An Interactive Web Tool for Deciding Between Possible Occupancy Study Designs for Rare and Cryptic Species

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Occupancy-based monitoring has become a valuable tool for studying rare and cryptic wildlife species. The growth of popularity of occupancy studies has been accompanied by the development of many adaptations to the original standard occupancy design, aiming to improve efficiency and to address cases where model assumptions cannot be met. For example, removal & conditional designs were developed for efficient distribution of effort between initial site visits versus repeat surveys based on how common a species is. The robust design is another adaptation that accounts for cases where the focal species may leave the study site between survey occasions. Given many options, it is not always clear which survey design will be most effective for the multiple constraints of a specific case. Yet, choosing an effective study design is critical, particularly when seeking to obtain information for rare and cryptic species, for which standard approaches are often less effective. We used case studies of Montana's non-game Species of Greatest Inventory needs to guide development of an interactive, web-based tool that provides recommendations on occupancy study design based on study objectives and focal species characteristics. These recommendations are based on a synthesis of existing research into occupancy study design and accompanying power analyses. Simple power analyses provide users a visual sense of the effort required to obtain information related to covariates or detect trends when using an occupancy study approach under different circumstances. We will demonstrate the app using Montana Species of Greatest Inventory Need as an example.