

Holy Hypothesis Statman!

By Dave Person

Holy hypothesis Statman!!!! There may be a problem with using logistic regression in habitat use-availability analyses. Darn, another cherished procedure endorsed by the "Priesthood of Normal Deviates" goes down the drain. Or does it? Do you know? Maybe you should. I urge members to read the Spring 2006 issue of the Journal of Wildlife Management (JWM) that contains an excellent series of papers about the promises and pitfalls of resource selection analyses. That issue follows on the heels of another debate among wildlifers, using models and Akaike information criteria (AIC) versus classical Popperian hypothesis testing (See Guthery et al., Spring issue JWM 2005). The debate has gotten so acrimonious that one would think they were arguing about religion or the right path to heaven: "*Only the chosen few have controls*" versus "*It's all relative depending on the size of your log likelihood.*" You know the script don't you? If not, maybe you should.

So what should we make of those debates and issues? I am reminded of a prominent ecologist who said, "*Ecology is not rocket science, it is a whole lot harder*". In my opinion, that implies our methods of analyses must be flexible to meet the difficult challenges that we face and we must be knowledgeable about those methods. Despite our best efforts, study designs often are compromised, controls confounded, and assumptions violated. We rarely have the opportunity to do nice, clean ANOVA-type of experiments. Indeed, if our work was restricted only to questions that could be solved in that way, we quickly would be out of work. However, if the opportunity does exist, by all means use a nice, classical experimental design rather than more ambiguous and complicated modeling. In contrast, if you have to evaluate multiple hypotheses with covariates changing simultaneously and no controls, use a modeling approach along with AIC model selection criteria. The bottom line is to be flexible and understand the uses and limitations of every approach or method that you use. To that end, wildlife biologists need more than a rudimentary understanding of statistics. We are often "pushing the envelope" of assumptions associated with statistical tests. We need to get beyond the ubiquitous bar charts and line graphs that we trot out at every board or public meeting. Some of you may be inclined to leave that knowledge to your staff biometrician. Take it from me, to use the real talents and knowledge of your local biometrician you need to have a good understanding of the methods you are applying. Reading journal articles such as those I highlighted in JWM is a good practice to keep up on the technical details. Some of you may consider taking courses in statistics. I specifically recommend courses discussing general linear modeling and categorical data analysis. I also believe that the Alaska chapter of The Wildlife Society can help by sponsoring workshops and online training focusing on data analysis. Online training would be particularly helpful to those without access to universities or colleges.

Getting back to the beginning, can you use logistic regression in habitat use-availability analyses? Absolutely! You just need to make sure that either your available sites are actually unused or that the probability of use is low. Even if that assumption is violated, the relative values for covariates in your model likely are still valid for ranking the effects of each on use but the absolute probability of use predicted by the model is unreliable. In the parlance of resource selection analyses, the resource selection function can be estimated but the resource selection probability function cannot.

In thinking about this column, I remembered a trip I took on a plane a few years ago. I sat next to an overly talkative man who clearly liked to hear the sound of his own voice. I was trying to work on a manuscript and he kept interrupting me with comments and questions, rarely waiting for me to answer. I was working on a page with many equations when he asked me if I really understood those things. I looked at him incredulously and said, "Of course, don't you?" On that note, he kept quiet for the rest of the trip.