The relationship between landowners' demographics and attitudes and their willingness to participate in a quail habitat restoration cooperative

Reitz, R. A.[1], S. L. Sheriff[1], T. V. Dailey[1], H. J. Scroggins[1], T. B. Treiman[1], C. D. Scroggins[1], R. A. Pierce II[2], and W. B. Kurtz[2]

[1] Missouri Department of Conservation and [2] University of Missouri-Columbia

College of Agriculture, Food and Natural Resources
UNIVERSITY OF MISSOURI-COLUMBIA

USDA-NRCS/MSU Bobwhite Restoration Project

Quail Unlimited Missouri State Council

INTRODUCTION

Much of the potential success of northern bobwhite (*Colinus virginianus*) restoration is dependent on management of habitat on private land. The objective of this study was to develop a systematic approach for using ecological and sociological data to identify potential restoration areas. Our primary approach used a mail survey to determine landowner attitudes, demographics and ability to participate in a habitat restoration cooperative (details of survey are in adjacent poster). Choosing appropriate questions for such a survey is difficult. On one hand, a post-card question, "Would you be interested in participating in a quail habitat restoration cooperative?," could suffice. Alternatively, both the number and seriousness of responses to such a question could be increased if the survey includes information that would help landowners make an informed decision (e.g., description of bobwhite habitat management, potential personal benefits of participation, justification for restoration). Because this was an exploratory study, we included a comprehensive set of survey questions that would increase our understanding of landowner willingness to participate in a restoration cooperative. The next step was to determine the relationship between the landowner's intentions and his/her characteristics using an information-theoretic approach.

METHODOLOGY

We used a self-administered, mail-back questionnaire to assess landowner willingness and ability to carry out habitat restoration on their land (see adjacent poster by Reitz et al. entitled "Attitudes of north Missouri landowners toward large-scale quail habitat restoration areas on private lands"). We developed a priori models to attempt to identify the parameters that best represented landowner willingness to become involved in a "cooperative" habitat restoration program. We used a cumulative logistic regression approach for ordinal response data (Agresti 2002). The response order was "Yes," "Maybe," and "No" (response options to the question "Would you be interested in joining a quail management cooperative?"). We used the Akaike Information Criterion (AIC) for our model selection approach described by Burnham and Anderson (2002). Specifically, we used the AICc criterion (Burnham and Anderson 2002:66-67) that corrects for small sample size in relation to the number of parameters being estimated. Model selection offers the advantage of evaluating competing models that are not nested in structure. It is also more informative than the "no difference" results often obtained when using null hypothesis testing in that the information-theoretic approach can distinguish between multiple hypotheses through competing models in the examination of empirical data sets (Franklin et al. 2001:75).




THE GLOBAL MODEL

A valid alternative to data dredging is to develop *a priori* hypotheses (models) before analyzing data. These models are based on biological, social, and management considerations as well as theory (Franklin et al. 2001:81-82). We evaluated 8 *a priori* models developed around demographic, behavioral, and experiential factors and ranked them using AICc, which is a second-order AIC (Akaike's Information Criterion) necessary for small sample sizes (i.e., ratio of $n/K < 40$; Burnham and Anderson 2002). We computed Akaike weights (w_i), where a given w_i is considered the weight of evidence in favor of model i being the best model given the set of R models (Burnham and Anderson 2002). Our global model had 29 parameters (described in Table 1) and a sample size of 509 observations.

Table 1. Global Model and Associated Variable Descriptions

Variable	*Description*
QHUNT	Did landowner primarily manage land for quail hunting?
CROPS	Did landowner primarily manage land for crops and forage?
RCINCOME	Importance of income from row crops
COWINCOME	Importance of income from livestock
GOVTINCOME	Importance of income from government programs
HUNT	Importance of managing land for hunting
GOVTEXPER	Past experience in government programs
QFRIENDLY	Willingness to use quail friendly land management practices
QBURDEN	Level of agreement that adding quail habitat to land could be too much work
QCOSTLY	Level of agreement that adding quail habitat to land is too expensive
QTIME	Level of agreement that adding quail habitat to land could be too time consuming
QHABITAT	Did landowner provide areas, food, or cover for quail on their land?
WORKSHOP	Did landowner attend workshops, seminars, etc. concerning habitat management?
ALLOWQHUNTING	Would landowner allow quail hunting on land if quail numbers were high?
MDCINFO	Does landowner use MDC information when making land management decisions?
GENDER	Respondent gender
AGE	Respondent age
EDUC	Respondent education level
LIVE	Did landowner live on their farm or rural property?
YEARSOWNED	How long did the landowner own their land?
LANDOWNERTYPE	Was the landowner a full or part-time farmer or a recreational landowner?
%INCFARM	Percentage of income derived from farming operations

CANDIDATE MODELS

Plausible candidate models were developed to explain landowner willingness to become involved in a quail habitat restoration cooperative (based on response to the question "Would you be interested in joining a quail management cooperative?"). Our 8 *a priori* models focused on variables related to current and potential land management practices, attitudes toward game birds, habitat restoration, hunting, income, education, and demographics. Our global model (consisting of all variables contained in the models described above) fit these data well (Chi-square = 946.1621, DF=985, P=0.8083). Of the *a priori* models that were considered, the global model, with all ordinal variables treated as quantitative predictors (Agresti 2002:190), was the most appropriate, with a probability of this model being the best according to the Akaike weight (w_i) (nearly 1). However, surveys that include such a large number of questions are expensive and likely reduce response rate. Thus, we examined models with fewer questions and through "data dredging," found two alternate models that were more desirable, with higher Wald Chi-square values. These two models contained the survey items: RCINCOME, GOVTEXPER, QFRIENDLY, QCOSTLY, QTIME, WORKSHOP, ALLOWQHUNTING, GENDER, EDUCATION, and YEARSOWNED. The interaction and directionality of these variables is explained in the DISCUSSION section.

DISCUSSION

This modeling process suggests:

- Respondent willingness to become involved in a cooperative quail habitat restoration program can, *in this particular study area*, be predicted by responses to a relatively small proportion of questionnaire items, as identified in the "Alternate Models." These models were used to develop a shortened questionnaire that is being tested in a telephone survey of nonrespondents.
- There was an increased likelihood of willingness to participate in a cooperative habitat program if the landowner:
  - did not place much importance row crop income,
  - had previously participated in government programs and had positive experiences,
  - was willing to use quail-friendly management (fire, disking, native plants, etc.),
  - thought that adding quail habitat was affordable and not too time consuming,
  - had attended habitat management workshops,
  - was willing to allow hunters on their property if quail numbers were good,
  - was male,
  - had some college education,
  - and had owned their land for a shorter period of time.
- Future studies of this type should focus on pre-identifying these specific factors to reduce respondent burden when completing surveys, thus resulting in higher response rates.




LITERATURE CITED

Agresti, A. 2002. Categorical data analysis. Second Edition. John Wiley and Sons, New York, New York, USA.

Franklin, A. B., T. M. Shenk, D. R. Anderson, and K. P. Burnham. 2001. Statistical model selection: an alternative to null hypothesis testing. Pages 75-90 *in* T. M. Shenk and A. B. Franklin, Editors. Modeling in natural resource management: development, interpretation, and application. Island Press, Washington, DC, USA.

Burnham, K. P., and D. R. Anderson. 2002. Model selection and multimodel inference: a practical information-theoretic approach. Second Edition. Springer-Verlag, New York, New York, USA.

ACKNOWLEDGEMENTS

We are grateful for assistance from Parker Rice, Matt Arndt, Amanda Moltzan, Bruce Lane, David Davis, Shawn Deering, Tommy Deberry, and the following entities: USDA-NRCS/MSU Bobwhite Restoration Project, USDA-Missouri FSA & NRCS, University of Missouri-Columbia, University of Missouri Extension Centers in Adair, Scotland, and Gentry Counties, University of Missouri Forage Research Center-Linneus, and Missouri State Council of Quail Unlimited.

This study was supported in part by a grant by the USDA-NRCS to Mississippi State University under the terms of Agreement No. NRCS 68-7482-3-121. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the funding/contract agencies.

For further information contact Tom Dailey (tom.dailey@mdc.mo.gov)