

Neu C W, Byers C R & Peek J M. A technique for analysis of utilization-availability data.

J. Wildlife Manage. 38:541-5, 1974.

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A statistical technique evaluating preference or avoidance of a given habitat or forage species is presented using moose (*Alces alces*) distribution patterns in an area including the Little Sioux Burn of northeastern Minnesota as an example. The technique involves the use of a Bonferroni z statistic which estimates whether a specific observation within a multinomial distribution occurs more or less frequently than expected. [The SC1® indicates that this paper has been cited in more than 175 publications.]

Detecting Habitat Preferences

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Wildlife biologists working with habitat relationships require a means of determining whether or not one or several habitats are selected out of proportion to their occurrence within the environment. In the 1960s, the standard procedure was to use chi-square to determine whether a difference existed between the observed frequency distribution of habitat use and the frequency distribution of habitat occurrence. The chi-square test examined the hypothesis that one frequency distribution was equivalent to the other. If the hypothesis was rejected, as was almost always the case, then an inspection of the data was used to see whether the greatest discrepancies existed.

At that time, I was investigating moose habitat selection patterns in northeastern Minnesota. The Little Indian Sioux Fire of 1971 afforded a unique opportunity to assess responses of moose to a 13,446 hectare habitat modification—a "natural experiment." I decided that a more quantitative approach to examining habitat selection, which would eliminate the need to inspect the data set for differences, some of which might not be signifi-

cant, should be used. Two doctoral students studying for preliminary examinations in the College of Business at the University of Minnesota, Clyde W. Neu and C. Randall Byers, were interested in my project. At my request, they were pleased to volunteer to search for such a test, since they were deep into reviews of statistical methods for prelims anyway. My two colleagues quickly came up with the Conferoni normal statistics as a means to provide a quantitative approach for detecting habitat preference, and we ran the analysis.

We thought it would be useful to attempt to publish this procedure in the *Journal of Wildlife Management*, since I knew that more and more interest was developing in assessing habitat preferences. One reviewer, a statistician, felt that since the procedure was available in the statistical literature, the manuscript was not necessary. My own feelings were that the results from our analysis of moose habitat use around the burn were of value and thought we might be erring by emphasizing the method rather than the information.

Since 1974, numerous procedures for assessing habitat preference have been used, including other univariate tests^{1,2} and, increasingly, multivariate tests,³ reflecting greater use of statistics in wildlife ecology. And, the whole concept has been challenged as providing questionable information, since habitat selection may, in some cases, be heavily dependent upon population density.^{4,5} Much of this was recognized 20 or more years ago, and one must use common sense and supporting information to interpret the results of an investigation of habitat preferences. Perhaps this paper, with its resurrection of a little-known statistical test, might best be considered as one of the earlier efforts to develop more quantitative and objective means of analyzing habitat use information, which helped stimulate a more rigorous and extensive examination of a critical aspect of wildlife ecology.

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Received February 17, 1992