Project Summary
Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Statistical Methodological Development for Long-Term Vegetation Monitoring

Discipline: Natural
Type of Project: Technical Assistance
Funding Agency: National Park Service
Other Partners/Cooperators: Montana State University
Student Involvement: Yes
Effective Dates: 6/02/2017 – 9/30/2022
Funding Amount: 65,213

Investigators and Agency Representative:
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Project Abstract: The project will develop statistical models and related tools for analyzing vegetation monitoring data collected as categorical visual estimates of above-ground cover and other variables that are central components of the NPS Upper Columbia Basin Network and Greater Yellowstone Network vegetation monitoring protocols. Methodological needs include replacing existing ordinal regression techniques with more flexible and biologically-realistic models that accommodate a variety of latent cover class distributions that are not adequately described by symmetric Gaussian models and that accommodate observer errors. Specifically, the NPS data analysis needs include an integrated, comprehensive hierarchical modeling framework that can support inferences about both distribution (e.g. invasive weed establishment) and abundance (e.g. population size of invasive weeds and native perennials) within and among park units, and that can consume ordinal cover class data with an over-abundance of non-detections (zeros), right- and left-skewed abundances (counts), and observation errors. Additional work may include similar statistical development of models and coding for other monitoring efforts within the Greater Yellowstone Network.

This project will result in products and tools (e.g. codes) that will be included in the long-term vegetation monitoring protocol standard operating procedures for data analysis. In addition there will be a peer-reviewed manuscript that describes the advancements in these analyses techniques for vegetation monitoring data that will inform other research and monitoring programs beyond the work being conducted by the two networks.

Keywords: National Park Service, Greater Yellowstone Network, Montana State University, statistical models, vegetation monitoring