

Using Integrated Population Models to Monitor Game Species

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Abstract: Traditional harvest-based estimators of abundance for game species, especially white-tailed deer, lack measures of precision and make strong assumptions about mortality processes or accounting of mortality. Moreover, information on other population characteristics is oftentimes available, such as reproductive data obtained via embryo counts or adult:young ratios, but such data may not be readily incorporated into traditional estimators and usually are evaluated in an ad hoc manner. We developed an integrated population model in a Bayesian framework that provides measures of precision and incorporates multiple sources of data in a population dynamics model to make inferences about survival, harvest, and reproductive rates, abundance, and population trends. The model uses data collected on hunter harvest, reproductive rates, survival between hunting seasons, and adult male and female harvest rates as data inputs. These data are integrated via a simple population dynamics model to estimate abundance, survival rates, and harvest rates by sex-age class along with measures of precision. Oftentimes, rich data sets are available for game species that can be used in integrated population models to enable stronger inferences about population trends. Moreover, these models can be used to investigate the population dynamics of species, or estimate population parameters for which it is otherwise difficult to collect data (e.g., survival from birth to the first hunting season), because all available data are linked to a population dynamics model that is believed to describe the system.