# COMBINING MULTIPLE SOURCES OF INFORMATION TO BETTER ESTIMATE COVARIATE EFFECTS ON THE PROBABILITY OF A RARE EVENT

P.M. Dixon[†]

*Iowa State University, Ames, USA*

[†] E-mail: *pdixon@iastate.edu*

Successful capture of wasp prey by the insectivorous cobra lily plant is rare. Two captures and 157 visits were seen in 376.5 plant-hours of direct observations. Both the average capture probability and the relationship between capture probability and plant size are imprecisely estimated. Aggregated data on the total number of captures are easy to collect but provide no information on the number of visits. I develop Poisson-Binomial models that combine direct and aggregated data to estimate average capture probability and visitation rate. The models are extended to estimate the relationship between capture probability and plant size. By evaluating asymptotic relative efficiency, I show that combining data increases the precision of the capture probability when that is small and increases the precision of the vistation rate when the capture probability is large. For these data, combining data provides a four-fold increase in precision.