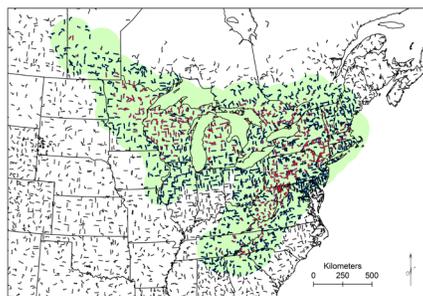


Estimating Trend and Detection Probability Using Data from the Breeding Bird Survey

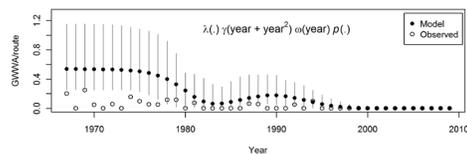
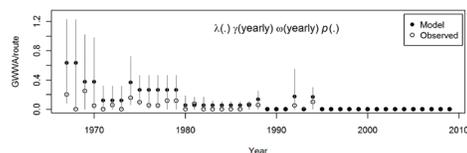
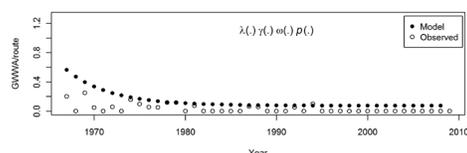


Photo by Michael Lutmerding



The Challenge: The North American Breeding Bird Survey (BBS) is designed to estimate avian population change, and it has become one of the primary sources of data used to prioritize species conservation efforts. Initiated in 1966 and with data from over 5000 roadside routes, no other bird survey is as spatially and temporally extensive. Because of its increasing importance, researchers continue to seek ways of improving the reliability of its results. One concern is that imperfect detection of birds during counts could bias trend estimates. Currently, the analysis accommodates some sources of variation in detectability, but it cannot account for factors that affect both detection probability and abundance.

The Science: Hierarchical Models and Software for Estimating Detection Probability: Researchers at Patuxent have pioneered the development of statistical models that use information from replicate counts to estimate detection probability. Recently, an extension of these models was developed (Dail and Madsen 2011) that can be used to estimate trend and detection probability using unreplicated count data as is collected by the BBS. In order to implement and evaluate the Dail-Madsen model, we developed a free software package called **unmarked**, which is now being used by hundreds of ecologists worldwide. We used this software to fit the model to BBS data collected on numerous species, and in some cases, we found that the models fit the data well and yielded results consistent with other information. For many species, however, model fit was poor indicating that the assumptions of the model may not be reasonable.



The Future: While the Dail-Madsen model, in its current state, may not be a robust alternative to the current method of analysis, we are extending the model to accommodate distance sampling data, which should increase the precision of the estimates and allow for valid estimates of trend and population size. We will add these new methods to **unmarked** so that other ecologists can benefit from our work and assist us in our goal of improving methods for analyzing BBS data.