

NC Wildlife Commission 2007-2008 Hunter Survey Design and Analysis Project

I decided to use this survey that a graduate student and I are currently designing and later will be analyzing as an example of some of the topics we will cover in class at various times of the semester. These notes will be updated and expanded during this semester.

Brief Outline of the Survey

The North Carolina Wildlife Commission plans to run a state-wide mail Survey of Hunting in 2008. Three of the key variables measured in the survey are Numbers of Hunters, Hunter Effort in Days, and Hunter Harvest for a wide variety of game species. The results of the survey will help inform managers of the species on how to adjust future hunting regulations.

Sampling Frame

The sampling frame used to draw the sample of hunters to contact will consist of all of the hunter license files available to the Wildlife Commission. There are at least 16 types of licenses ranging from lifetime licenses to 1-year licenses to short term 6-day licenses purchased by nonresidents of NC. The period covered by the survey is from March 1, 2007 to February 29, 2008. The license frame for the 2005-2006 survey consisted of 475, 888 hunters.

Sampling frame problems are undercoverage due to some people not buying a license. The amount of this kind of undercoverage is unknown. There may also be some duplications, but that is probably minor. Also a significant problem is that some addresses are incorrect so that mail is undeliverable (9% last survey).

Another problem for which we do not know how to adjust is that many licenses can be purchased on any day of the year and run for a year (except the short term licenses). This means that there are hunters in the frame that only have small parts of the year when they could legally hunt even if they bought a long-term license. This could occur if they bought a license for the first time late in the year or if they failed to renew a license

purchased first in the previous year. In addition some hunters only have a short 6-day license. It is not clear to me yet if we should try and adjust for this problem of varying days of eligibility to hunt in the analysis. We did not adjust for it in the sampling design. We do need to insist that the computer record for each hunter includes the number of days they are eligible to hunt in the year and the license type they purchased. If that is the case it would be possible to consider it in the analysis.

Sampling Design

A 2% simple random sample from the whole frame will be taken. We considered a stratified random sampling design where the strata were different license types, but decided it was not necessary. [Any analyses on individual license types can use the subpopulation theory (Thompson 2002, Chapter 5)].

This size sample was based on prior studies resulting in reasonable estimates for common species (For example, Quail Harvest in 2006 was 228,220 with 90% CI bounds of 224,162 and 232,278 and Deer Harvest was 257,758 with 90% CI bounds of 255,542 and 259,974). Species that are rarely hunted will have poorer precision. (Example Bear Harvest was 2,290 with 90% CI bounds of -1,810 and 6,390 while Wild Hogs Harvest was 1,901 with 90% CI bounds of -1,990 and 5,792).

Contact Method

Mail surveys are a very cost efficient method of obtaining survey information, but they often suffer from substantial nonresponse. Nonresponse may cause bias in the population estimates of harvest and effort because the more avid hunters are more likely to respond. This mail survey will follow the general total design method of Dillman (2000) to reduce the effects of nonresponse bias. One key element of the approach is to design the survey to use multiple mailings (3) to increase the response rate. With this approach we expect a total response rate over all three mailings of 60-65 % based on past surveys.

Analysis Methods

The analysis methods used will be based on standard finite population theory for simple random sampling without replacement (Thompson 2002). Point estimates, standard errors and confidence interval estimates will be provided.

Important estimates will involve population means and totals for hunter Effort and Harvest for a list of important species. For common species some variables of particular importance will be considered at the subpopulation level. Some important subpopulations of interest are regions (Coast, Piedmont and Mountains), license types (especially nonresidents vs. residents of NC), and possibly age and gender. We also treat hunters with few vs. many days of eligibility as subpopulations of interest.

One nonstandard feature of the analyses will be to attempt to adjust and remove nonresponse bias by using several methods. These might include regression extrapolation methods based on important auxiliary variables correlated with nonresponse and also methods based on modeling the patterns of nonresponse in the different mailings. We will discuss these topics briefly later in the semester.

Time Table for the Survey

January-March 2008 Planning the Design of the Survey in collaboration with Wildlife Commission staff. Wildlife Commission staff will prepare the survey which will include preparation of the questionnaire and computer files for sampling, etc. They will draw the sample in March. Some of this time I will be working with my student to develop an analysis plan.

April-June 2008. The survey will be run by the Wildlife Commission staff and the data files edited and checked. Due to the three mailings it takes about 7 weeks to get all the questionnaires back.

July-September, 2008. We will analyze the data and a report will be presented to Wildlife Commission staff. They will use the results of the survey to manage these species.

September-December 2008. We will prepare a detailed protocol of the design and analysis methods for use in future surveys. This will include our computer programs.

References

Dillman, D. A. (2000). *Mail and Internet Surveys: The Total Design Method*. John Wiley and Sons, New York, New York, USA.

Thompson, S. K. (2002). *Sampling. Second Edition*. John Wiley and Sons, New York, New York, USA.