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NWRC Research Scientists: Dr. Kim Pepin

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I am a quantitative disease ecologist who works with managers and policymakers to develop predictive modeling tools to aid decision making in One Health contexts.

Disease. I quantify processes that are important in wildlife disease transmission and invasive species spread, such as contact structure, demography, animal movement, and environmental transmission. I leverage an understanding of these processes for management applications. Example applications include:

- Predicting geographic spread, hotspots, or prevalence of disease
- Inferential methods of disease surveillance data for optimizing disease risk assessment
- Developing designs and conducting adaptive disease surveillance
- Determining optimal disease control strategies (e.g., wildlife vaccination, removal, and other techniques)
- Monitoring and estimating disease elimination
- Methods for interpreting serology data across within and between-host scales for risk assessment

I work on a variety of zoonotic or wildlife-livestock disease systems, often focusing on the reservoir host species. Examples include influenza A, rabies in wild

carnivores, African swine fever in wild pigs, bovine tuberculosis in deer, SARS-CoV-2 in wild mammals, and chronic wasting disease in deer.

Invasive or pest species. I develop quantitative tools for risk assessment, evaluating management actions, and guiding control of invasive/pest species and their damage, especially of wild pigs. I also design field studies to identify and understand key ecological processes that are essential for planning science-based management solutions and identifying the best targets for management. Example applications include:

- Developing modeling tools for risk assessment of new pest or disease control products where risk assessment methods are challenging to establish (e.g., transmissible vaccines, gene drive products)
- Methods and user-friendly tools for inferring management efficacy based on management data
- Inferring population density or damage before and after management
- Evaluating population dynamics under different management strategies
- Estimating the amount of damage prevented by management
- Mapping elimination probability
- Identifying how resource allocation can be optimized in space and time

Research Project

NWRC Research Areas: Wildlife Disease

This project supports the National Wildlife Disease Surveillance Program, characterizes wildlife pathogens, and develops tools to identify and mitigate disease risks.

Current Research

- Improving communication between model developers and users
- Science-based modeling tools for guiding research, optimizing management, and evaluating management actions in One Health contexts
- Methods for predicting disease emergence in multi-host disease systems, including systems with environmental transmission

- Understanding the role of social processes, contact structure, landscape heterogeneity, and animal movement in disease transmission – methods for inferring these processes and integrating them into predictions of spatial spread
- Disease surveillance design and methods for inferring disease transmission from surveillance data

Areas of Expertise

- Disease ecology
- Evolutionary Biology
- Epidemiological modeling
- Spatial processes
- Wildlife-livestock interface
- Evaluating and optimizing control strategies
- Risk assessment
- Surveillance design

Affiliations

- Affiliate Faculty, Department of Fish, Wildlife, and Conservation Biology and Graduate Degree Program in Ecology, Colorado State University
- Adjunct Faculty, School of Biological Sciences, Southern Illinois University

International Experience

- China (avian influenza)
- Brazil (dengue fever)
- Poland (African swine fever)
- Canada (raccoon rabies, wild pigs)

Publications

View Dr. Kim Pepin's publications.

Education

- Ph.D., 2006, Mechanisms of viral adaptation, University of Idaho
- BSc, 1998, Ecology, University of British Columbia

Contact

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