

Abstract

In this dissertation, I will discuss three research projects: two in the field of environmental statistics and one in the field of statistics education. In Chapter 2, we propose a novel sampling design for animal movement studies which combines samples at regular and random time intervals. We compare our novel sampling design, called lattice and random intermediate point (LARI), to regular sampling designs in two data examples and one simulation example. In these cases, LARI sampling leads to more accurate and precise parameter estimation compared to regular sampling. In Chapter 3, we describe a flexible model for golden eagles (*Aquila chrysaetos*) and other partially migrating species. We compare our proposed approach using varying coefficients to latent-state models, and we show that our approach better describes dispersal, migration, and resident behaviors. The flexibility of our approach also allows us to model behavior of less stereotypical individuals. In Chapter 4, we describe the development, deployment, and analyses of the Survey of Probability Attitudes (SPA), which we adapted from the existing Survey of Attitudes Toward Statistics (SATS-36). We present validity evidence for the SPA and used mixed effects models to model the gain in attitude component scores from the beginning to the end of a probability course. We illustrate the effect of regression to the mean in an attitude study and discuss the implications for future work.