

ABSTRACT

DISSERTATION: Bayesian Inference of Fisheries and Ecology Models

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The goal of fisheries and ecology research is to understand the dynamics of the natural world. To achieve this goal two statistical paradigms are used, frequentist and Bayesian inference. While frequentist inference remains the dominant statistical method in fisheries and ecology, there are many advantages to a Bayesian approach. The goal of this dissertation is to evaluate fisheries and ecology models using Bayesian inference to answer key environmental problems. My specific objectives are; 1) evaluate covariates of Walleye *Sander vitreus* recruitment to age-0 from stocked populations in six Midwestern Reservoirs; 2) evaluate yield-per-recruit models of Walleye and hybrid striped bass in a Midwestern Reservoir; 3) estimate electrofishing capture probabilities while accounting for schooling behavior of common stream fishes. A Bayesian approach allowed me to identify that Walleye recruitment was affected by the number of stocking events, moronid stocking abundance, and maximum discharge. However, the magnitude and direction of the effect varied among reservoirs. I also determined management strategies that can be used to obtain maximum yield of two competing piscivores while accounting for uncertainty in model inputs. Finally, I developed a model that described capture probabilities of stream fish while accounting for schooling behavior. This model was a more accurate method compared to the traditional model.