

Title: Markov chain estimation of avian seasonal fecundity

Matthew A. Etterson^{1,2} Richard S. Bennett², Eric L. Kershner³, and Jeffery W. Walk⁴

¹etterson.matthew@epa.gov

²U.S. Environmental Protection Agency, Duluth, MN

³ Environmental Security - U.S. Marine Corps Base Camp Pendleton, CA

⁴ The Nature Conservancy, Peoria, IL

Avian seasonal fecundity is of interest from evolutionary, ecological, and conservation perspectives. However, direct estimation of seasonal fecundity is difficult, especially with multibrooded birds, and models representing the renesting and quitting processes are usually required. To explore the consequences of modeling decisions on inference about avian seasonal fecundity we generalize previous Markov chain (MC) models of avian nest success to formulate two different MC models of avian seasonal fecundity that represent two different ways to model renesting decisions and breeding cessation. We parameterize both Markov chains (regular and absorbing) for two species (eastern meadowlark, *Sturnella magna*, and dickcissel, *Spiza americana*) and compare the results using mean squared error of the estimated number of successful broods per breeding female. We also provide formulae for estimating the expected variation in female breeding success. The absorbing MC performed better for both species, though the regular MC performed almost as well when the duration of the breeding season was estimated by taking the 95th percentile of a negative binomial distribution fit to the observed durations among all females. In their simplest form the models contain very few parameters (4 or 5) and should also prove useful as a foundation for more complex models of avian seasonal fecundity and demography. *This abstract does not necessarily reflect USEPA policy.*