

FEATURE ARTICLES

NEST SURVIVAL ESTIMATION: A REVIEW OF ALTERNATIVES TO THE MAYFIELD ESTIMATOR

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Abstract. Reliable estimates of nest survival are essential for assessing strategies for avian conservation. We review the history of modifications and alternatives for estimating nest survival, with a focus on four techniques: apparent nest success, the Mayfield estimator, the Stanley method, and program MARK. The widely used Mayfield method avoids the known positive bias inherent in apparent nest success by estimating daily survival rates using the number of exposure days, eliminating the need to monitor nests from initiation. Concerns that some of Mayfield's assumptions were restrictive stimulated the development of new techniques. Stanley's method allows for calculation of stage-specific daily survival rates when transition and failure dates are unknown, and eliminates Mayfield's assumption that failure occurred midway through the nest-check interval. Program MARK obviates Mayfield's assumption of constant daily survival within nesting stages and evaluates variation in nest survival as a function of biologically relevant factors. These innovative methods facilitate the evaluation of nest survival using an information-theoretic approach. We illustrate use of these methods with Lark Bunting (*Calamospiza melanocorys*) nest data from the Pawnee National Grassland, Colorado. Nest survival estimates calculated using Mayfield, Stanley, and MARK methods were similar, but apparent nest success estimates ranged 1–24% greater than the other estimates. MARK analysis revealed that survival of Lark Bunting nests differed between site–year groups, declined with both nest age and time in season, but did not vary with weather parameters. We encourage researchers to use these approaches to gain reliable and meaningful nest survival estimates.

Key words: apparent nest success, Lark Bunting, Mayfield method, nest success, nest survival estimation, program MARK, Stanley method.