khadka, Wisconsin Cooperative Wildlife Research Unit*

Funding: *Wisconsin, DNR $45,213*

Expected Completion: *June 31, 2026 (pending NCE)*

The purpose of this project is to provide technical assistance to the United States Fish and Wildlife Service (USWFS) by developing semi-automated methods to organize and standardize information it collects from permit holders so that it can be more easily used for managing federally endangered, threatened, and at-risk species. To do this, the University of Wisconsin Madison will build a series of reproducible data workflows and pipelines using the R programming language and SQL for permit data collected for freshwater mussels, bee and/or bat species to convert these data from excel spreadsheets into a series of standardized spatial databases united by a common data schema. These workflows and pipelines will be constructed in such a way that they can be re-used by USFWS for additional species in the future. We will also produce a data paper to submit to a peer reviewed scientific journal fully describing the datasets for the three groups of species listed above. These activities will better enable the USFWS to use species permit data to address critical recovery and management needs. In addition, this project will be used to train a University of Wisconsin Madison graduate student in advanced data science methods, with an emphasis on building reproducible workflows.



Bijit Khadka presents work conducted under a CESU project on building ecological data pipelines for permit data from federally listed freshwater mussel species at the 14th Freshwater Mollusk Conservation Society Biennial Symposium, in Ann Arbor, Michigan.

Modeling host behavior and environmental transmission of chronic wasting disease

Investigators: *Wendy Turner, USGS, Wisconsin Cooperative Wildlife Research Unit; Jun Zhu, University of Wisconsin-Madison; Dan Walsh, USGS, Montana Cooperative Wildlife Research Unit; Jim Powell, Utah State University; Nurul Islam and Marie Gilbertson, Wisconsin Cooperative Wildlife Research Unit*

Funding: *USDA NIFA, NSF-NIH-USDA Ecology and Evolution of Infectious Diseases program, $2.5 million*

Expected Completion: *August 31, 2027*

Understanding the principles of infectious disease transmission is crucial for identifying management tools for disease control and prevention. Elucidating such principles is challenging in host-pathogen systems when transmission occurs both directly and indirectly through the environment. Researchers must disentangle diverse multi-scale drivers, from fine-scale host interactions with pathogens in environmental reservoirs to large-scale movements of natural populations in heterogeneous landscapes. A general analytical framework is lacking to link direct and environmental transmission processes and data streams across spatiotemporal scales. This gap limits understanding and management of a broad range of human and animal pathogens transmitted both directly and environmentally: from cholera in humans, to African swine fever in livestock, to white nose syndrome and chronic wasting disease (CWD) in wildlife. We will address this gap by developing a broadly applicable model framework, linking landscape structure, host movement ecology, pathogen distribution and transmission modes, and allowing examination of how individual-level processes affect spatiotemporal dynamics of disease within a population. This analytical approach will be applied to CWD, a fatal prion disease of free-ranging cervids. CWD is an ideal study system because the infectious agent, a mis-folded protein known as a prion, can be transmitted directly or from environmental reservoirs. Heterogeneities in host habitat, behavior, and movement mediate direct transmission, but also deposition of prions into the environment and subsequent environmental transmission. Prion kinetics in heterogeneous environments further shape transmission risk. We propose a deterministic model scaffold that formally incorporates heterogeneities in social behavior and movement with pathogen retention, transport, and infection potential in complex landscapes. A novel application of multi-scale homogenization to our models will analytically link fine-scale pathways of infection with large-scale population processes. Lab, field, and statistical analyses will parameterize prion transmission and host movement, leveraging data and expertise from Wisconsin Department of Natural Resources. We will embed competing models in an uncertainty framework that allows us to assess the relative importance of transmission pathways and to evaluate system responses to population management and landscape disturbance.

Wolf predation and chronic wasting disease in Wisconsin

Investigators: *Timothy Van Deelen, University of Wisconsin - Madison; Wendy Turner, USGS, Wisconsin Cooperative Wildlife Research Unit; Eliezer Gurarie, SUNY College of Environmental Science and Forestry; Michael Menon, Wisconsin Cooperative Wildlife Research Unit*

Funding: *Great Lakes Indian Fish and Wildlife Commission, $225,000*

Expected Completion: *December 31, 2026*

The potential impact of selective removal of CWD-positive deer by canids like wolves and coyotes on CWD transmission dynamics is under-investigated, yet an important consideration for wildlife managers. For example, it is unknown whether canids might preferentially target CWD-infected prey, and what the consequences could be for long term population dynamics of predators, prey and disease. However, given the chronic nature of CWD and its neurological and physical effects, symptomatic individuals are expected to have a heightened risk of predation. In this project, we propose to investigate the potential effects of selective harvesting and predation by: (1) understanding the spatial and temporal patterns of wolf and coyote predation on deer, (2) developing a spatially explicit model that encapsulates dynamics of deer (including CWD), canid, and human interactions and (3) creating a generalizable, web-based tool for managers to be able to explore the consequences of targeted management strategies for CWD in the Great Lakes region. In particular, the leading edges of expanding CWD prevalence and wolf re-establishment are two phenomena that are just beginning to meet in Wisconsin. Understanding how predation might mitigate CWD spread will enable managers to quantify the payoff for maintaining wolves or coyotes on the landscape, identify areas where canid predation can be beneficial for disease control, and explore how background levels of recreational hunting of both deer and their canid predators affects these natural processes. The potential role of selective predation on CWD dynamics has enormous management significance for exercise of native peoples' treaty rights, the multi-billion-dollar recreational sport of deer hunting, and the important resources generated for conservation and management of all wildlife.

PROJECTS COMPLETED THIS YEAR

Investigating environmental transmission of chronic wasting disease (RWO-149)

Investigators: *Wendy Turner, Wisconsin Cooperative Wildlife Research Unit; Stuart Lichtenberg, University of Wisconsin-Madison; Daniel Walsh, USGS, Montana Cooperative Wildlife Research Unit; Daniel Storm, Wisconsin DNR; Allen Herbst, USGS NWHC; Stephanie Katircioglu, Wisconsin Cooperative Wildlife Research Unit*

Funding: *USGS Biological Threats Program, $264,305*

Expected Completion: *August 31, 2025*

Chronic wasting disease is a fatal disease affecting deer species, which has negative effects on affected populations and wildlife conservation. Chronic wasting disease is caused by an infectious misfolded protein, called a prion. These prions can be transmitted directly, from an

infected to a susceptible host through close contact, or indirectly, through host contact with prions in the environment. Little is currently known about the environmental transmission pathway, and its importance in disease spread in deer populations. This project investigated environmental transmission of chronic wasting disease in white-tailed deer (*Odocoileus virginianus*) in southwestern Wisconsin. The first objective was to examine prion amounts found in soils at suspected prion reservoir sites and how these change over time. The second objective was to evaluate deer behavior at potential environmental reservoirs to assess exposure risks through both environmental reservoirs and specific host behaviors. Project outcomes will directly benefit the Wisconsin Department of Natural Resources, with findings on environmental transmission risk conducted in a high-prevalence area where the disease was first detected in Wisconsin. Our results will also benefit stakeholders working to understand and slow the spread of chronic wasting disease across North America, including federal, state and tribal agencies in at-risk areas. Stephanie Katircioglu completed her M.S. degree in May 2025, and a manuscript from this work in under revision for a journal.

Assessing risks associated with CWD-positive deer carcasses, scavenging, and carnivore movement within a CWD endemic area

Investigators: *Wendy Turner, USGS, Wisconsin Cooperative Wildlife Research Unit; Dan Storm, Office of Applied Science, Fish Wildlife and Parks Division, Wisconsin Department of Natural Resources; Marie Gilbertson, Heather Inzalaco and Aaron Groves, Wisconsin Cooperative Wildlife Research Unit*

Funding: *USDA-APHIS, $213,334*

Expected Completion: *August 31, 2025*

Scavengers may mitigate CWD transmission risk through removal of infectious materials from carcass sites but may also transport CWD prions into new areas through wide-ranging movement behavior. Investigations of carcass sites and scavenger-mediated management of CWD-affected areas have remained underexplored due to limitations in sensitivity of prion detection tools. CWD-positive deer carcasses can act as important sources of environmental prion contamination and subsequent transmission, by depositing CWD prions from infectious tissues into the environment, creating “hot spots" for environmental CWD transmission. However, few carcasses go unnoticed or unutilized by scavenging wildlife, and cervid-consuming predators and scavengers may alter patterns of disease spread through removal or dispersal of prions on the landscape. This project fills key gaps in knowledge about how scavengers alter prion deposition from CWD-infected carcasses into the environment at local and landscape scales through assessing prion distributions at deer mortality sites and quantifying scavenger foraging and movement behaviors in a CWD endemic areas. Our objectives were to 1) assess the effects of CWD-positive carcasses and vertebrate scavengers on prion deposition and distribution in soils at deer carcass sites and 2) quantify animal activity at deer carcass sites and scavenger movement ecology to evaluate host exposure risk and the effects of scavengers on carcass consumption and prion removal or dissemination. This project will improve understanding of prion dynamics in soils at CWD-positive carcass sites and how scavenging of CWD-positive carcasses influences those dynamics. Findings from this project will provide information that is directly relevant to state regulatory and oversight agencies. Private landowners will also find this information valuable when making decisions regarding

deer carcass or gut pile disposal practices conducted on their properties. Work for this project is still ongoing, with expected completion in the next fiscal year.

Movement of deer in southwest Wisconsin and its role in CWD spread

Investigators: *Wendy Turner, USGS, Wisconsin Cooperative Wildlife Research Unit; Daniel Storm, David MacFarland, Scott Hull, Wisconsin DNR; Daniel Walsh, USGS, Montana Cooperative Wildlife Research Unit; Marie Gilbertson, Wisconsin Cooperative Wildlife Research Unit*

Funding: *Wisconsin Department of Natural Resources,* $476,247

Expected Completion: *June 30, 2025*

This project focuses on the spatiotemporal context of how landscape heterogeneity, seasonality, and deer movement behavior (individually and in aggregate) affect chronic wasting disease (CWD) spread. The goal was to better understand the mechanisms of CWD spread and the causes of the observed directional (rather than uniform) CWD diffusion and growth across the landscape. The project investigated the impact of CWD infection on deer movement behavior, and the reverse, the impact of deer movement behaviors and contacts on CWD spread. Understanding the times and places where deer are most likely to congregate and the weather, landscape, phenological and demographic factors that alter movement patterns and direct and indirect contact rates will help predict CWD dynamics and may inform management activities. Further, better understanding how sex- and age-specific movements and habitat selection vary according to landscape composition and configuration, weather, plant and crop phenology is of interest to ecologists and the general public and may help managers understand variation in deer population dynamics. Products of this study include five scientific publications, an M.S. degree and numerous scientific and public presentations.

Investigating causes and impacts of pneumonia on white-tailed deer

Investigators: *Pauline L. Kamath, University of Maine, Orono; Wendy Turner, USGS, Wisconsin Cooperative Wildlife Research Unit; Marie Pinkerton, University of Wisconsin-Madison; Daniel Walsh, USGS, Montana Cooperative Wildlife Research Unit; Daniel Storm, Wisconsin DNR; Zoe Barandongo, University of Maine, Orono (previously WCWRU)*

Funding: *Wisconsin DNR, $350,179*

Expected Completion: *December 31, 2024*

Within the United States, deer represent an important source of food and revenue, while also hosting pathogens that put healthy deer populations at risk and jeopardize human health and food security. Developing tools for disease surveillance in important recreational and sustenance species like deer will thus be paramount for detecting and responding to outbreaks and spillover events. In Wisconsin, the Department of Natural Resources has been monitoring the white-tailed deer (*Odocoileus virginianus*) population for chronic wasting disease (CWD) since 1999. Recently, surveillance efforts have identified additional mortalities in deer attributed to pneumonia. Interestingly, such mortalities have been observed in deer both with and without CWD, suggesting the presence of a yet unknown etiologic agent in this population.

This study will compare the respiratory tract microbial communities of deer that died with pneumonia to those that died without pneumonia, and to hunter-harvested deer. Preliminary results show high prevalence (9.8-41.4% of BLAST-ed reads) of the Gram-negative bacteria *Fusobacterium necrophorum* in pneumonia-positive individuals, and a lack thereof in control individuals. While *F. necrophorum* has been previously identified as a cause of mortality in deer, it remains unclear whether it is the direct cause of pneumonia-related mortality in this case or an opportunistic colonizer of already diseased deer. This project aims to confirm the etiologic agent(s) responsible, characterize their distribution, identify risk-factors underlying host mortality, and understand the association with CWD. Ultimately, this information will help inform management strategies and developing disease surveillance systems for the Wisconsin deer population. Products of this study include one published paper, and two manuscripts in preparation.

Looking backwards to know where to go: leveraging historical data to guide CWD management (RWO-148)

Investigator: *Wendy Turner, USGS, Wisconsin Cooperative Wildlife Research Unit; Daniel Walsh, USGS, Montana Cooperative Wildlife Research Unit; Daniel Storm, Wisconsin DNR; John Draper Wisconsin/Montana Cooperative Wildlife Research Units*

Funding: *USGS Emerging Diseases, $264,305*

Expected Completion: *December 31, 2024*

Management of chronic wasting disease (CWD) is one of the most significant challenges facing many wildlife agencies in North America. One of the difficulties in managing this disease is that CWD-affected species range across jurisdictional boundaries; yet currently there is little communication or coordination among management agencies regarding CWD response. Unified efforts to evaluate the effectiveness of the suite of management actions that agencies have applied for disease control are lacking. This project aimed to fill these gaps by leveraging historical information maintained by state agencies to evaluate impacts of CWD management activities on population and disease dynamics and establish a framework that will improve coordination and information exchange. This framework will serve as the basis for the creation of an adaptive management strategy for CWD mitigation among Midwestern, state and federal, wildlife management agencies. The objectives of this project are to investigate the impacts of deer harvest regulations on the realized harvest within and between states in the Midwest, tie the analytical results to CWD dynamics to determine the harvest regulations most likely to have the desired outcome for managing CWD, and plan an adaptive management workshop for participating state agencies to effectively use the results of the modeling effort regarding harvest strategies. Products of this study include two published papers, and two manuscripts in preparation.

PUBLICATIONS AND PROFESSIONAL PAPERS

Peer-reviewed articles
Unit Staff (bolded) and unit-associated students/scientists/postdocs (underlined)

Cossu, C.A., S. Ochai, M. Troskie, A. Hartmann, J. Godfroid, L.-M. de Klerk, **W.C. Turner**, P.L. Kamath, L.O. van Schalkwyk, R. Cassini, R. Bhoora, H. van Heerden. 2024. Detection of tick-borne pathogen coinfections and coexposures to foot-and-mouth disease, brucellosis and Q fever in selected wildlife from Kruger National Park, South Africa, and Etosha National Park, Namibia, *Transboundary and Emerging Diseases*, 2417717. https://doi.org/10.1155/tbed/2417717

Draper, J.P., E.E. Brandell, J. Isabelle, C. Jacques, C. McCoy, E. Michel, D.J. Storm, C. Ott-Conn, B. Wojcik, **W.C. Turner**, D.P. Walsh. 2025. Doe diligence: A regional analysis of antlerless deer harvest regulations in the Midwestern United States of America. *PLoS ONE*, 20(6): e0324708. https://doi.org/10.1371/journal.pone.0324708



Gilbertson, M.L.J., A.C. Ketz, M.A. Hunsaker, D.P. Walsh, D.J. Storm, **W.C. Turner**. 2025. White-tailed deer (*Odocoileus virginianus*) habitat use and implications for chronic wasting disease transmission, *Wildlife Monographs*, 217(1): e70001. https://doi.org/10.1002/wmon.70001

Hoff, S. K.E. Langwig, J.R. Hoyt, L. Johnson, E. Olsen, D. O'Dell, C.J. Pendergast, C.J. Herzog, J.T. Foster, K.L. Parise, **W.C. Turner.** 2025. The importance of peripheral populations in the face of novel environmental change. *Proceedings of the Royal Society B – Biological Sciences,* 292: 20242331. https://doi.org/10.1098/rspb.2024.2331

Hunsaker, M., M.L.J. Gilbertson, D.J. Storm, **W.C. Turner**. 2025. The breeding season and movement ecology of male white-tailed deer in southwest Wisconsin. *Ecology and Evolution*, 15(7):e71589. https://doi.org/10.1002/ece3.71589

Jenouvrier, S., A. Eparvier, B. Şen, F. Ventura, **C. Che-Castaldo**, M.M. Holland, L. Landrum, K.M. Krumhardt, J. Garnier, K. Delord, C. Barbraud, & P. Trathan. 2025. Living with uncertainty: Using multi-model large ensembles to assess emperor penguin extinction risk for the IUCN Red List. *Biological Conservation*, 305: 111037. https://doi.org/10.1016/j.biocon.2025.111037

Kabengele, K., **W.C. Turner**, P.E. Turner, C.B. Ogbunugafor. 2024. A meta-analysis highlights the idiosyncratic nature of trade-offs in laboratory models of virus evolution, *Virus Evolution*, veae105. https://doi.org/10.1093/ve/veae105

Mokgokong, S.P., A. Hassim, T. Mafuna, **W.C. Turner**, H. van Heerden, K.E. Lekota. 2025. Comparative genomics of *Bacillus anthracis* A and B-clades reveals genetic variation in

genes responsible for spore germination. *Genomics,* 117(5):111074. https://doi.org/10.1016/j.ygeno.2025.111074

Ochai, S.O., A. Hassim, E.H. Dekker, T. Magome, E. Lekota, S.M. Makgabo, L.-M. de Klerk-Loris, O.L. van Schalkwyk, P.L. Kamath, **W.C. Turner**, H. van Heerden. 2024. Comparing microbiological and molecular diagnostic tools for the surveillance of anthrax. *PLoS Neglected Tropical Diseases*, 18(11): e0012122. https://doi.org/10.1371/journal.pntd.0012122

Ochai, S.O., L. Snyman, A.C. Dolfi, A. Ramoelo, B.K. Reilly, J.M. Botha, P.L. Kamath, E. Archer, **W.C. Turner**, H. van Heerden. 2024. The roles of host and environment in shift of primary anthrax host species in Kruger National Park, *PLOS ONE*, 19(12): e0314103. https://doi.org/10.1371/journal.pone.0314103

Şen, B., **C. Che-Castaldo**, M.A. LaRue, K.M. Krumhardt, L. Landrum, M.M. Holland, H.J. Lynch, K. Delord, C. Barbraud, & S. Jenouvrier. 2025. Temporal and spatial equivalence in demographic responses of emperor penguins to environmental change. *Journal of Animal Ecology*, 94(15): 932-942. https://doi.org/10.1111/1365-2656.70025

Şen, B, **C. Che-Castaldo**, & H.R. Akçakaya. 2024. The potential for species distribution models to distinguish source populations from sinks. *Journal of Animal Ecology*, 93(12): 1924-1934. https://doi.org/10.1111/1365-2656.14201

Wu, H., C. Flynn, C. Hall, **C. Che-Castaldo**, D. Samaras, M. Schwaller, & H.J. Lynch. 2024. Penguin colony georegistration using camera pose estimation and phototourism. *PLOS ONE*, 19(10): e0311038. https://doi.org/10.1371/journal.pone.0311038

Youngflesh, C., **C. Che-Castaldo**, M.R. Schwaller, M. Polito, S.P. Serbin, and H.J. Lynch. 2025. Satellite monitoring of penguin diet links sea ice, food web dynamics, and population change, EcoEvoRrix. https://ecoevorxiv.org/repository/view/10720/

Posters and Papers Presented at Professional Meetings
Unit Staff (bolded) and students/scientists/postdocs (underlined)

DuVivier, A.K., K. Krumhardt, L. Landrum, Z. Sylvester, **C. Che-Castaldo**, A. Eparvier, M. M. Holland, S. Jenouvrier, S. Labrousse, M. LaRue, C. Nissen, B. Şen & C. M. Brooks. 2025. Quantifying the value of Antarctic polynyas on the ecosystem from phytoplankton to penguins. American Meteorological Society Denver Summit, Denver, CO.

Gilbertson, M. L. J., D. P. Walsh, D. J. Storm, **W. C. Turner**. CWD effects on white-tailed deer movement. Wildlife Disease Association Annual Meeting. Victoria, British Columbia, Canada, 7/27-8/1 2025.

Gilbertson, M. L. J., D. P. Walsh, D. J. Storm, **W. C. Turner**. "CWD effects on white-tailed deer movement." Invited presentation for special symposium, "Deer Management."

Wisconsin Chapter of the Wildlife Society annual conference, February, 2025. Stephens Point, Wisconsin.

Gilbertson, M. L. J., A. C. Ketz, M. Hunsaker, D. P. Walsh, D. J. Storm, **W. C. Turner**. "Seasonal variation in white-tailed deer habitat selection, encounter locations, and CWD transmission potential." Wisconsin Chapter of the Wildlife Society annual conference, Feb 2024. Green Bay, Wisconsin.

Gilbertson, M. L. J., D. P. Walsh, D. J. Storm, **W. C. Turner**. "Disease-induced impacts on movement in a large ungulate." Invited presentation for special symposium, "Integrating movement and space-use ecology into wildlife disease research and management." The Wildlife Society Conference, October, 2024. Baltimore, Maryland.

Katircioglu, S., D. P. Walsh, D. J. Storm, **W. C. Turner**. "Comparing relative PrP^{CWD} loads in soil from deer scrapes and food plots in southern Wisconsin" The Wildlife Society Conference, October, 2024. Baltimore, Maryland.

Khadka, B., A. Allstadt, E. Olson, & **C. Che-Castaldo**. 2025. Development of a Federally Listed Mussel Dataset and Analytical Pipeline. 14th Freshwater Mollusk Conservation Society Biennial Symposium, *Ann Arbor, MI*.

Şen, B., **C. Che-Castaldo**, J. Grebmeier, L. Cooper, V. Lyubchich, & M. Fitzpatrick. 2025. Space does not stand for time in near-term population predictions. Ecological Forecasting Initiative 2025 Conference, Blacksburg, VA.

Şen, B., S. Jenouvrier, & **C. Che-Castaldo**. 2024. Quantifying the short- and long-term predictability of Adélie penguin populations. American Geophysical Union Conference, Washington, DC.

Theses and Dissertations

Katircioglu, S. 2025. *Exploring environmental dynamics of chronic wasting disease: soil matrix effects on RT-QuIC detection of prion contamination at scrapes and food plots,* M.S. in Wildlife Ecology, UW–Madison. https://minds.wisconsin.edu/handle/1793/95173

HONORS AND AWARDS

None to report.

PROFESSIONAL ACTIVITIES AND OUTREACH

Professional Activities

Unit Leader:
Review Editor, EcoHealth (June 2025 – present)
Associate Editor, *Journal of Wildlife Diseases* (August 2022-present)
Academic Editor, *PLOS ONE* (December 2018 – present)

Member, Chronic Wasting Disease Science Team, U.S. Geological Survey, member (August 2021-present)

Co-organizer, Departmental Seminar Committee, Department of Forest and Wildlife Ecology, UW–Madison (2022-present)

Teaching

Unit Leader:
Guest lecture
FWE 548 Diseases of Wildlife, UW–Madison, Fall 2024

Assistant Unit Leader:
Instructor
FWECOL 875 Camera Trap Analysis, Spring 2025

Media Coverage

National Deer Association, 2025. "New study investigates peak rut buck movement." https://deerassociation.com/new-study-investigates-peak-rut-buck-movement

iSportsman USA, 2025. "New study shines a light on buck movement during the rut." https://isportsmanusa.com/tactics/new-study-shines-a-light-on-buck-movement-during-the-rut/

CIDRAP, 2025. 6-year study of deer home range, habitat preference could help officials manage CWD. https://www.cidrap.umn.edu/chronic-wasting-disease/6-year-study-deer-home-range-habitat-preference-could-help-officials-manage

Phys.org 2025. Scientists' study of white-tailed deer could help control chronic wasting disease. https://phys.org/news/2025-05-scientists-white-tailed-deer-chronic.html

Wyoming News Exchange 2025. Spreading CWD: New study looks at deer interactions. https://www.wyomingnews.com/news/local_news/spreading-cwd-new-study-looks-at-deer-interactions/article_23c6dda0-fbbe-48f8-b7b0-d5a8092b495a.html

Mirage News 2025. Deer Study May Aid Chronic Wasting Disease Control. https://www.miragenews.com/deer-study-may-aid-chronic-wasting-disease-1464067/

EurekAlert! AAAS. 2025. Scientists' study of white-tailed deer could help control chronic wasting disease. https://www.eurekalert.org/news-releases/1084240

Outdoor News, 2024. "Wisconsin study sheds new light on buck movement." https://www.outdoornews.com/2024/10/15/wisconsin-study-sheds-new-light-on-buck-movement/

Forbes, 2024, Basic Research Matters: Meet The Winners Of 2024's Golden Goose Awards, https://www.forbes.com/sites/michaeltnietzel/2024/10/04/basic-research-matters-meet-the-winners-of-2024s-golden-goose-awards/

New Scientist, 2024, AI can use tourist photos to help track Antarctica's penguins, https://www.newscientist.com/article/2453986-ai-can-use-tourist-photos-to-help-track-antarcticas-penguins/