

## TECHNICAL SKILLS

**Statistical Modeling:** Bayesian & Frequentist inference, generalized & linear regression, hierarchical/multilevel models, sensitivity analysis, multivariate analysis

**Programming:** R, C++, Stan, Python, Bash

**Systems & Infrastructure:** Git, VS Code, Linux (remote machines), HPC (SLURM), SSH, L<sup>A</sup>T<sub>E</sub>X

## RELEVANT EXPERIENCE

### ORISE Research Fellow — USDA APHIS

Jun. 2024 – Present

*Statistical Modeling, Data Analysis, & Scientific Software Development*

Remote, US

- Conceived and implemented an end-to-end analysis that leveraged hierarchical Bayesian modeling, stochastic simulation, and optimization to improve disease surveillance protocols.
- Estimated power-law kernel function parameters using custom MCMC samplers, likelihood functions, and sensitive survey data.
- Engineered reproducible HPC pipelines in Bash and R to run and process millions of simulations.
- Developed a Python algorithm to optimize sampling targets using both empirical and estimated parameters.
- Translated technical results for non-technical stakeholders to iteratively improve the modeling framework.

### Research Associate II — Colorado State University

Oct. 2023 – Jun. 2024

*Statistical Modeling & Simulation Development*

Fort Collins, CO

- Conceived of a system of ordinary differential equations and fit them to messy survey data within a Bayesian framework using Stan and R in order to infer latent processes.
- Performed sensitivity analyses to attribute uncertainty to specific model parameters (estimate effect sizes) and inform where data collection and parameter estimation should be improved.
- Built reproducible HPC workflows using Bash and R to orchestrate large-scale simulation and analysis pipelines.

### Graduate Research Assistant — Colorado State University

Aug. 2021 – Aug. 2023

*Simulation Development, Data Engineering & Analysis*

Fort Collins, CO

- Engineered new features in a large C++ simulation to evaluate counterfactual management strategies and support decision making during future disease outbreaks.
- Built R-based data pipelines to process large simulation outputs, generate standardized figures, and run sensitivity analyses quantifying how parameter uncertainty impacts model outcomes.
- Maintained a reproducible and version-controlled codebase with Git for multi-institution, international collaboration.
- Generated quarterly reports and presented biweekly updates to funding institutions.

## EDUCATION

### Colorado State University

Aug. 2021 – Aug. 2023

*M.S. Ecology (Applied Statistics Focus)*

Fort Collins, CO

### Lewis & Clark College

Aug. 2017 – May 2021

*B.A. Biology, Honors (Significant International Affairs Coursework)*

Portland, OR

## SELECTED PUBLICATIONS & PRESENTATIONS

Simony, B. J. et al., *Stochastic modeling of bovine tuberculosis dynamics in white-tailed deer*, in: *Research in Veterinary Science* (2025), p. 105970.

**Smith, Samuel M** et al., *Potential benefits of adaptive control strategies are outweighed by costs of infrequent, but dramatically larger disease outbreaks*, in: *Royal Society Open Science* 12.8 (2025).

**Smith, Samuel M** et al., *United States cattle market location and annual market sales estimate data*, in: *Data in Brief* (2025), p. 111877.

**Smith, Samuel M**, Beck-Johnson, L. M., and Webb, C. T., “United States Disease Outbreak Simulation and United States Animal Movement Model”, in: *USDA-ARS Geospatial and Environmental Epidemiology Scoping Workshop*, Mississippi State University, Starkville, MS, May 2024.

**Smith, Samuel M** et al., “Harnessing a National-Scale Disease Transmission Model to Understand the Impact of Control on Livestock Disease Spread”, in: *CEAH ASF Mini Conference*, Fort Collins, CO, Sept. 2024.

**Smith, Samuel M**, Beck-Johnson, L. M., and Webb, C. T., "Supporting Emergency Disease Management with Structured Decision-Making", in: *Ecology and Evolution of Infectious Diseases Annual Meeting*, Pennsylvania State University, State College, PA, May 2023.