

## **Statistical computing:**

### Markov chain Monte Carlo

- Autocovariance estimation using shape constraints/non-parametric mixture models (joint with Hyebin Song (PSU))
- Variance reduction for MCMC

### Optimization

- Algorithms for nonparametric mixture model estimation (implementation and analysis)
- Variance reduction for stochastic gradient descent

## **Spatial statistics:**

### Differential equation models for disease spread

- Previously: diffusion model for CWD in Wisconsin deer (joint with Jun Zhu (UW-Madison) and Dan Walsh (USGS))
- Statistical challenges: inference, model specification
- Computational challenges: extensions to larger scale (state and region)

### Nonparametric estimation of spatial covariance functions

### Markov random field models for spatial data