

Janine Mistrick

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Current Position

Postdoctoral Research Associate

Sept 2023-present

University of Minnesota, Dept. Veterinary and Biomedical Sciences | Dr. Peter Larsen lab

Tick-borne pathogen surveillance in ticks and wild rodents using Nanopore adaptive sequencing approaches

Education

The University of Minnesota, Saint Paul, MN

Sept 2018-Aug 2023

Ph.D., Ecology, Evolution, and Behavior | Dr. Meggan Craft, advisor

Funding: NSF Graduate Research Fellowship Program

Dissertation: "Effects of environmental factors on pathogen exposure and transmission in wild rodent populations"

The Pennsylvania State University, University Park, PA

Sept 2012-Dec 2016

B.S. with Honors in Biology, Ecology option; Environmental Inquiry minor

Honors Thesis: "Spatial distribution by size and age and allometric relationship of a spruce population in west Greenland."

B.S. French; International Studies minor

Dean's List, awarded each of 9 semesters Fall 2012-Fall 2016

Université Paul-Valéry & Université de Montpellier, Montpellier, France

Fall 2016

Core Skills

- **Quantitative: R statistical software:** network modeling and social network analysis using capture-mark-recapture data; standard frequentist statistics (ANOVA, linear and logistic regression, multiple regression, mixed-effects models); microbiome community analysis; dynamical disease modeling, network modeling for epidemics, Bayesian statistics | **data entry, management, manipulation, and analysis of large datasets** from longitudinal capture-mark-recapture epidemiological field studies using Microsoft Access and R statistical software | **ArcGIS:** spatial mapping and data interpolation | **Data visualization** using R
- **Field:** designing and implementing epidemiological field studies for observational and experimental study of wildlife disease dynamics | leveraging longitudinal capture-mark-recapture data to study rodent space use and contact behavior | live-trapping and handling wild rodents with and without anesthesia | rodent blood sampling via retroorbital bleeds | IACUC-approved euthanasia under field conditions | small mammal dissection | radio telemetry | living and working in remote conditions
- **Laboratory:** DNA/RNA extraction | conventional and real-time PCR | immunofluorescence assays
- **Sequencing & Bioinformatics:** Long-read, single molecule genetic sequencing using Oxford Nanopore Technology | LINUX environment bioinformatic analysis and interpretation of molecular sequence data
- **Formal training** in wildlife disease ecology and epidemiology: Graduate courses: Ecology of Infectious Diseases, Quantitative Methods for Population Health, One Health & Infectious Diseases of Wildlife | multiple courses in statistics and frequentist and Bayesian regression modeling, data visualization

Publications

1. **Mistrick, J.**, Veitch, J. S. M., Kitchen, S. M., Clague, S., Newman, B. C., Hall, R. J., Budischak, S. A., Forbes, K. M., & Craft, M. E. (2024). Effects of food supplementation and helminth removal on space use and spatial overlap in wild rodent populations. *Journal of Animal Ecology*, 93, 743-754. <https://doi.org/10.1111/1365-2656.14067>
2. **Mistrick, J.**, Kipp, E. J., Weinberg, S. I., Adams, C. C., Larsen, P. A., & Craft, M. E. (2024). Microbiome diversity and zoonotic bacterial pathogen prevalence in *Peromyscus* mice from agricultural landscapes and synanthropic habitat. *Molecular Ecology*, 33, e17309. <https://doi.org/10.1111/mec.17309>
3. Book chapter: **Mistrick, J.**, Gilbertson, M.L.J., White, L.A., Craft, M.E.. “Constructing animal networks for parasite transmission inference” in V. Ezenwa, S.M. Altizer, and R.J. Hall (eds), *Animal Behavior & Parasitism* (2022). Oxford University Press.
4. Dissertation: **Mistrick, J.** “Effects of environmental factors on pathogen exposure and transmission in wild rodent populations”. University of Minnesota (2023). Available from ProQuest Dissertations & Theses Global (Order No. 30638368).
5. Undergraduate honors thesis: **Mistrick, J.** “Spatial distribution by size and age and allometric relationships of a spruce population in west Greenland”. The Pennsylvania State University (2016). Available online through the Schreyer Honors College: <https://honors.libraries.psu.edu/catalog/29098>

Manuscripts

1. (*In Review with Proc. Biol. Sci.*) **J. Mistrick**, J.S.M Veitch, K.E. Wearing, S.M. Kitchen, S. Clague, S. Du, M. Michalska-Smith, B.C. Newman, T. Sironen, C.E. Cressler, R.J. Hall, S.A. Budischak, K.M. Forbes, M.E. Craft. “Ecological factors alter how spatial overlap predicts viral infection dynamics in wild rodent populations.” *Preprint available on bioRxiv*: <https://doi.org/10.1101/2024.06.19.599763>

Grants and Funding

**Unless otherwise noted, all grant applications were written by J. Mistrick*

Total Awarded: Research & Travel: \$34,965 | Scholarship & Fellowship: \$156,000

Graduate field research:

Effects of food and macroparasite infection on spatial overlap and viral prevalence in a wild rodent population

- \$12,000 in small grants awarded Summer 2020 - Summer 2022

Pilot study on the influence of habitat type on the pathogen prevalence in wild rodents in Minnesota

- UMN Itasca Biological Station – White Earth student research internship program to support mentorship in a research project **written by J. Mistrick, S. Jansa, P. Larsen, M. Craft* (\$7,500) Summer 2019
- \$9,000 in small grants awarded Summer 2019

Cedar Creek Ecosystem Science Reserve Graduate Fellows Program (\$2,700) Summer 2019

National Science Foundation Graduate Research Fellowship Program (\$36,000/year for 3 years) Sept 2018-2023

Training/travel awards:

- \$3,765 in small awards and registration waivers awarded June 2019 – April 2021

Eberly College of Science Braddock Scholar, Penn State (\$4,000/semester for 8 semesters), 2012-2016

Schreyer Honors College Annual Scholarship, Penn State (\$2,000/semester for 8 semesters), 2012-2016

Edward C. Hammond Jr. Memorial Scholarship, Penn State, awarded Spring 2013, Spring 2014

Research Experience

Postdoctoral field & laboratory research – U. Minnesota, Peter Larsen lab – Sept 2023-present

NIH grant: New tools for tick-borne pathogen surveillance

- Designed and conducted fieldwork for sampling of wild rodent reservoirs of tick-borne pathogens
- Conducted DNA and RNA extractions from rodent tissues for PCR-based and sequenced-based screening for known and novel tick-borne bacterial and viral pathogens
- Developed novel qPCR assays to screen rodent tissue samples for known tick-borne pathogens

Graduate field research – Lammi Biological Station, Finland – April-Aug 2021, Sept-Nov 2022

NSF-EEID grant: Habitat and coinfection as drivers of heterogeneity in cross-scale wildlife infectious disease processes

- Large-scale experimental manipulation of wild bank voles by food addition & helminth removal
- Live-trapped over 700 voles annually for non-terminal sampling including blood via retroorbital sinus
- Immunofluorescence assay (IFA), RNA extraction, differential white blood cell counts, fecal egg counts
- Data entry from field datasheets, quality control of entered data (over 2000 entries per year)

Social network analysis – U. Minnesota, Meggan Craft lab – Aug 2021-July 2023

- Construction of dynamic spatial overlap networks from capture-mark-recapture behavioral data
- Social network analysis, modeling, and statistical analysis of spatial overlap and hantavirus infection data to investigate spatial and behavioral factors influencing the risk of viral infection in wild bank voles

Independent graduate field research – U. Minnesota, Meggan Craft lab – May-Aug 2019

Pilot study: Influence of habitat type on zoonotic pathogen prevalence in wild rodents in Minnesota

- Designed, organized, and conducted disease ecology field research project to capture wild *Peromyscus* mice at multiple field sites in Minnesota and collect blood and fecal samples to test for zoonotic bacterial pathogens and compare prevalence geographically and in natural vs. human-dominated habitats
- Wrote and obtained 13 small grants (totaling \$16,500) to fund this research; managed all research funds, budgeting expenses through university and independent channels
- Live-trapped and handled 170 wild *Peromyscus* mice for collection of blood, fecal, and tissue samples
 - Extensive experience using isoflurane anesthetic, performing retro-orbital eye bleeds
 - Wrote and implemented IACUC-approved protocol for appropriate and ethical collection of non-terminal samples in a field research setting

Independent graduate laboratory research – U. Minnesota, Peter Larsen Lab – July 2019-July 2022

Pilot study: Influence of habitat type on zoonotic pathogen prevalence in wild rodents in Minnesota

- DNA extraction from fecal samples; real-time multiplex qPCR for *Giardia* and *Cryptosporidium*
- Long-read sequencing of fecal metagenome using Oxford Nanopore MinION sequencer

Microbiome community analysis – U. Minnesota, Meggan Craft lab – May-July 2023

- Diversity community analysis of fecal microbiome samples including alpha and beta diversity analyses and non-metric multidimensional scaling ordination to compare microbiome composition

Research technician – Penn State University, Peter Hudson lab – Aug 2017-May 2018

NSF-EEID: The community ecology of viromes: Virome assembly and pathogen transmission in a changing landscape

- Co-led long-term monitoring and manipulation study of wild free-ranging white-footed mice (*Peromyscus leucopus*) and eastern chipmunks (*Tamias striatus*) and their community of parasites
- Live-trapped over 500 animals for non-terminal collection of blood, fecal, oral, and tissue samples
 - Extensive experience using isoflurane anesthetic, performing retro-orbital eye bleeds
- Euthanized *Peromyscus* in the field using IACUC-approved methods
- Organized and trained two dozen undergraduate students to assist in field and lab research
- Data entry and quality control of 3,000 datasheets using Microsoft Access

Field technician – University of Wyoming, Jeffrey Beck lab – May-Aug 2017

Greater Sage-Grouse Response to Sagebrush Treatments

- Worked on longitudinal study to determine the long-term effects of sagebrush treatments on demographic and habitat selection of greater sage-grouse (*Centrocercus urophasianus*)
- Extensive use of radio telemetry to locate and monitor radio-marked sage-grouse and nesting locations

Undergraduate research assistant – Penn State, Peter Hudson lab – Jan-April 2017

NSF-EEID: The community ecology of viromes: Virome assembly and pathogen transmission in a changing landscape

- Dissection of *Peromyscus* gastrointestinal tract to identify common helminth species

National Science Foundation Research Experience for Undergraduates

University of Alaska Anchorage, Douglas Causey lab – May-July 2015

Bat ecology and spatial distribution in southcentral Alaska

- Conducted acoustic field surveys and mist-netting captures for little brown bats (*Myotis lucifugus*)
- Performed vegetation plot and forest surveys to determine bat activity and habitat association
- Partnered with U.S. Forest Service in the Chugach National Forest to conduct the first field surveys in southcentral Alaska for bat activity and habitat association

Undergraduate honors thesis field research – PSU, Eric Post lab, Kangerlussuaq, Greenland – June-July 2014

Spatial distribution by size and age and allometric relationships of a spruce population in west Greenland

- Independently developed and conducted field study of recruitment of conifers in novel subarctic habitat

Undergraduate field research assistant – Penn State, Eric Post lab, Kangerlussuaq, Greenland – July 2013

Arctic vegetation responses to global change: reproduction, growth, and consequences for biodiversity

- Conducted plant ecology research on phenology and morphology shifts of forbs and grasses in response to warming and watering treatments simulating climate change scenarios

Undergraduate lab research assistant – Penn State, Eric Post lab – Spring 2013, Spring 2014

Arctic vegetation responses to global change: reproduction, growth, and consequences for biodiversity

- Assessed the effects of experimental warming and precipitation increase on seed mass and germination

Workshops and Training

Center for the Improvement of Mentored Experiences in Research (CIMER) Entering Mentoring curriculum

12-week workshop series – Spring 2024

Communicating Novelty and Controversy in Ecology and Evolution of Infectious Diseases, Ecology and

Evolution of Infectious Diseases annual conference – May 2023

Applied Spatial Ecology Workshop, Pennsylvania State University – September 2021

→ 2-day short course on spatial analysis for wildlife-related research, taught in R

Social Networks: Statistical Approaches, Statistical Horizons – April 2021

→ 3-day short course on social network analysis, taught in R

Clinic on Dynamical Approaches to Infectious Disease Data (DAIDD), South African Centre for Epidemiological

Modelling and Analysis – December 2020

→ 7-day modeling clinic on dynamical models used in the study of infectious disease dynamics

Network Modeling for Epidemics, University of Washington – August 2020

→ 5-day short course in stochastic network models for infectious disease transmission dynamics using the EpiModel software package in R

Genomics of Disease in Wildlife workshop, Colorado State University – June 2019

→ 6-day workshop with intensive training and hands-on analyses of host and pathogen genomic data

Presentations

Public Dissertation Defense Seminar, U. Minnesota – Aug 2023

Effects of environmental factors on pathogen exposures and transmission in wild rodent populations

Wildlife Disease Association Annual Conference, Madison, WI – July 2022

*Winner of **Terry Amundson Best Student Presentation Award** for outstanding oral presentation of research findings

*Effects of food addition and helminth removal on spatial overlap networks in wild bank voles (*Clethrionomys glareolus*)*

J. Mistrick, S.M. Kitchen, J.S.M. Veitch, S. Clague, C.E. Cressler, R.J. Hall, S.A. Budischak, K.M. Forbes, M.E. Craft.

PhD Preliminary Exam Seminar, U. Minnesota – Nov 2020

Effects of food abundance and macroparasite infection on microparasite transmission in a wildlife population: How important is spatial overlap?

Lunch with a Scientist Seminar Series, Cedar Creek Ecosystem Science Reserve, Bethel, MN – October 2020

Of Mice and Pathogens: Graduate disease ecology research

National Science Foundation REU final presentation, University of Alaska Anchorage, Anchorage, AK – July 2015

Bat ecology and spatial distribution in southcentral Alaska

J. Mistrick, S. Cooperman, J. Faust, D. Causey.

Posters

Ecology and Evolution of Infectious Diseases Annual Conference, University Park, PA – May 2023

*Using spatial overlap to predict Puumala hantavirus infection status in wild bank voles (*Clethrionomys glareolus*)*

J. Mistrick, J.S.M. Veitch, K.E. Wearing, S.M. Kitchen, S. Clague, B.C. Newman, C.E. Cressler, R.J. Hall, S.A. Budischak, K.M. Forbes, M.E. Craft.

Ecology and Evolution of Infectious Diseases Annual Conference, Atlanta, GA – June 2022

*Effects of food addition and helminth removal on spatial overlap networks in wild bank voles (*Clethrionomys glareolus*)*

J. Mistrick, S.M. Kitchen, J.S.M. Veitch, S. Clague, C.E. Cressler, R.J. Hall, S.A. Budischak, K.M. Forbes, M.E. Craft.

Research Frontiers in Animal Behavior & Parasitism Symposium, Athens, GA – May 2020

*poster accepted, symposium canceled due to COVID-19

*Characterization of *Giardia* spp. infection in wild *Peromyscus* mice across forest and peridomestic habitats in Minnesota*

J. Mistrick, S. Jansa, S. Stone, P. Larsen, M. Craft.

Ecology and Evolution of Infectious Diseases Annual Conference, Princeton, NJ – June 2019

Investigating the overlap of ecological dispersal and disease transmission in theory and application.

Penn State University, University Park, PA

Accepted student's day for the Schreyer Honors College – May 2016

Undergraduate Research Exhibition – April 2016

Undergraduate presenter at Ecology graduate program Novel Ecosystem Symposium – March 2016

Spatial distribution, age structure, and allometric relationships in a growing spruce population in west Greenland.

J. Mistrick, D. Watts, E. Post.

Teaching & Mentoring Experience

Teaching Assistant, U. Minnesota, College of Biological Sciences

- Ecology lab – *Spring 2022*
- Foundations of Biology Lab I for Biology Majors – *Spring 2020, Fall 2021*
- Mammalogy lab – *Fall 2019*

Mentoring, U. Minnesota

- Field Guides undergraduate student mentoring program – *Fall 2020, Fall 2021*
- College of Veterinary Medicine Summer Scholar research program mentor – *May-August 2019*
- Cedar Creek Ecosystem Science Reserve Graduate Student Fellow – *June-August 2019*
- Itasca Biological Station White Earth student research internship – *July 2019*

Science Education & Outreach

Minnesota Department of Natural Resources Chronic Wasting Disease Deer Monitoring Program CWD check station volunteer – *Nov 2018, 2019, 2021, 2023*

National Ocean Sciences Bowl, Lake Sturgeon Bowl (University of Wisconsin-Milwaukee) Regional competition: Science Judge – *Feb 2024*; Scorekeeper – *March 2021 (virtual)*

U. Minnesota, Cedar Creek Ecosystem Science Reserve, East Bethel, MN Cedar Creek Eco-Extravaganza, Mentor – *May 2019*

Pennsylvania State University, Eberly College of Science Science-U summer camps, Curriculum Mentor – *June-Aug 2016, June-July 2018* Expanding Your Horizons STEM Career Day for Young Women, Mentor – *January 2016, 2017*

National Ocean Sciences Bowl, Chesapeake Bay Bowl region (Delaware Sea Grant) Regional competition, Rules Judge – *February 2013, 2017* High school team competitor – *Academic years 2008-2012, Team captain AY 2011-2012*

Service

Manuscripts Reviewed:

Molecular Ecology, Journal of Urban Ecology, Journal of Medical Entomology
Co-Reviewer: Functional Ecology | Animal Behavior, Proceedings of the Royal Society, Biology | Methods in Ecology and Evolution | Journal of Animal Ecology

Student Coordinator, U. Minnesota EEB prospective graduate student Welcome Week recruitment event *Jan 2019, 2020, 2023 (in-person) – Jan 2021, 2022 (virtual)*

Co-organizer, U. Minnesota Field Guides undergraduate student mentoring program – Sept 2020-Dec 2021

U. Minnesota EEB Graduate Student Body Co-president – Sept 2019-Sept 2020

Co-coordinator, U. Minnesota Ecosystem Health Research Seminar – Fall 2019-Spring 2022

Professional Memberships

Wildlife Disease Association

March 2022-present

References

Dr. Meggan Craft – PhD advisor craft@umn.edu - (612) 625-6242
Associate Professor, Department of Ecology, Evolution, and Behavior, University of Minnesota

Dr. Peter Larsen – Postdoctoral advisor, PhD committee member plarsen@umn.edu - (612) 626-1694
Associate Professor, Department of Veterinary and Biomedical Sciences, University of Minnesota

Dr. Peter Hudson – Research collaborator pjh18@psu.edu - (814) 865-0522
Willaman Professor of Biology, Department of Biology, The Pennsylvania State University