

EXPLORING METHODS TO MINIMIZE
BIAS DUE TO NONRESPONSE
IN SELF-ADMINISTERED MAIL SURVEYS

By

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A THESIS

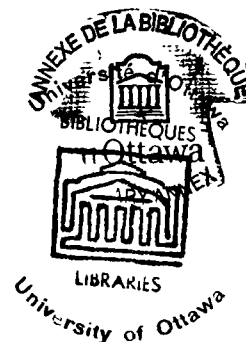
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CHAPTER I

INTRODUCTION AND PROBLEM STATEMENT

Very important decisions are often based on survey results. Consequently, it is vital that predictions based on them be as accurate as possible. The accuracy and reliability of social research is affected by forms of bias or error not encountered in physical and biological research. Because of his reasoning power and distinct personality and psychological traits, a human being has within his control the privilege to determine whether or not he will answer personal questions asked of him in a survey and what he will answer.

There are many errors which affect the accuracy and reliability of surveys (Deming, 1944). For the sake of convenience these may be summarized as sampling and non-sampling errors. The sampling error, essentially, is the difference between a value in a population and its estimate based on a random sample. Since it is controllable through the size and design of the sample it is sometimes regarded as the least of the errors present. Non-sampling errors include instrumentation biases, data processing biases, and bias due to response and nonresponse. Although there is a need to direct effort towards all of these errors in the development of theories of bias, this thesis deals with sample survey research methodology and focuses on the problem of nonresponse bias. More specifically it explores methods to minimize bias due to nonresponse in self-administered mail questionnaires.

The Mail Questionnaire as a Research Instrument

Despite some criticism (Sletto, 1940; Wallace, 1954) the use of the self-administered mail questionnaire has increased over the years. The use of the mail questionnaire to collect survey data is by no means a recent development. Although a detailed account of a mail survey conducted among Church of England clergymen is found in an 1839 issue of the Journal of the Royal Statistical Society, the history of mail surveys dates as far back as 1577 when King Philip II of Spain decided to conduct a census of his New World possessions (Erdos and Morgan 1970,2).

Since then mail surveys have been employed increasingly in the areas of marketing, public opinion polls and government studies. In democratic countries with a relatively high level of literacy self-administered mail questionnaires and schedules have become part of everyday life with applications including catalogue mail orders, complex consumer and advertising studies, and even taxation forms. In recent years the U.S. and Canadian governments have made extensive use of the mail survey technique in order to obtain better quality census data than with previous methods while keeping the cost at a reasonable level.

Self-administered mail surveys differ from personal interview and telephone surveys in as much as there is no person to ask questions and guide the respondent. Consequently mail surveys differ in various aspects including survey design and questionnaire construction giving rise to several advantages and shortcomings.

By and large it is usually considerably less expensive and simpler to administer a mail questionnaire than other techniques such as interviewing and it requires less manpower. The mail questionnaire is capable of studying a widespread random sample as in the case of a nationwide survey and is easily controlled from a central location. In countries where an efficient postal service exists it will reach virtually all persons selected regardless of social class, wealth, or residence, including those who are temporarily away from home. In cases where the study topic is a sensitive issue the anonymous mail questionnaire usually tends to favour more truthful replies. In instances when the topic requires recollection of an activity over a period of time the respondent is allowed time to reflect in privacy and reply at his convenience. Lastly, it is free of many of the biases associated with other survey techniques.

However, for the mail survey technique to be used successfully, several conditions must be satisfied. It is necessary that:

- 1) A relatively complete mailing list be available,
- 2) the survey topic be such that questions can be clearly formulated and structured,
- 3) the self-administered questionnaire be reasonably short and relatively simple to understand and to complete,
- 4) there be a means of ensuring or checking that the respondent is the addressee.

When these conditions are met the researcher should feel

confident that a self-administered mail survey will yield satisfactory results.

The Implications of Nonresponse Bias

It is almost impossible to obtain answers from every person in a large sample selected at random no matter what data collection method is used. This failure to measure some of the units in the sample is usually due to the following reasons:

(1) An imperfect sampling frame:

The mailing list which is too old may contain individuals who are deceased, have moved etc... For some reason the list may also omit persons who should be included.

(2) True nonresponse:

Some recipients forget or refuse to answer the questionnaire while others are unable to return it.

(3) Oversight:

Some questionnaires are lost due to imperfections in survey procedures or postal services while others are misplaced by the recipient.

This study is concerned with true nonrespondents, individuals who receive a questionnaire but for some reason do not complete and return it.

In any survey, those who choose not to participate pose a problem. One of the major drawbacks usually associated with the self-administered questionnaire is the relatively low rate of returns (Moser and Kalton: 1971, 262). The problem of error arises and the researcher is faced with several problem questions. Do nonrespondents differ significantly from respondents?

Assuming that the sample is representative of the population studied can we assert that respondents represent the sample? Why do some people reply and others not? Can one assume that it is a matter of chance whether one individual responds or another or is the recipient's motivation to reply affected by factors which lie within the researcher's control? These questions are often not easily answered and the best sampling plan may become worthless because of error due to nonresponse. If respondents differ from nonrespondents, statistics based on data obtained from the latter will not truly depict the population investigated and predictions may be inaccurate and misleading.

However, if it can be shown that the characteristics being surveyed for the people who have not answered the questionnaire do not differ significantly from those who did, then the researcher need not worry about this bias. Furthermore, nonresponse does not necessarily have a distorting effect on all survey results. When nonresponse bias cuts across the research variables in a uniform way it will not affect the relationship among these variables. For example, if a survey is intended to study only the number of recreation days spent hunting it will not matter whether nonresponding hunters have spent more money or travelled longer distances, as long as the distribution of the number of days they hunted is similar.

In view of these implications the crucial problem of nonresponse must be examined wherever survey research data is used and information collected by surveys having a low

rate of returns should be treated with caution until some means is devised to ensure that the reliability of the data is not affected by nonresponse.

Problem Statement and Objectives

The applicability of the self-administered mail questionnaire to biological research presents a problem worthy of investigation. More specifically the question of nonresponse bias delineates a problem which must be examined if game resource management is to be validly based on hunter survey results.

This thesis explores the existence, direction and extent of error due to nonresponse in the continuing Canadian Migratory Game Bird Harvest Survey of hunters. The Canadian Migratory Game Bird Harvest Survey makes use of the self-administered mail questionnaire technique to collect data from a stratified national sample of hunting permit buyers in order to estimate the annual kill of game birds and the number of man-days of recreation provided. These objectives are in accordance with the British North America Act, Section 132, and the Migratory Birds Convention between Canada and the United States of America (Benson, 1971a).

The mail technique is well suited for this type of survey: The sample is selected from a list of Migratory Game Bird Hunting Permit buyers containing the names and addresses of the hunters. The objective and factual information requested enables the use of a relatively simple, structured questionnaire of reasonable length. Since many of the recipients have been active over several months of the hunting season the mail survey

provides them with the time to recollect in privacy and reply at their convenience. By using the mail technique it is possible to survey a cross section of over 30,000 Canadian and non-resident waterfowl hunters at reasonable cost.

Since the questionnaire is an imposition on the time and privacy of the recipient the Migratory Game Bird Harvest Survey has resulted in a relatively low rate of returns. Table I reveals that the average usable response rate, between 1968 and 1970, for Canada, has been 33 percent¹. In order to minimize the effect of nonresponse the Advertising and Research Foundation recommends on 80 percent or better response on mail surveys which brings the rate of nonresponse in line with the rate of substitution in well conducted personal interview studies (Erdos and Morgan, 1970,144). Since no mail survey can be considered reliable unless it has a high percentage of returns or unless some kind of verification proves that the response is representative of the sample it was decided to give this potential problem further attention.

In theory there is no problem in estimating nonresponse bias. In the study of nonresponse, Cochran (1953, 293-294) considers the survey population (N) as divided into two

1 Usable responses consist of all questionnaires returned less returns which are undelivered, obviously incorrect or blank, received after the deadline date or received from persons who did not purchase a permit during the current season. Since the sampling frame consists of permit buyers from the previous year, the total response rate is estimated to be between 45 and 50 percent if persons who do not renew their permits are included.

TABLE 1 - Response to Migratory Game Bird Harvest Survey
by Region for 1968, 1969, 1970¹.

Year	Questionnaires Mailed by Region (1)	Usable Responses (2)	Response Rate (2)/(1)
1968	Canada 37,668	13,414	0.36
	Eastern 21,492	7,316	0.34
	Western 16,176	6,098	0.38
	Ontario 7,068	2,592	0.37
1969	Canada 37,994	10,837	0.29
	Eastern 22,214	6,423	0.29
	Western 15,780	4,414	0.28
	Ontario 7,395	2,440	0.33
1970	Canada 33,264	11,305	0.34
	Eastern 19,512	6,461	0.33
	Western 13,752	4,844	0.35
	Ontario 6,533	2,386	0.37
All Years	Canada 108,926	35,556	0.33
	Eastern 63,218	20,200	0.32
	Western 45,708	15,356	0.34
	Ontario 20,996	7,418	0.35

¹ Number of questionnaires mailed and usable responses are reported in Benson (1971b, 1970, 1969).

strata: respondents (N_1) and nonrespondents (N_2) where no survey data are available for the latter. This would not matter if it could be assumed that the characteristics of N_2 are the same as those of N_1 . If the purpose of the survey is to estimate the population mean μ how much bias is there in using as an estimate of μ the mean μ_1 based on the group of respondents only?

The bias due to nonresponse is then $\mu_1 - \mu$ and the effect of nonresponse on the sample estimate can be written as follows:

$$\begin{aligned}\mu_1 - \mu &= \mu_1 - (R_1\mu_1 + R_2\mu_2) \\ &= \mu_1 (1 - R_1) - R_2\mu_2 \\ &= R_2 (\mu_1 - \mu_2)\end{aligned}$$

where: μ_2 = the unknown mean for the nonresponse stratum

$R_1 = \frac{N_1}{N}$ = the proportion of respondents in the population

$R_2 = \frac{N_2}{N}$ = the proportion of nonrespondents in the population

It can be seen that nonresponse bias will be greater:

- (1) the greater R_2 ;
- (2) the greater is the difference between μ_1 and μ_2

Thus, it is important not only to seek to reduce the nonresponse proportion to a minimum but also to obtain some information about the characteristics of the nonresponse stratum.

The existence of nonresponse bias in the Migratory Game Bird Harvest Survey, if any, must be discerned and measured.

On one hand, characteristics of respondents and nonrespondents must be compared; on the other hand, research on mail survey techniques must be conducted in an effort to increase the current rate of returns at a minimum cost.

A Special Study on Nonresponse

Assuming that the extent of nonresponse bias and the rate of questionnaires returned depend to some extent upon factors within the control of the researcher it was decided that the problem of nonresponse could be studied most effectively in a special mail study. Following a review of relevant studies concerning nonresponse (Chapter II) the special study involving an initial mailing and two follow-ups of nonrespondents was designed to estimate the degree of nonresponse bias and to experiment with response induction mail survey techniques (Chapter III). The differences between respondents and nonrespondents are estimated in Chapter IV and the results are discussed in Chapter V. The relative effectiveness of several techniques used to increase response is analysed in Chapter VI and is followed by a brief discussion (Chapter VII). A general discussion and recommendations are given in conclusion (Chapter VIII).

CHAPTER II

REVIEW OF RELEVANT STUDIES

The review of relevant literature in this methodological study is intended to investigate the differences usually found between respondents and nonrespondents, to examine the methods used to compare the two groups and estimate nonresponse bias, to explore the response induction techniques which have been used successfully in other mail surveys and to consider similar research in the area of wildlife resource management.

The brief review of findings related below has been drawn largely from journals of sociology, psychology and marketing research. Because survey research techniques have received little attention from biologists, findings of researchers in other disciplines is relied upon for guidance in approaching the problem we have outlined.

How Respondents and Nonrespondents Differ

Where differences between respondents and nonrespondents have been found, it is important to note which characteristics account for the variance in the majority of studies. These variables may then serve as guidelines in the study of survey biases in other disciplines.

A considerable body of literature points to the fact that nonrespondents often differ markedly from respondents. Although the literature on nonresponse bias in mail questionnaires is too extensive to be discussed here many of the relevant problems are summarized by Scott, (1961: 149-151), Ellis et al. (1970: 103-104), Parten (1966: 391-397) and Norman (1948: 235-247).

The following variables appear repeatedly as the source of greatest variation regardless of the discipline or subject with which the studies are concerned. Several studies have found that nonrespondents tend to have a significantly lower educational level, a lower socio-economic status and lower level of interest in the subject of the survey. Depending on the nature of the surveys, both direct and inverse relationships have been found between responsiveness and age, profession, or place of residence.

The two characteristics which are underlined most frequently are level of education and level of interest in the survey topic. While education level might not seem ~~most~~ relevant in the Migratory Game Bird Harvest Survey which makes use of a relatively short and simple questionnaire the level of interest in the survey might have important implications. The main purpose of the Migratory Game Bird Harvest Survey is to estimate annual kills and to establish the annual Migratory Bird Regulations; if participation and success ~~are~~ reported more frequently by hunters most interested and active, estimates based on these responses may be too high and regulations too stringent.

Measuring Nonresponse Bias

From the point of view of methodology the techniques used to compare respondents and nonrespondents and to estimate nonresponse bias are as important as the results of these studies. These techniques vary in degree of sophistication and range from the simple reporting of the proportion of respondents and nonrespondents for a given variable and a comparison of these proportions using

the chi-square significance test to the regression estimate of nonresponse bias.

In practice the measurement of nonresponse bias proves difficult since the variables needed for analysis depend on information which the nonrespondents by definition fail to make available. Various techniques have been used to investigate whether the responses are randomly distributed over the sample population and if any form of compensation or weighting should be employed. (Scott, 1961: 152-157; Ellis et al, 1970: 103-104; Moser and Kalton, 1971: 166-187). The more common ones are listed here:

- (1) Incomplete responses (i.e. non deliverable questionnaires) indicate if the addressee is deceased, has moved, has refused the questionnaire, etc.
- (2) The sampling frame may contain control data which can be used to reveal any strong relationship between these and the response rate.
- (3) Census data can sometimes be used for checking aggregate characteristics of the sample against those of the population from which it was drawn.
- (4) Enumeration by interview of all or a subsample of nonrespondents is one of the surest and costliest method. However, very few interview surveys ever achieve a 100 percent reply and nonresponse may remain a problem for the interview as well as the mail survey. When this method is chosen the following formula may be used to estimate a population characteristic μ .

$$\mu = \frac{N_1 \mu_1 + (N - N_1) \mu_2}{N}$$

Where: μ_1 and μ_2 are the means of the original and follow-up respondents respectively
 N_1 is the number of initial respondents
 N is the sample size.

- (5) Successive follow-ups may be sent by mail to nonrespondents and a short cut formula devised to estimate the unknown characteristics of nonrespondents. This method, introduced by R. C. Pace (1939) assumes that nonrespondents initially resist the efforts of the researcher, but later accede. With the assumption that each wave or returns probes deeper into the core of nonrespondents the researcher may employ the coordinate values of the initial response group and the follow-up response groups to extrapolate any obtained trend to unknown values for the group of nonrespondents. If the coordinate values in each wave of returns are represented by X, the response rate, and Y, a given respondent characteristic, the value of the dependent variate Y which is expressed in terms of X may be predicted by means of a regression equation. In his extensive review of papers on mail survey research, Scott, (1971: 164) concludes that the

"... linear extrapolation of ... the between-wave trend appears to bring an advantage more often than not ... if results must be used from a survey whose response rate is modest, the surveyor will probably be wise to estimate the population figure by extrapolation of the early/late bias; the estimate should improve the accuracy more often than not."

Each of these methods may be used within limits depending upon the nature of the survey, reliability of the data, costs, time and effort involved. If no difference is found between

respondents and nonrespondents, then all the responses obtained may be weighted to represent the total sample.

Response Induction Techniques

The above procedures attempt only to correct or minimize the bias due to nonresponse and do not eliminate it. There remains the possibility that "hard core" nonrespondents may have very different characteristics. The soundest method of minimizing error due to nonresponse is to aim for the highest possible rate of survey returns within a given budget and time limit. Maximizing the response rate, however, is not always simple.

"The specific factors responsible for a larger percentage of returns to various types of questionnaires are largely unknown and further study is needed in this area."

(Young, 1966: 205).

A brief review of the literature reveals that several survey techniques have been used successfully to increase the total number of questionnaires returned. Many techniques favouring increased response rates are found in reference texts such as Moser and Kalton (1971), Erdos and Morgan (1970), Parten (1966), and Scott (1961). Since there is considerable overlap in these works the author summarizes the more successful techniques and refers to several papers in an effort to formulate guidelines to maximize the rate of return in self-administered mail surveys.

The design and use of self-administered mail questionnaires in survey research may be arbitrarily divided into three main phases:

- 1) Respondent preparation and involvement
- 2) Design and construction of the questionnaire
- 3) Follow-up and other procedures

The work involved throughout these phases is intended to promote a meaningful relationship between the researcher and the addressee, help refine the research tool designed to collect accurate data, and ensure the highest possible response rate for a given cost.

- 1) Respondent preparation and involvement

Respondent preparation and involvement is usually achieved by contacting members of the sample selected prior to the mailing of the questionnaire. This contact is intended to increase respondent participation by introducing the survey and its purpose without any immediate demands upon the addressee. It may help increase the reliability of the data by allowing the potential respondent to give some thought to the research topic. In cases when the potential respondent will be required to keep track of certain facts over a period of time he may be provided with a list of important items or even a recording device at the time of contact to aid recall and facilitate completion of the questionnaire at a later date. Of the various means of contacting selected individuals (i.e., post cards, personal contact, telephone, telegrams...) there is indication that the advance letter is an effective and inexpensive instrument of persuasion (Heaton, 1965; Backrack and Scoble, 1967).

The form and content of the letter accompanying the

questionnaire may be similar to that of the advance letter enabling the investigator to repeat his request for co-operation. Letters should be brief and written in simple language using short sentences. It is advisable that the letters be printed on letterhead paper (Rocher, 1963). Personal letters (i.e., individually typed and signed) do at times improve the response rate (Simon, 1967). The purpose of the letter is to explain the nature of the survey and to convince the recipient that his response is truly needed. In some instances the recipients have been motivated to respond by egoistic and altruistic appeals (Champion and Sear, 1969). In any case the letter should underline the utility of the research undertaken and the important role of the respondent (Linsky, 1965). It is generally a good policy to underline the ease with which the questionnaire can be completed, to draw the reader's attention to such conveniences as a self-addressed, postage-paid return envelope, if and when it is used, and to express appreciation for a prompt reply. It is advisable for the letter to be signed by a person known to have a high status (Backrack and Scoble, 1967). By and large letters with an impersonal salutation and facsimile signature yield satisfactory results.

2) Design and construction of the questionnaire

Designing self-administered mail questionnaires to collect accurate information while attempting to maximize the rate of return has been the topic of several papers. Some of the salient findings which favour good design with respect to questionnaire form and content as well as respondent motivation are now

discussed.

A) Questionnaire format

Since the mail questionnaire must be its own salesman the format of a questionnaire, its appearance, its overall attractiveness, are considered important variables affecting response.

The questionnaire length may at times affect response rates. While it has been suggested that the effect of length is more pronounced within the limits of one to ten pages (Sletto, 1940), research elsewhere indicates that whenever possible a one page questionnaire having logically interdependent questions generates more meaningful answers and reduces nonresponse to questions (Bauer and Meissner, 1963). A recent survey suggests that the appearance of brevity may be more important than brevity itself in attempting to maximize response (Crapo and Chubb, 1969: 85). As a general rule mail questionnaires should not only be as short as possible but designed in a manner to appear short and simple to understand. The response will generally tend to be lower where a greater amount of work is demanded of the respondent (Scott, 1961: 168).

The ease with which a questionnaire can be completed is also important. It is advisable to clearly separate and number the individual questions, to avoid overcrowding and ensure that the respondent has sufficient space for answering. The type may be varied to emphasize important words, phrases and instructions. Whenever possible there should be a simple and standard method of indicating the answer to a question.

The more objective and factual the information sought the more highly structured the questionnaire form may be (Crapo and Chubb, 1969: 16). Highly structured forms which list closed questions and offer fixed alternative answers such as the dichotomous "yes" or "no", a multiple choice or a check list may be completed by using a simple check mark (✓). When using structured questionnaires care must be taken to offer full alternatives (Noelle-Newman, 1970). Therefore closed, fixed alternative questions should be used only when the possible replies are clear cut, limited, and known by the researcher. Structured forms tend to increase the efficiency of the questionnaire by speeding its completion and accelerating the analysis since editing, coding and keypunching are facilitated.

B) Questionnaire content.

The attractiveness of the questionnaire format should not be offset by its content. The questionnaire heading should clearly define the subject under investigation and show the official backing of a sponsor respected by the population studied (Crapo and Chubb, 1969:20). In some cases government sponsorship brings an advantage in the total response rate (Scott, 1961: 169). Brief instructions should help the addressee complete the form correctly.

The sequence of the questions may affect the rate and quality of a response in mail surveys. Short, simple and preferably interesting questions should be asked first to encourage the respondent and give him confidence (Young,

1966: 197). Questions should flow from general to more specific items (Crapo and Chubb, 1969: 25) and show logical interdependence (Bauer and Meissner, 1963). Several short questions are often more effective than a single complex one. (Seltiz et al, 1959: 553). Care should be taken to avoid difficult and unclear phraseology (Seltiz, et al, 1959: 561), to minimize the amount of unnecessary reading on the form, and to direct the language toward producing uniformity of understanding among respondents (Cicourel, 1969-70). Simple vocabulary, clear and straight forward syntax, and a neutral style of wording are advisable. In a multilingual context efforts should be directed at minimizing distinct meanings due to inaccuracies in translations.

C) A word on motivation

Format and content must be co-ordinated to achieve questionnaire attractiveness and captivity. It seems reasonable to assume that a questionnaire which makes excessive demands on intelligence and memory will seldom achieve a satisfactory rate of return.

A special effort must be directed toward preparing a self-administered form which is appealing in order to maximize the addressee's willingness to answer. A central motivating theme, or motto; and a unifying symbol may be used to achieve this (Crapo and Chubb, 1969:145). The unifying symbol should seek to capture attention and make the form difficult to ignore or forget. The motivating theme may serve to make the potential respondent aware of his responsibility and role in the survey.

Questionnaire attractiveness may be further increased by

using quality paper, a size and style of type which is easily readable, and by ensuring a high level of quality control in the printing of the forms. There is some indication that the use of a coloured questionnaire, blue for example, tends to yield a high rate of returns (Crapo and Chubb, 1969:145). Changing the colour of the follow-up questionnaire may also increase the response (Parten, 1966:168).

3) Follow-up of nonrespondents.

Follow-ups appear to be the most successful technique used to maximize the rate of returns. The very fact that a reminder is sent is strong evidence to the addressee that a reply is important. Main follow-ups may take the form of a simple post-card reminder, a formal letter or a letter reminder accompanied by a questionnaire. Several follow-ups may be sent and the frequency and type of contacts with the nonrespondents may be varied to achieve optimum response (Robin, 1965; Nichols and Meyer, 1966). Follow-ups may also be made using other more expensive and time consuming techniques such as personal interviews or telephone calls. These methods often provide the researcher with additional information on variables which may be related to such things as nonresponse bias.

4) Other related techniques

Finally a variety of additional devices may be used to supplement the basic survey techniques discussed above. Since the questionnaire should be simple to complete and easy to return a self addressed, postage paid return envelope should be provided. Envelopes bearing colored

stamps tend to yield a higher returns than business reply envelopes (Gullahorn and Gullahorn, 1963). It has also been found that a higher response rate is achieved when first-class postage is used over third-class postage (Gullahorn and Gullahorn, 1963) and special delivery postage used over regular postage (Champion and Sear, 1969) on outgoing envelopes.

In some cases additional replies have been induced using incentives. A cash inducement of 25¢ (Kephart and Bressler, 1958) and the enclosure of a small golf pencil (Crapo and Chubb, 1969) have been shown to increase response significantly. One of the advantages in using mail questionnaires, it is felt, is that the addressees may respond anonymously. There is some indication that respondent anonymity may provide the researcher with more honest and frank answers on sensitive issues (Knudsen et al., 1967).

In summary, the self-administered questionnaire is an imposition on the time and privacy of the recipient and may results in a low rate of returns. Some factors which favour an increased proportion of returns include:

- 1) A means of contacting, preparing and involving the persons selected.
- 2) designing an attractive and simple questionnaire
- 3) reminding the recipient and impressing upon him the importance of a reply through the use of follow-ups.
- 4) motivating the addressee to reply by getting his attention, interesting him, and providing incentives.

Nonresponse Bias in Game Harvest Surveys

A search of the literature available on nonresponse bias in game harvest surveys reveals that research on this dimension is relatively sparse and inconsistent. Of the five studies found which mention or discuss the extent of nonresponse bias only one is Canadian. One paper only was found which remotely discusses techniques to increase response.

In a study conducted by Overton, in Florida, a representative sample of game license buyers was surveyed by mail and nonrespondents after three waves were interviewed. Partial results (Overton, 1953, 9-10) indicate decreasing mean kills among late respondents and nonrespondents with regard to turkeys, doves, ducks and coots and inconsistent results with respect to deer, quails and squirrels; the author suggests that bias due to nonresponse is greater in surveys dealing with a single species than in surveys dealing with many species. However, in another study concerned with validity of mail survey data on bagged waterfowl (Atwood, 1956) California, Utah and Missouri hunters were interviewed in the field and later sent a post-season mail questionnaire. No significant differences were found between respondents and nonrespondents. In a study of hunters in a wildlife area in Ohio, where field records of users had been kept, hunters were surveyed by a post-season mail questionnaire; Findings revealed that error due to nonresponse was about 9 percent of the known kill of pheasants and rabbits; Nonrespondents were found to be less

persistent in their hunting effort and killed less game than hunters who did respond resulting in positive biases in the estimates of hunting trips and harvests (Martinson and Whitesell, 1964). In a deer hunting survey conducted in New Mexico (MacDonald and Dillman, 1968) a 10 percent sample of licence holders were questioned using a mail survey consisting of three waves, followed by a telephone interview of a 20-percent subsample of nonrespondents. Nonresponse bias was found to have a significant positive effect on the proportion of successful hunters and on the harvest estimates of one of four hunting license types (Resident Big Game). In the only Canadian study found (Sen, 1971:144-145) a special mail survey was undertaken among a sample of Migratory Game Bird Hunting Permit buyers in Manitoba and bias due to nonresponse was corrected by fitting a quadratic equation to the cumulative sums of four response waves; Results indicate a positive bias in mean duck kill of 6-percent compared with the usual estimate based on the first two waves as in the national survey.

On the subject of techniques to increase response only one paper was found to discuss the importance of questionnaire design and mailing procedures; Partial results suggest that follow-ups are an effective method of increasing response, that full sized questionnaires sent by first-class mail are more effective than post card questionnaires in all waves and letter reminders only in follow-ups (Overton, 1953: 6-8)

Summary and Conclusion

This review of relevant studies has provided insights into nonresponse and methods of reducing this bias in mail surveys. In practice, the researcher may either ignore the problem, weight for nonresponse or make use of techniques known to induce responses. The researcher may assume that no error is introduced into the survey findings when only part of the selected sample replies if follow-ups of nonrespondents to the initial mailing or data available on the survey population reveal no meaningful differences concerning the characteristics investigated. If differences are found between the means of the respondents to the initial mailing and follow-ups reliable statistical methods may be used to eliminate or reduce the bias. For example, if there is some indication that the response to the follow-up wave is more representative of nonrespondents than responses to the initial mailing it may be advisable to weight the final nonresponse proportion by the replies to the follow-up mailing. If several follow-ups are used, it may be preferable to establish trends from the results of several cumulated response waves and to extrapolate the mean for a 100 percent response rate.

Although survey nonrespondents may differ from respondents, the important question is whether the two groups differ enough to invalidate estimates based on data from the latter. Results from the few studies on nonresponse bias in game harvest surveys are inconsistent and apply mostly to American hunters. In view of the fact that findings vary according to species hunted, types

of hunters and estimation methods used and that several positive biases in estimates have been found, a special empirical study of Canadian hunters is justified. Although the study is further justified by the fact that Canadian hunters may differ in behaviour from Americans, further research is needed on nonresponse in the Canadian Migratory Game Bird Harvest Survey in order to estimate nonresponse bias, to find economical and effective techniques of increasing the response and to develop a bias correction method which can easily and economically be integrated into the current survey framework.

Chapter III describes the design and implementation of the special study and the technique adopted to estimate nonresponse bias.

CHAPTER III

DESIGN OF SURVEY ON NONRESPONSE

The design of the special survey on nonresponse consists of several complementary phases. After a method for estimating nonresponse bias was chosen, response induction techniques were selected and a detailed sampling design prepared. Details concerning the implementation of the survey and the presentation of the results are given in the interest of those seeking a better understanding of the study.

Estimating Nonresponse Bias

In view of the existing framework of survey procedures in the Migratory Game Bird Harvest Survey it was decided that the least expensive and most convenient method of exploring the occurrence and extent of nonresponse bias was to undertake a special mail survey consisting of three mailings: this involved sending a first follow-up to those not responding to the initial questionnaire, and a second follow-up to those not responding to the first or second queries. The procedure used to adjust for nonresponse bias was the linear extrapolation of the between wave trend as recommended by Scott (1971:164). It was felt that if significant nonresponse error existed this relatively simple method of detection and correction could be easily and inexpensively adapted to the Migratory Game Bird Harvest Survey.

In theory, respondents to the successive waves are viewed as three distinct groups forming a continuum of respondent types:

- Respondents to wave I are considered as early respondents having a high response probability,
- Respondents to wave II are considered as late respondents with a medium response probability and
- Respondents to wave III are considered as potential nonrespondents with a low response probability.

It is argued that the continuum from highly motivated persons to individuals who normally would not have cooperated is indicative of the direction and extent of the error due to nonresponse and that extrapolation should reflect the characteristics of the hard core of nonrespondents.

In order to correct for nonresponse bias the returns must be analysed on a cumulative basis. Thus, the population value of a parameter corresponding to complete response (i.e. 100-percent response rate) may be estimated on the basis of cumulative percentage response. Since the general nature of regression equations involves the paths of the means of Y values for given values of X, we shall fit the data with the best fitting straight line¹ obtaining an equation of the form:

$$Y = mx+b$$

where: Y_1 = the observed cumulative total for
some characteristic (dependent variable),

X_1 = the corresponding cumulative response rate,

m = an unknown constant, the slope of the
line, indicating the magnitude of change
in Y,

¹ See Croxton et al, 1963, pages 233-243.

b = an unknown constant, the Y intercept.

The characteristics of the hard core of nonrespondents may also be estimated from the estimated population value of a parameter for complete response by an equation of the form

$$Y_{nr} = \frac{(100 \cdot Y) - (X_3 \cdot Y_3)}{100 - X_3}$$

where:

Y_{nr} = the value of some characteristic
for the nonrespondents

Y = the estimated population value of the
parameter for complete response

Y_3 = the observed cumulative total for
some characteristic from the third
response wave

X_3 = the cumulative response rate from
the third response wave

100 = complete response rate

Inducing Responses

Before experimenting with new mail survey response induction techniques it was necessary to examine the procedures in the 1970 Migratory Game Bird Harvest Survey. Several investigation techniques were then elaborated, in accordance with some of the principles of response induction discussed earlier, and an experiment designed to measure the effect of these techniques on the rate of returns.

1) Procedures in the 1970 Migratory Game Bird Survey

The Migratory Game Bird Harvest Survey makes use of

several conventional mail survey techniques. Respondent preparation and involvement is achieved, to some extent, by contacting all the previous year's permit buyers by mail during the month of August, a few weeks before the opening of the new hunting season. Addressees receive a report of the previous year's survey results and an abstract of the forthcoming season's hunting regulations. Approximately 10% of the addresses which have been selected randomly also received a "gold card". Addressees are informed that they will receive a questionnaire at the end of the hunting season if the envelope contains a "gold Card"¹. A questionnaire bearing the recipient's name, a covering letter signed by the Director-General of the Canadian Wildlife Service and a preaddressed postage-paid reply envelope are mailed at the end of the hunting season. One follow-up is sent to nonrespondents in a manner similar to the initial questionnaire mailing.

2) Procedures in the Special Survey

Several new techniques which would not constitute an increase in cost in the Migratory Game Bird Harvest Survey procedures were tried in the special survey.

¹ A copy of the covering letter and the "gold card" are shown in Appendix I. The "gold card" is a small card enabling the hunter to record the date, place and species killed for each hunting trip.

These included:

- a) modification in the nature of the August contact mailing,
- b) changes in questionnaire format,
- c) the use of a questionnaire allowing respondent anonymity

Other techniques which would result in increased survey costs included:

- d) the use of an incentive,
- e) special class postage, and
- f) an additional follow-up

Since techniques c, d, e and f are discussed later in this chapter under the heading "Experimental Design" this section will limit itself to the intricacies involved in designing covering letters and questionnaires.

Covering letters were prepared for use in the contact, initial questionnaire and follow-up phases of the study. All letters were bilingual and printed on letter head paper. Although each letter bears an impersonal salutation, is brief, and shows a facsimile signature of the Director-General of the Canadian Wildlife Service, a special effort was made to capture the recipient's attention by printing the outline of a mallard in flight in the background of the text¹.

1 The outline of the Mallard was also used as a unifying symbol on the redesigned questionnaires.

(a) Contact Mailing and Covering Letters

A special contact envelope consisting of a letter and a gold record card was mailed to the sample about one week before the opening of the hunting season¹. The addressees were informed that they would definitely receive a questionnaire regarding their waterfowl harvest at the end of the season.

The letter covered the following aspects:

- 1) the purpose of the survey with respect to the hunter's interest,
- 2) the important role of the recipient,
- 3) the method of selection,
- 4) the brevity of the questionnaire,
- 5) the importance and confidentiality of replies,
- 6) the usefulness of the gold card.

Hunter preparation and involvement using this method was deemed important partly because the hunting seasons are lengthy, varying from three to five months, and in part because some of the information requested on the post-season harvest questionnaire is very specific. Without formal knowledge of survey involvement it was felt that many hunters with little or no preparation or hunting records would have difficulty recalling their activity and answering the schedules.

1 A copy of the redesigned contact letter and the record card is shown in Appendix 2.

Letters which accompanied the various questionnaires were prepared in accordance with the guidelines formulated earlier. The covering letters in the first questionnaire mailing included the following points¹:

- 1) the importance of the survey
- 2) the short questionnaire and the postage-paid reply envelope enclosed.
- 3) a request for cooperation and prompt return.
- 4) confidentiality of the reply.
- 5) a special invitation for inactive hunters to reply.
- 6) an invitation for comments.

Letters accompanying the anonymous questionnaire and the incentive differed only slightly.

The covering letters used in the first and second follow-ups are similar to those described above².

Although no systematic effort was made to study the effect of these content and format changes on the response rate some evidence will be presented indicating the probable effect of the changes in the method of contacting hunters in August.

(b) Redesign of Harvest Survey Questionnaire.

The format of the current Migratory Game Bird Harvest Survey schedule was redesigned in an effort to achieve questionnaire attractiveness and simplicity. Very few changes

1 The covering letters are shown in Appendix 2 and 3.

2 These covering letters are shown in Appendices 4 and 5.

were made in the content of the questionnaire since it was assumed that the questionnaire already in use for several years was providing the Canadian Wildlife Service with the information required.

After a close examination of the Harvest Survey questionnaire¹ the following observations were made:

- (1) The black and white questionnaire is printed on one sheet of 8½"x11" white bond paper.
- (2) The eight bilingual questions covering both sides of the sheet require the respondent to make use of several answering techniques in order to complete the form:
 - (a) checking (✓),
 - (b) crossing (X),
 - (c) circling and
 - (d) filling in blanks.
- (3) The questionnaire heading consists mainly of a blank space in which no survey title or general questionnaire instructions are shown.
- (4) By and large the questions are neither logically interdependent nor are they listed in order of increasing complexity.

1 The questionnaire is shown in Appendix 6.

- (5) Some questions appear very lengthy to read.
- (6) The questionnaire does not ask the recipient if he actually hunted this season. This question would seem important since many permit buyers who do not have the opportunity to go hunting may not respond.
- (7) Some compound questions require several answers and tend to make questionnaire completion more difficult.

Following these observations several experimental questionnaires were designed in order to increase the recipient's motivation to respond¹. In brief, the redesigned questionnaire layouts differ from the current harvest schedule with respect to the following items:

- 1) The new questionnaires are printed on white bond paper using blue ink.
- 2) A larger type size with bold facing is used to ease reading.
- 3) The French and English texts have been separated and are printed on opposite sides of the sheet in order to simplify reading and create the impression of a shorter questionnaire. By placing all questions on the same page it was felt that keypunching would be made easier, the quality of the answers would be improved, and the amount of editing reduced.

1 These questionnaires are discussed under the heading "Experimental Design".

- 4) Some questions are abridged to reduce the amount of reading
- 5) The questionnaire heading and ending are redesigned to capture the attention and interest of the recipient and to provide basic instructions as shown in FIGURES I and VII.
- 6) As shown in FIGURES II, III, IV, V and VI, the question order was modified for three reasons:
 - a) to show simple, easy to answer questions first.
 - b) to reduce the nonresponse rate and maximize the number of questions completed.
 - c) to logically proceed from general to more specific questions and progressively filter out permit buyers from non permit buyers, active from inactive hunters.
- 7) The methods of answering the structured schedule were standardized and limited to the use of a simple check marks (✓) and filling in blanks as seen in FIGURE III.
- 8) Answer spaces were shaded in 10% blue to facilitate question completion, editing and keypunching as shown in FIGURES II to VI. Initial drafts were precoded in order to facilitate keypunching even further.

However, field codes were omitted from most answer spaces on the final questionnaires, as it was soon realized that these would only confuse the respondent.

FIGURE 1 - REDESIGNED QUESTIONNAIRE HEADING

A. REDESIGNED QUESTIONNAIRE¹

CONFIDENTIAL - FRANÇAIS AU VERSO

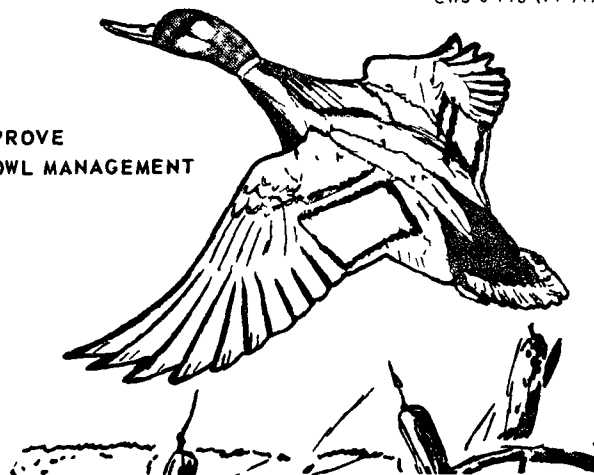
CWS 0-113 (11-71)

CANADIAN WILDLIFE SERVICE
1971 MIGRATORY GAME BIRD HUNTING SURVEY

PLEASE ANSWER THIS SHORT QUESTIONNAIRE
JUST CHECK (✓) AND FILL IN THE BLUE SPACES

HELP IMPROVE
WATERFOWL MANAGEMENT

NAME OF HUNTER
MAILING ADDRESS



B. HARVEST QUESTIONNAIRE



ENVIRONMENT
CANADA

ENVIRONNEMENT
CANADA

CANADIAN WILDLIFE SERVICE
SERVICE CANADIEN DE LA FAUNE

NAME OF HUNTER
MAILING ADDRESS

-
- 1 The redesigned questionnaire heading underlines the confidential nature of the survey, refers French speaking recipients to the opposite side, identifies the topic and year of the survey, provides brief instructions on questionnaire completion, shows the same unifying waterfowl symbol found on the covering letter and makes use of a motivational theme which is a condensed version of the purpose of the survey as outlined in the letter. One redesigned questionnaire was sent as an anonymous questionnaire; on this form the phrase "no signature is required" was printed in lieu of the name and address of the permittee.

FIGURE 2 - REDESIGNED OPENING QUESTIONS

A. REDESIGNED QUESTIONNAIRE¹

1 DID YOU BUY A CANADA MIGRATORY GAME BIRD HUNTING PERMIT AT THE POST OFFICE THIS YEAR? YES ☐ IF YES PLEASE NO ☐ GIVE PERMIT NO.

2 DID YOU HUNT MIGRATORY GAME BIRDS IN CANADA? THIS SEASON YES ☐ NO ☐ IN 1970 YES ☐ NO ☐ IN 1969 YES ☐ NO ☐

IF YOU DID NOT HUNT THIS SEASON PLEASE COMPLETE QUESTIONS 1 & 2 ONLY AND RETURN THE QUESTIONNAIRE

B. HARVEST QUESTIONNAIRE

1. Did you purchase a Canada migratory game bird hunting permit at the Post Office this year?
Avez-vous acheté, cette année, un permis canadien de chasse aux oiseaux migrateurs considérés comme gibier?

Yes ☐ No ☐
Oui Non

If yes give permit No.
Dans l'affirmative, inscrivez-en le numéro

Please return the questionnaire even if you did not buy a permit this year.
Prière de retourner le questionnaire, même si vous n'avez pas acheté de permis, cette année.

7. Did you hunt Migratory Game Birds in Canada?
Avez-vous chassé, au Canada, des oiseaux migrateurs considérés comme gibier?

In 1969 Yes No
En 1969 Oui Non

In 1970 Yes No
En 1970 Oui Non

- 1 The opening questions on the redesigned questionnaire are intended to filter out permit buyers from non-buyers and active hunters from the inactive. To the right, a more obvious reminder invites the inactive hunter to reply. Because of the new question order, hunters inactive in 1971 are more likely to report their previous experience.

The cells in the permit number answer space are intended to remind both the respondent and the keypunch operator that all permit numbers contain 6 digits. The check answer spaces have been standardized.

FIGURE 3 - REDESIGNED QUESTIONS ON PLACE OF HUNTING

A. REDESIGNED QUESTIONNAIRE¹

3 SHOW ONE PROVINCE WHERE YOU DID MOST OF YOUR HUNTING FOR MIGRATORY GAME BIRDS THIS SEASON.

N.F.L.D. ☐ 1 P.E.I. ☐ 2 N.S. ☐ 3
N.B. ☐ 4 QUE. ☐ 5 ONT. ☐ 6
MAN. ☐ 7 SASK. ☐ 8 ALTA. ☐ 9
B.C. ☐ 10 N.W.T. ☐ 11 YUKON ☐ 12

4 PRINT THE NAME OF THE TOWN (WITH A POST OFFICE) NEAREST THE PLACE WHERE YOU DID MOST OF YOUR HUNTING THIS SEASON.

5 HOW FAR IS THE HUNTING PLACE FROM THAT TOWN MILES

6 SHOW THE DIRECTION OF THE HUNTING PLACE FROM THAT TOWN

NORTH ☐ 1 EAST ☐ 2 SOUTH ☐ 3 WEST ☐ 4
NORTH ☐ 5 EAST ☐ 6 NORTH ☐ 7 SOUTH ☐ 8
WEST ☐ 9 WEST ☐ 10 WEST ☐ 11 WEST ☐ 12

B. HARVEST QUESTIONNAIRE

5. Please circle the province or territory where you did most of your hunting for migratory birds this season.

Prière d'encercler le nom de la province ou du territoire où vous avez surtout chassé, cette saison, les oiseaux migrants.

6. Print Name of City, Town or Village (with Post Office) near place where most of your hunting was done, in rectangular box.

Inscrire en lettres moulées dans le rectangle le nom de la localité (Bureau de poste) le plus proche de l'endroit où vous avez chassé le plus.

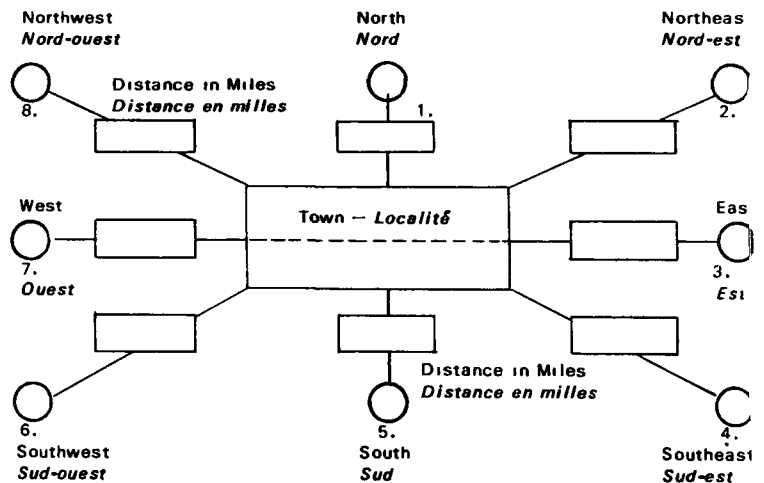
Indicate with "X" in one of the circles showing direction from town to place where most of your hunting was done.

Indiquer par un "X" dans le cercle approprié dans quelle direction se trouve, par rapport à la localité, l'endroit où vous avez chassé le plus.

Give the distance in miles (approx.) from town nearest to place where most of your hunting was done.

Donner approximativement, en milles, la distance entre la localité et l'endroit où vous avez chassé le plus.

01 Nfld. - T.-N. 05 Que. - P.Q. 09 Alta. - A/b.
02 P.E.I. - I.-P.-É. 06 Ont. 10 B.C. - C.-B.
03 N.S. - N.-É. 07 Man. 11 N.W.T. - T.N.-O.
04 N.B. - N.-B. 08 Sask. 12 Yukon



¹ The redesigned questionnaire continues to make use of the check mark (✓) as a standard answering procedure. Where permissible the questions are abridged to reduce the amount of reading. Question 6 on the Harvest questionnaire has been subdivided into three questions in an effort to ease understanding and completion.

FIGURE 4 - REDESIGNED QUESTIONS ON DAYS HUNTED AND KILL

A. REDESIGNED QUESTIONNAIRE¹

7 NUMBER OF DAYS ON WHICH YOU HUNTED WATERFOWL¹ (DUCKS, GEESE, COOTS) THIS SEASON DAYS

8 NUMBER OF DAYS ON WHICH YOU HUNTED OTHER MIGRATORY GAME BIRDS (RAILS, GALLINULES, SNIPES, DOVES, BAND-TAILED PIGEONS, CRANES, WOODCOCK) DAYS

9 NUMBER OF BIRDS YOU KILLED & RETRIEVED

DUCKS	SEA DUCKS	COOTS	CANADA GEESE	OTHER GEESE	SNIPES
WOODCOCK	MOURNING DOVE	BAND-TAILED PIGEONS	GALLINULES	CRANES	UNKNOWN

B. HARVEST QUESTIONNAIRE

In this question, "waterfowl" means all Ducks (including Merganser, Scoter, Eider, and Oldsquaw), all Geese (including Brant), and American Coots (mud hens).

In this question, other migratory game birds means Rails, Gallinules, Snipe, Doves, Pigeons, Cranes or Woodcock.

Count one day for every date on which you hunted waterfowl. If you did not hunt at all during the season, place only a zero (0) in question 2, and mail the questionnaire.

NUMBER OF DAYS on which you hunted waterfowl this season.
NOMBRE TOTAL DE JOURS où vous avez chassé les oiseaux aquatiques, cette saison.

NUMBER OF DAYS on which you hunted other migratory game birds.
NOMBRE DE JOURS où vous avez chassé d'autres oiseaux migrateurs considérés comme gibier.

Place numbers in all spaces below to show your own personal hunting totals. Place a zero (0) for any kind of bird you did not shoot. Do not include birds killed or crippled by other hunters.

I KILLED AND RETRIEVED
J'AI ABATTU ET RAPPORTÉ.

2. Dans la présente question, l'expression "oiseaux aquatique" signifie tous les canards (y compris les becs-scie, les macreuses, les eiders et les ka-kawis), toutes les oies (y compris la barmache cravant) et les foulques d'Amérique (poules d'eau).

Dans cette question, oiseaux migrateurs signifie les râles, les gallinules, les bécassines, les tourterelles, les pigeons, les grues et les bécasses.

Comptez un jour pour chaque date à laquelle vous avez chassé les oiseaux aquatiques. Si vous n'avez pas chassé de la saison, n'inscrivez qu'un zéro (0) à la question 2, et mettez le questionnaire à la poste.

Indiquez le nombre total de vos prises personnelles dans les cases ci-dessous. Marquez un zéro (0) si vous n'avez abattu aucun oiseau des espèces indiquées. Ne mentionnez pas les oiseaux abattus ou blessés par d'autres chasseurs.

I KILLED AND RETRIEVED ALSO
J'AI ABATTU ET RAPPORTÉ AUSSI

Ducks canards	Canada Geese Barmache du Canada	Snipe bécassines	Band-tailed Pigeons pigeons du Pacifique
Coots (mud hens) foulques (poules d'eau)	Other Geese (including Brant) Autres oies barmaches (cravant comprises)	Woodcock bécasses	Gallinules gallinules
Sea Ducks canards de mer		Mourning Doves tourterelles tristes	Cranes grues

- The redesigned questionnaire reduces the amount of reading to a minimum. "Waterfowl" is given a simpler definition. A hunting "day" is implicitly defined as any day on which the respondent has gone hunting birds. An additional species category labelled "Unknown" is provided in order to determine what proportion of hunters may have difficulty identifying the species retrieved. The pronoun "you" is underlined to emphasize the personal nature of the report and exclusion of other hunters' kills. The instruction regarding the use of zeros (0) is omitted as it seems to be of little value; furthermore, it might confuse the respondent since it is used with a different meaning in the Duck Calendar of the Harvest questionnaire.

FIGURE 5 - REDESIGNED DUCK CALENDAR

A. REDESIGNED QUESTIONNAIRE¹

10 DUCK CALENDAR.
SHOW IN THE CALENDAR THE NUMBER OF DUCKS YOU KILLED & RETRIEVED FOR EACH DAY YOU HUNTED DURING THE REGULAR DUCK SEASON.
PLEASE DO NOT INCLUDE MERGANSER & SEA DUCKS
MARK ZERO (0) WHEN YOU HUNTED BUT KILLED NO DUCKS.
LEAVE BLANK ALL DATES NOT HUNTED

NOVEMBER 1971						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

SEPTEMBER 1971						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

OCTOBER 1971						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

DECEMBER 1971						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

JANUARY 1972						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

B. HARVEST QUESTIONNAIRE

DUCK CALENDAR We would like to know when during the season you killed your ducks and how many you killed each day (except Merganser and sea ducks, i.e. Scoter, Eider, and Old-squaw, which in some places have special regulations).

Leave blank all dates you did not hunt waterfowl.

On days you hunted waterfowl during the duck season, show in the correct date-spaces the NUMBER OF DUCKS ONLY that you yourself killed and retrieved. DO NOT show other birds (geese, coots, sea ducks, etc.) in the calendar.

For all days of the ducks season on which you hunted but did not kill any ducks mark zero (0) in the proper date-spaces. Mark zero even if you killed other birds, (such as geese, sea ducks, etc.)

8. CALENDRIER DE LA CHASSE AU CANARD: Nous aimerions savoir quand, au cours de la saison, vous avez abattu des canards et combien vous avez abattu chaque jour, (à l'exception des becs-scie et des canards de mer, c'est-à-dire, les macreuses, les eiders et les kakawis, à l'égard desquels il existe, en certains endroits, des règlements spéciaux).

Laissez en blanc toutes les dates où vous n'avez pas chassé les oiseaux aquatiques.

Pour les jours où vous avez chassé les oiseaux aquatiques, pendant la saison de chasse aux canards, indiquez, à la date voulue, le NOMBRE DE CANARDS SEULEMENT que vous avez vous-même abattus et rapporté. NE PAS INDIQUER au calendrier les autres oiseaux (oies, foulques, canards de mer et autres).

Pour tous les jours de la saison de chasse aux canards où vous avez chassé mais n'avez pas abattu de canard, inscrivez zéro (0) à la date voulue. Inscrivez zéro même si vous avez abattu d'autres oiseaux (oies, canards de mer et autres).

September 1971 <i>Septembre</i>						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		
D	L	M	M	J	F	S

October 1971 <i>Octobre</i>						
S	M	T	W	T	F	S
				1	2	
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						
D	L	M	M	J	F	S

November 1971 <i>Novembre</i>						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				
D	L	M	M	J	V	S

December 1971 <i>Décembre</i>						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
27	28	29	30	31		
D	L	M	M	J	F	S

January 1972 <i>Janvier</i>						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					
D	L	M	M	J	F	S

FIGURE 5 (CONT'D)

-
- 1 The redesigned questionnaire reduces the amount of reading to the basic instructions required to complete the question. Key words have been underlined. Since nonresponse to this question has generally been higher, the amount of space devoted to the Duck Calendar was reduced in an effort to increase questionnaire attractiveness and response to other equally important questions.

FIGURE 6 - REDESIGNED QUESTION ON BANDING

A. REDESIGNED QUESTIONNAIRE¹

II HOW MANY OF THE BIRDS
YOU SHOT THIS SEASON
HAD METAL LEG-BANDS?

DUCKS CANADA
GEESE

OTHER
GEESE OTHERS



SPECIES	BAND NUMBER	DATE TAKEN			PLACE TAKEN		HAVE YOU REPORTED TH BAND BEFORE
		DAY	MONTH	YEAR	PROVINCE	NEAREST TOWN	
							YES ☐ NO ☐
							YES ☐ NO ☐
							YES ☐ NO ☐

B. HARVEST QUESTIONNAIRE

4. How many of the birds you shot THIS SEASON wore metal leg-bands?

*Parmi les oiseaux que vous avez abattus, cette saison, combien portaient
des bagues métalliques?*

Ducks ☐ Canada ☐ Other ☐
canards Geese Bernache Autres ☐
du Canada oies

Coots ☐ Others ☐
foulques Autres ☐

Kind of Bird <i>Genre d'oiseau</i>	Band Number <i>Numéro de Bague</i>	Date Taken <i>Date de prise</i>				Place Taken <i>Lieu de prise</i>			Has This Band Been Reported Previously? <i>Cette bague a-t-elle déjà été rapportée?</i>
		Mon. <i>Mois</i>	Day <i>Jour</i>	Yr. <i>Année</i>	Prov.	Nearest Town <i>Localité la plus proche</i>	Local Area <i>Région</i>		

- 1 The redesigned questionnaire makes maximum use of the available space on the questionnaire. An arrow is used to link the two sections of the question since it has been observed that some hunters tend to report unbanded birds in the first portion of the Harvest questionnaire. The answer spaces in the first section have been increased to distinguish them from check answer spaces. Other modifications include the subdivision of the band number space into cells, clearer wording in the question "Have you reported this band before?", and the provision of "yes", "no" check spaces in this last question.

FIGURE 7 - REDESIGNED QUESTIONNAIRE ENDING

A. REDESIGNED QUESTIONNAIRE¹

PLEASE RETURN THE QUESTIONNAIRE TODAY IN THE PREPAID ENVELOPE - THANKS AGAIN

B. HARVEST QUESTIONNAIRE

NOTHING

1 The redesigned questionnaire ending thanks the respondent and reminds him to return the schedule promptly using the envelope provided.

Experimental Design

The special survey was designed to accomodate seven basic response induction techniques, or treatments, within a framework of three mailing waves. It was, therefore, possible to estimate nonresponse bias using a linear regression model and to measure the effect of the treatments on the rate of response with respect to the Harvest Survey questionnaire. The treatments included:

1) Three New Questionnaires:¹

Two of the new schedules (treatment B and E) which are comparable in content to the current Harvest questionnaire (treatment A) were printed on paper of different size and appeared to vary in length; a third questionnaire (treatment K) was shortened and excluded the questions on the place of hunting and the duck calendar.¹

2) Respondent Anonymity:

Another schedule (treatment D)² was sent without the conventional address label affixed to it and did not require the respondent's signature.

3) An Incentive:

A colorful 23 page booklet entitled "Ducks at a Distance" was sent with one of the questionnaires (treatment C)³

1 Shown in APPENDICES 7, 8 and 9.

2 Shown in APPENDIX X

3 The questionnaire sent with the incentive is identical to treatment E

4) Follow-ups:

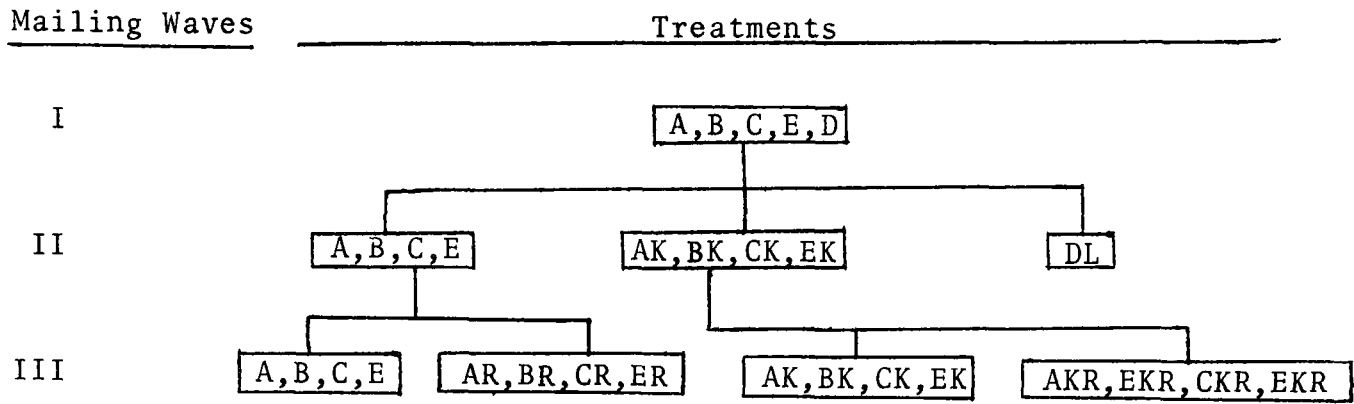
A maximum of two follow-up waves were sent to recipients not responding to the first mailing.

5) Special Postage:

A proportion of the questionnaires in one of the follow-ups was sent by registered mail as opposed to the regular first-class postage.

Since it was not feasible to study all possible interactions among these basic treatments the study was arbitrarily designed to study a selected number of treatments within each of the three mailings as illustrated in FIGURE 8. In wave I five randomly selected samples were sent mail questionnaires at the end of the hunting season using treatments A, B, C, D and E. For the second mailing, nonrespondents to treatments A, B, C and E from wave I were randomly divided into two groups; one group was followed-up using a questionnaire identical to the one sent earlier while the other group was sent the short questionnaire (treatment K). The group subjected to treatment D in mailing I was sent a letter reminder only.

FIGURE 8 - DESIGN OF STUDY ON RESPONSE INDUCTION



Definition of Treatments

- A- Current Migratory Game Bird Harvest questionnaire
(control group)
- B- Redesigned questionnaire printed in blue on 8½" x 11"
white paper
- E- Redesigned questionnaire printed in blue on 8½" x 14"
white paper
- C- Incentive sent along with a questionnaire identical to
treatment E
- D- Questionnaire identical to treatment E sent without
address label (anonymous questionnaire)
- AK- Nonrespondents to treatment A followed up with the
short questionnaire (treatment K)
- BK- Nonrespondents to treatment B followed up with the
short questionnaire

FIGURE 8 CONT'D

EK- Nonrespondents to treatment E followed up with the
short questionnaire

DL- Nonrespondents to treatment D followed up with a
letter reminder only

AR- Nonrespondents to treatment A followed up by registered
mail (treatment R)

BR- Nonrespondents to treatment B followed up by registered
mail

CR- Nonrespondents to treatment C followed up by registered
mail

ER- Nonrespondents to treatment E followed up by registered
mail

AKR- Nonrespondents to treatment AK followed up by registered
mail

BKR- Nonrespondents to treatment BK followed up by registered
mail

CKR- Nonrespondents to treatment CK followed up by registered
mail

EKR- Nonrespondents to treatment EK followed up by registered
mail

For the third mailing, nonrespondents to treatments A, B, C and E from wave II were randomly divided into two groups. Although both received questionnaires identical to those used in wave II, the schedules were sent to one group by registered mail (treatment R) and to the other using the conventional first-class postage. Similarly, while all nonrespondents to the short questionnaire in mailing II (treatments AK, BK, CK, EK) were mailed another short questionnaire, 50 percent of the questionnaires were sent by registered mail. Nonrespondents to the letter reminder (treatment DL) in wave II were not followed-up.

Although the design examined only a limited number of interactions among treatments it did enable the researcher to test those techniques which, if successful in inducing responses significantly, could be incorporated in the operational framework of the Migratory Game Bird Harvest Survey. For example, it was felt that if the full length questionnaires were too difficult for nonresponding hunters to complete, a shorter schedule containing only the most important questions might prove more successful in yielding a better representation of the sample selected and, consequently, of the population surveyed. If a letter reminder proved as useful in increasing the rate of returns as a questionnaire follow-up the cost of a two wave survey could be decreased. Registered mailing was used only in the third wave, mainly to impress an increasingly "hard core" of nonrespondents with the importance of the survey and also to reduce survey costs to a minimum. Finally, by

subdividing and following-up nonrespondents it was possible to test new treatments in successive waves, investigate some of the more significant interactions, and to combine groups subjected to later treatments in order to increase the effectiveness of statistical tests.

Drawing the Sample¹

Five representative samples of 840 persons each were selected from the 1970 file of Migratory Game Bird Hunters in Ontario. As seen in Table 2, each selection was stratified into twelve equal age groups and proportionally represented in three zones. The age groups in five year intervals ranged from 14 years or less to 65 years or more. Ontario was arbitrarily chosen as the study area. It is a fairly central Canadian province, is conveniently close to headquarters for pilot mail surveys and has the highest proportion of permit buyers in any province. By confining such a survey to one province many variables (i.e., biological, geographical, legal and sociological) were partly controlled.

1 The sample scheme was designed by Dr. A.R. Sen, Canadian Wildlife Service headquarters, Ottawa.

TABLE 2 - Sample Selections for Survey on Nonresponse.

Zone of permit purchase	Sample Selections ¹		All Five Selections
	Selections per age group	All twelve age groups	
1	21	252	1260
2	35	420	2100
3	14	168	840
TOTALS	70	840	4200

1 Each of the five sample selections represents one treatment (A, B, C, D, E) in mailing I.

Implementation of the Study

During the summer of 1971, questionnaires and covering letters were drafted, pretested and the final versions translated, varityped and printed. Other materials such as envelopes, record cards and incentives were ordered.

For each of the five initial samples selected by computer four sets of address labels were prepared and a listing printed. The labels, which were precoded to indicate the sample group and the mailing wave, and to show the name, address and permit number of the addressee were fixed to the questionnaire through the open window of the outgoing envelope. The listing, showing the selection by permit number sequence, was used to keep a record of the mailings and to ensure that only nonrespondents were mailed follow-ups.

The preseason contact consisting of a letter and the gold record card was mailed on September 7. Post-season questionnaires and follow-ups were sent at four week intervals on December 13, January 10 and February 9. Each mailing consisted of a covering letter, one copy of the questionnaire and a preaddressed postage paid reply envelope.

Survey returns were manually edited and coded in accordance with the Editing Instructions shown in appendices 11, 12 and 13. In order to detect and eliminate as many errors as possible in the completed questionnaires, the schedules were checked for completeness, accuracy and uniformity.

The schedules were checked for answers to every question applying to the respondent. Care was taken to code non-applicable replies differently from intentionally unanswered questions. Detailed keypunching instructions and field codes were prepared to ensure maximum quality control¹.

Methods of Analysis and Presentation of Results

For simplicity and convenience the analysis is presented in two parts. The first examines the existence and extent of nonresponse bias (Chapters IV and V) while the second studies the relative effectiveness of the various response induction techniques (Chapters VI and VII).

The effect of nonresponse on parameters such as the rate of permit renewal, hunter activity and success, speed of response, age, previous experience, mean days spent hunting, mean waterfowl harvested and undelivered questionnaires are examined with the aid of twelve tables and eleven figures. Because the sampling frame is based on permit buyers in the previous year it is important to distinguish between total response², potential hunters³, active hunters⁴, and successful hunters⁵. The tables which show the estimated population values

1 Shown in APPENDIX 14

2 All returns less questionnaires which are undelivered or unusable

3 All respondents who bought a 1971 Migratory Game Bird Hunting Permit.

4 All respondents who bought a 1971 permit and hunted waterfowl at least one day.

5 All respondents who bought a 1971 permit and harvested at least one waterfowl.

of parameters for complete response, cumulative response waves, individual response waves and the nonresponse group are intended to indicate trends, if any, as the response rate is increased over successive waves and to underline significant differences². The regression estimate utilizes the total response rate as the X coordinate¹. Corresponding figures illustrate the trends, indicate the magnitude of the change (m) in the dependent variables and show the accuracy of the prediction (r).

For simplicity the tables dealing with frequencies of variables of an unordered nature are dichotomized and the characteristic of a substratum is expressed as a proportion of the stratum. For example, by using the number of active hunters as a base to calculate the proportion of successful hunters the proportions of unsuccessful hunters is also taken into account; by using the number of successful hunters as a base to calculate the proportion of hunters below 40 years of age the proportion also reflects the proportion of successful hunters above 39 years of age.

For each dependent variable it was hypothesized that no significant differences between waves existed and that they

1 Although biologists are concerned mainly with the respondents who bought a hunting permit for the current season it is argued here that in a survey falling short of complete response the proportion of permit buyers is also subject to nonresponse bias. In this study the total response rate is the most valid independent coordinate value to use.

2. The data for successive waves was obtained by combining the responses to treatments in each wave. Since treatments D and DL were used only in two waves they were omitted from this part of the study.

were comparable to independent samples from a common population. In most cases the null hypothesis was examined using the Chi square test to determine if differences between waves merely resulted from sampling variability arising from chance factors involved in drawing the sample. This test compared observed frequency values, denoted by O, with expected values, denoted by E, in each cell using the formula

$$\chi^2 = \sum \frac{(O-E)^2}{E} \quad (\text{Croxten et al, 1968:586})$$

The choice of this test was motivated by the fact that an overall test could be applied to the three response waves. When the hypothesis was rejected, indicating that the observations exhibited different properties, the waves were submitted to a two by two contingency test to determine which wave or waves contributed most to correcting the bias.¹ When differences between means were examined for significant differences the t test was used in accordance with the formula:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sigma_{\bar{X}_1 - \bar{X}_2}} \quad (\text{Croxten et al., 1968:560})$$

Where $\bar{X}_i$ = the response wave means

$\sigma_{\bar{X}_1 - \bar{X}_2}$ = the standard error of the difference of the means which is obtained from the formula:

$$\sqrt{\sigma_{\bar{X}_1}^2 + \sigma_{\bar{X}_2}^2}$$

1 The above approximate test modified to include Yates' correction for continuity and has the effect of decreasing χ^2 values as seen in Croxten et al. (1968:594).

Although statistical levels of significance such as .05 and .01 have become common, arbitrary and virtually "sacred" (Skipper et al., 1967), it was decided to select the .10 level in view of the nature of the problem at hand after considering several criteria (Labovitz, 1968). Since our objective is to examine data to find biases, a higher level of significance increases our chance of discerning errors and developing hypothesis regarding nonresponse bias. The practical consequences of falsely rejecting the null hypothesis should not be drastic; given a reasonable response rate, the estimate of the population parameter based on the regression model will closely resemble the estimate based on responses from the two first response waves since the magnitude of the change in the dependent variable between the second and the third cumulative waves will very likely be small. Given the small number of observations in each treatment and especially in the third wave and the fact that standard errors vary inversely with sample size, true differences are more likely to be discerned at a higher level of significance. The sample and experimental designs in this special survey on nonresponse offer a relatively high degree of control over the effect of extraneous factors, reducing alternative interpretations so that a larger level of significance may be tolerated.

The relative effectiveness of the various response induction techniques is examined in eleven tables. To compare the effectiveness of various treatments for inducing response,

total returns have been expressed as a proportion of the number of questionnaires presumed delivered. The relative efficiency of the new treatments is obtained by comparing their response rates with the rate of returns in the control group consisting of a two wave administration of the Harvest Survey (Treatment AA). Since nonrespondents to treatments in the first mailing were subdivided to experiment with new treatments in follow-up mailings a special weighting procedure¹ was used to adjust the response rate and calculate the standard deviation. The usual method of presentation in the tables is to quote a percentage and give its standard error. Differences between response rates to various treatments have been examined for significance using the Z test. The Z scores were calculated by the formula:

$$Z = \frac{P_1 - P_2}{\sigma_{P_1 - P_2}} \quad (\text{Croxtton et al., 1968:585})$$

where: P_i = the response proportions

$\sigma_{P_1 - P_2}$ = standard error of the difference between the proportions obtained from the formula:

$$\sqrt{\sigma_{P_1}^2 + \sigma_{P_2}^2}$$

The null hypothesis has been rejected at the .10 level of significance.

1 The weighting method prepared by Dr. G.E.J. Smith, Canadian Wildlife Service headquarters, Ottawa, is presented in APPENDIX 15.

CHAPTER IV

ANALYSIS OF NONRESPONSE BIAS

We now examine the existence and extent of nonresponse bias observed in the special survey using the methods outlined in Chapter III. Twelve tables and ten figures are used to estimate the effect of nonresponse on:

- 1) the proportions of potential, active and successful hunters,
- 2) the speed of response,
- 3) the characteristics of hunters such as residence, age, previous experience, number of days hunting, size of harvest,
- 4) the reasons for nondelivery of questionnaires and
- 5) the percentage error due to nonresponse for selected variables.

In view of the description of the methods of estimation, analysis and data presentation given earlier, the tables and figures should be self-explanatory and written comments have been kept at a minimum.

Proportions of Potential, Active and Successful Hunters

Table 3 and figure 9 examine the proportions of potential, active and successful hunters by wave of return. The number of returns for each category of hunters is presented and constitutes the basis of the tables that follow in this chapter.

Of the total 79% respondents, 67% could be considered as potential hunters. While 72% of the potential hunters actually hunted 84% of the active hunters were successful.

Successive waves reveal a trend in which fewer late respondents and potential nonrespondents buy permits, hunt and harvest waterfowl. From the value of the parameter for complete response, estimated by linear extrapolation on the basis of cumulative percentage response, it is seen that the trend from wave I to wave I + II to I + II + III predicts the population better than waves I + II only or wave I + II + III only. There is a significant difference between the individual response waves for potential hunters (χ^2 (2df) = 6.35 $p < .05$) and active hunters (χ^2 (2df) = 5.19 $p < .10$) but not for successful hunters (χ^2 (2df) = 3.82 $p < .25$). Figure 9 illustrates the extent of nonresponse bias as a function of the cumulative response rate. The magnitude of the changes (m) and the accuracy of the predictions (r) are highest for potential and active hunters.

TABLE 3 - Proportions of Potential, Active, and Successful Waterfowl Hunters by Wave of Return and Estimates for Complete and Nonresponse.

A SURVEY DATA

Wave	Sample ¹ size (1)	Total Response		Potential Hunters		Active Hunters		Successful Hunters	
		<u>N</u> (2)	(2)/(1) (3)	<u>N</u> (4)	(4)/(2) (5)	<u>N</u> (6)	(6)/(4) (7)	<u>N</u> (8)	(8)/(6) (9)
I	3219	1373	0.43	954	0.69	703	0.74	597	0.85
II	1816	667	0.37	433	0.65	307	0.71	259	0.84
III	1116	456	0.41	294	0.64	197	0.67	156	0.79
I + II	3192	2040	0.64	1387	0.68	1010	0.73	856	0.85
I + II + III	3159	2496	0.79	1681	0.67	1207	0.72	1012	0.84
II + III	1783	1123	0.63	727	0.65	504	0.69	415	0.82

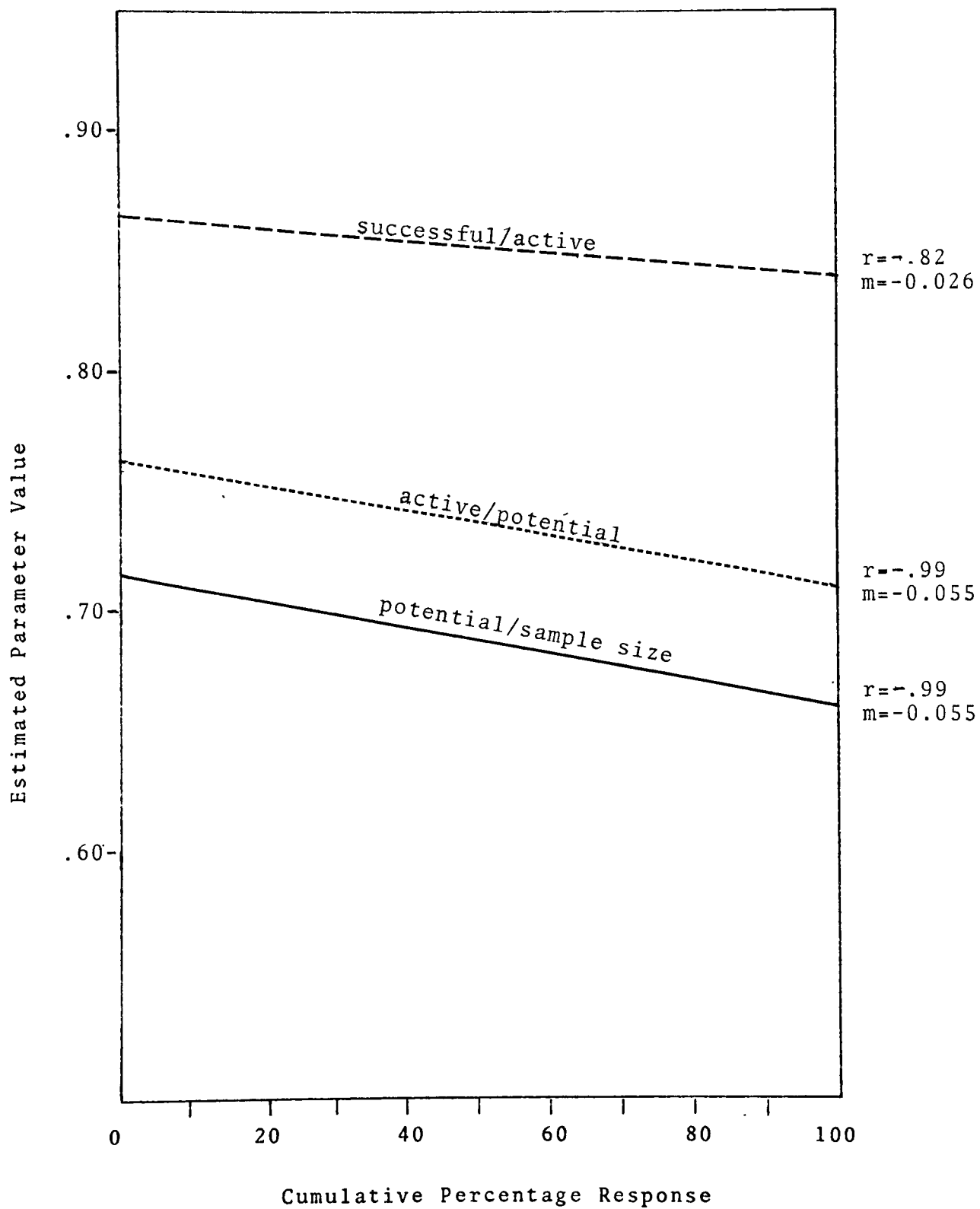
B ESTIMATES

Complete response	0.66**	0.71*	0.84
Nonresponse	0.62	0.67	0.84

- 1 excluding nondeliverables and treatment D
 *** Overall χ^2 test on individual waves significant at .01 level.
 ** Overall χ^2 test on individual waves significant at .05 level.
 * Overall χ^2 test on individual waves significant at .10 level.

Figure 9 - Proportions of Potential, Active and Successful Hunters by Cumulative Percentage Response

(Source: table 3)



Speed of Response

The speed with which hunters respond is presented in table 4 and figure 10. It is seen, for example, that after three consecutive mailings 78% of the active hunters responded within twenty-one days from the date when the questionnaires in each wave were sent out. The rate over successive waves is consistently higher for potential hunters followed by active and successful hunters respectively. The speed of response over successive waves increases and exhibits a trend in the three hunter groups. Differences between individual waves are significant for potential (χ^2 (2df) = 57.38 $p < .01$) and successful (χ^2 (2df) = 44.52 $p < .01$) hunters.

TABLE 4 - Proportions of Hunters Responding Within Three Weeks by Wave of Return and Estimates for Complete and Nonresponse.

A SURVEY DATA

Wave	Total Response Rate (1)	Hunters		
		Potential (2)	Active (3)	Successful (4)
I	0.43	0.73	0.71	0.69
II	0.37	0.82	0.81	0.81
III	0.41	0.93	0.96	0.94
I + II	0.64	0.76	0.74	0.73
I + II + III	0.79	0.79	0.78	0.76
II + III	0.63	0.86	0.87	0.86

B ESTIMATES

Complete Response	0.82***	0.82***	0.80***
Nonresponse	0.93	0.97	0.95

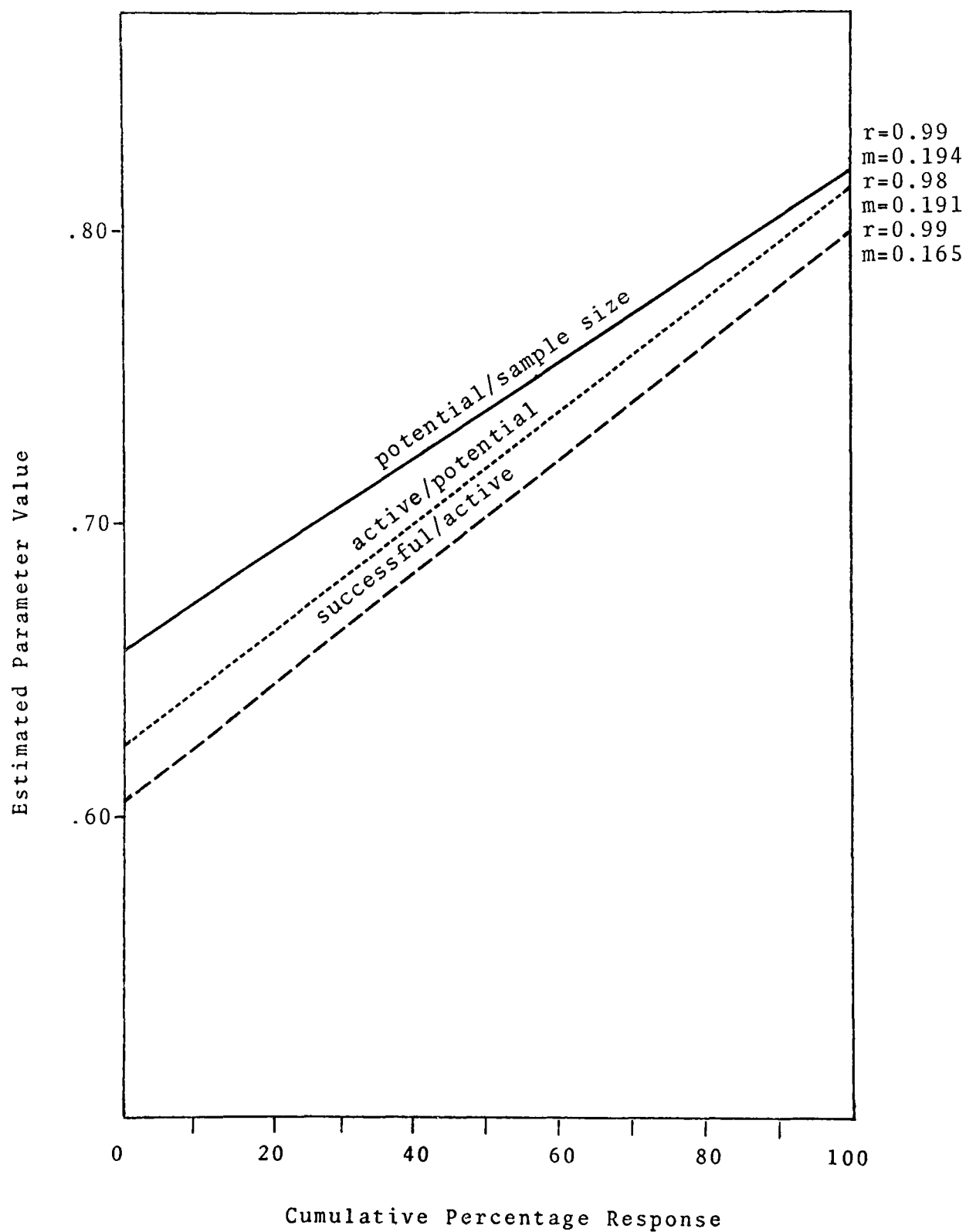
*** Overall χ^2 test on individual waves significant at .01 level.

** Overall χ^2 test on individual waves significant at .05 level.

* Overall χ^2 test on individual waves significant at .10 level.

Figure 10 - Proportions of Hunters Responding Within
Three Weeks by Cumulative Percentage
Response.

(Source: table 4)



Characteristics of Late and Nonresponding Hunters

In view of the significant differences between response waves it was deemed important to examine some of the characteristics of hunters to determine which factors affected the rate of returns.

i) Residency

The residence of hunters is analysed in two tables and one figure. Table 5 reveals, as expected, that a very large proportion of hunters reside in Ontario although there is a slight tendency for non-resident hunters¹ to make up a larger proportion of successful hunters and active hunters than of potential hunters. Although there is a slight tendency for non-resident successful and active hunters to respond early, the differences between individual waves is not significant for active (X^2 (2df) = 1.31 $p < .75$) or successful (X^2 (2df) = 2.25 $p < .25$) hunters.

Table 6 and figure 11 disclose that a very large proportion of hunters reside outside metropolitan areas². A tendency

1 Nonresident hunters of Ontario include residents of the United States.

2 Metropolitan areas are defined in accordance with the 1966 Canadian Census and include hunters residing in metropolitan Hamilton, Kitchener, London, Ottawa, Sudbury, Toronto, Windsor, Brampton, Brantford, Fort William and Port Arthur, Guelph, Kingston, Niagara Falls, Oshawa, St. Catharines, Sarnia, Sault Ste Marie, Timmins and Welland.

TABLE 5 - Proportions of Hunters Residing in Ontario by Wave of Return and Estimates for Complete and Nonresponse.

A SURVEY DATA

Wave	Total Response Rate (1)	Hunters		
		Potential (2) ¹	Active (3)	Successful (4)
I	0.43	0.89	0.87	0.85
II	0.37	0.90	0.88	0.88
III	0.41	0.92	0.90	0.90
I + II	0.64	0.89	0.87	0.86
I + II + III	0.79	0.89	0.88	0.87
II + III	0.63	0.91	0.89	0.88

B ESTIMATES

Complete Response	-	0.88	0.88
Nonresponse	-	0.88	0.92

¹ A dash indicates no estimate computed.

*** Overall X^2 test on individual waves significant at .01 level.

** Overall X^2 test on individual waves significant at .05 level.

* Overall X^2 test on individual waves significant at .10 level.

TABLE 6 - Proportions of Ontario Hunters Residing in Non-Metropolitan Areas by Wave of Return and Estimates for Complete and Nonresponse..

A SURVEY DATA

Wave	Total Response Rate (1)	Hunters		
		Potential (2)	Active (3)	Successful (4)
I	0.43	0.84	0.84	0.84
II	0.37	0.88	0.88	0.89
III	0.41	0.90	0.88	0.89
I + II	0.64	0.85	0.85	0.86
I + II + III	0.79	0.86	0.86	0.86
II + III	0.63	0.88	0.88	0.89

B ESTIMATES

Complete Response	0.87**	0.87	0.88*
Nonresponse	0.91	0.91	0.96

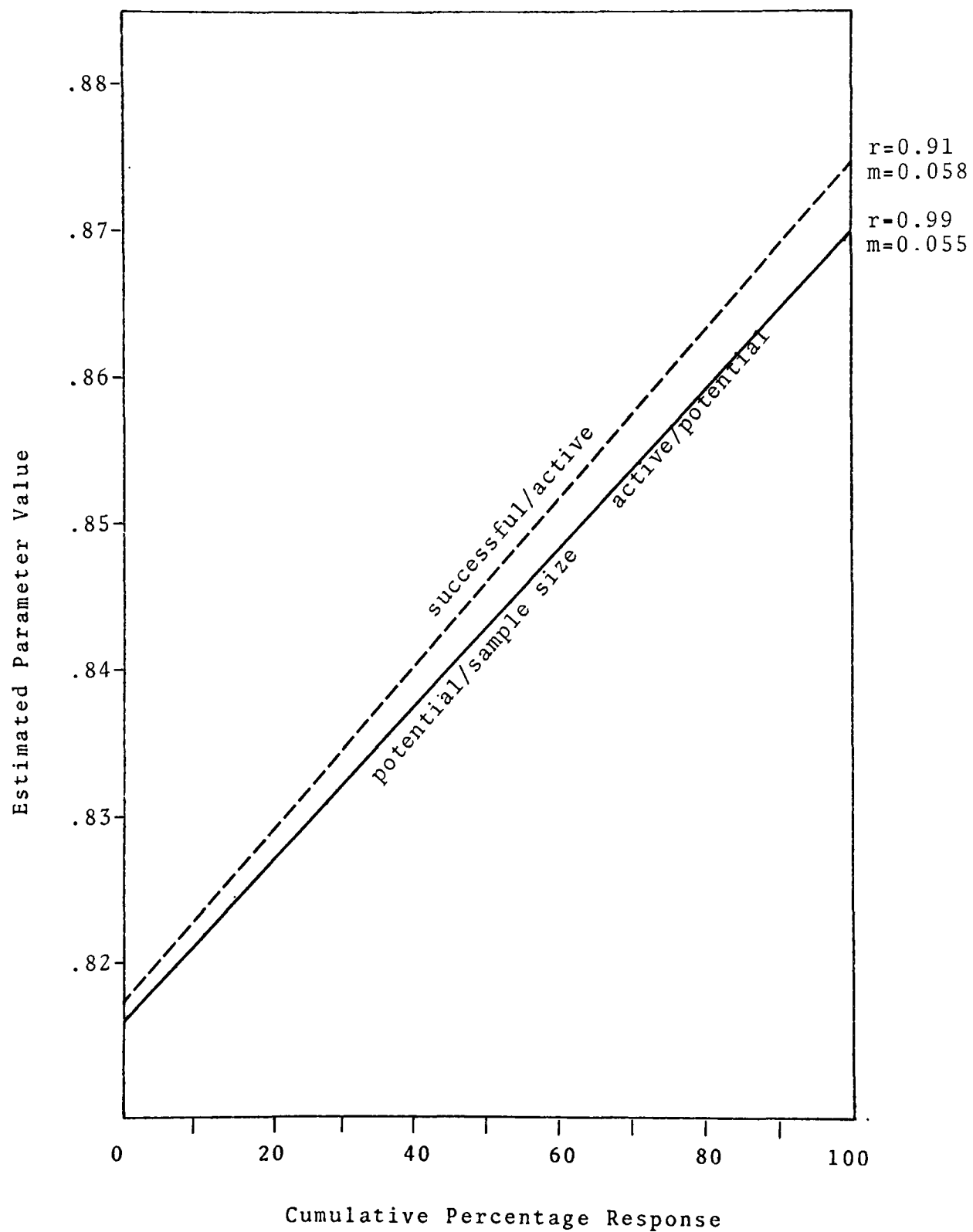
*** Overall χ^2 test on individual waves significant at .01 level.

** Overall χ^2 test on individual waves significant at .05 level.

* Overall χ^2 test on individual waves significant at .10 level.

Figure II - Proportions of Hunters Residing in Non-Metropolitan Areas by Cumulative Percentage Response

(Source: table 6)



for late and nonrespondents to originate from rural areas is displayed and the difference between individual response waves is significant for potential (χ^2 (2df) = 6.07 $p < .05$) and successful hunters (χ^2 (2df) = 5.60 $p < .10$) but not for active hunters (χ^2 (2df) = 4.57 $p < .25$).

2) Previous hunting experience

Since a large proportion of potential hunters engage in hunting (table 3), it was assumed that data related to the purchase of a hunting permit in previous years could be utilized as a measure of hunting experience. The effect of previous experience on response is shown in table 7 and figure 12. Although most of the hunters purchased permits during the two previous seasons there is a tendency for previous year permittees to make up a larger proportion of successful and active hunters respectively. Furthermore there tends to be a significantly greater proportion of hunters with 2 consecutive years experience among early respondents than among respondents to waves II and III resulting in a downward trend in previous experience among late and nonrespondents. The differences between waves is significant for active (χ^2 (2df) = 8.79 $p < .05$) and successful (χ^2 (2df) = 9.14 $p < .05$) hunters but not for potential hunters.

3) Age

The effect of age on response is investigated in tables 8 and 9 and illustrated in figures 13 and 14. Table 8 and figure 13 denote that the proportion of hunters below forty years is

TABLE 7 - Proportions of Hunters Buying Permits in 1971, 1970 and 1969 by Wave of Return and Estimates for Complete and Nonresponse.

A SURVEY DATA

Wave	Total Response Rate (1)	Hunters		
		Potential (2)	Active (3)	Successful (4)
I	0.43	0.77	0.84	0.86
II	0.37	0.72	0.76	0.78
III	0.41	0.73	0.81	0.85
I + II	0.64	0.75	0.81	0.83
I + II + III	0.79	0.75	0.81	0.84
II + III	0.63	0.72	0.78	0.80

B ESTIMATES

Complete Response	0.74	0.79**	0.82**
Nonresponse	0.70	0.71	0.74

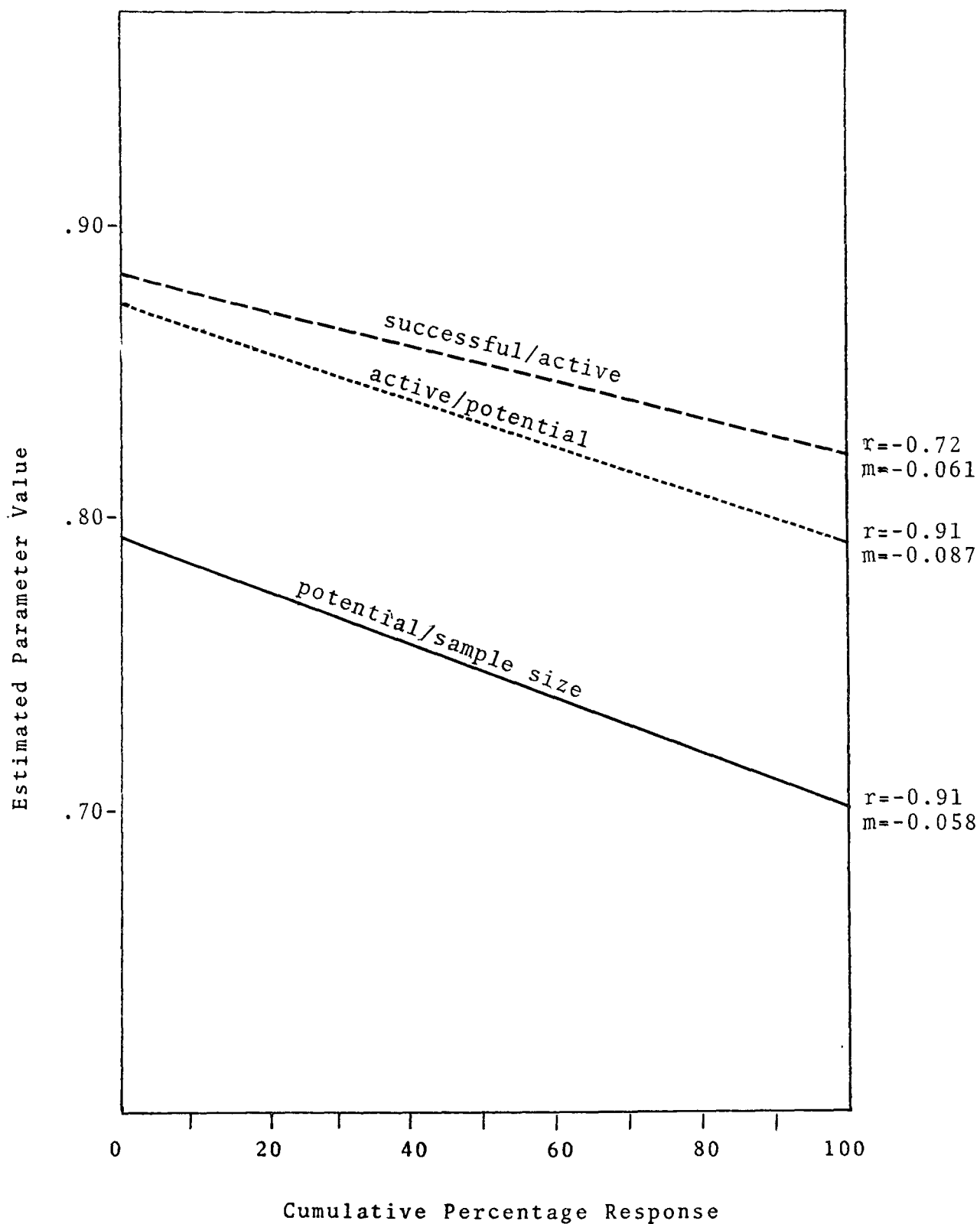
*** Overall χ^2 test on individual waves significant at .01 level.

** Overall χ^2 test on individual waves significant at .05 level.

* Overall χ^2 test on individual waves significant at .10 level.

Figure 12 - Proportions of Hunters Buying Permits
in 1971, 1970 and 1969 by Cumulative
Percentage Response

(Source: table 7)



highest among successful and active hunters respectively. The data also show a consistent increase in the proportion of hunters below forty as successive follow-ups are applied. The differences between response waves are significant for potential (χ^2 (2df) = 9.67 $p < .01$) active (χ^2 (2df) = 11.12 $p < .01$) and successful (χ^2 (2df) = 6.60 $p < .05$) hunters.

Since the selected sample was stratified into equally represented age groups it was possible to probe further into the effect of age on response. Table 9 and figure 14 analyse the proportions of hunters responding by age groups in the sample. The data reveals a significant positive relationship ($r=0.88$ $p < .01$) between age and response rate in wave I for potential hunters¹. The follow-up waves have the effect of

1 For convenience the mid - point in the groups was used to plot the curves and compute the correlation coefficients. the values of r were tested to determine if they differed significantly from zero. It was hypothesized that there was no correlation between age and response rate. The hypothesis was discredited if the correlation was considered significant. Since the distribution of values of r from random samples is not normal, when $r \neq 0$, Fisher's Z test based on Hotelling's transform was used to normalize the distribution (Croxtan, 1968:623).

The test is as follows :

$$\frac{Z}{\sigma_z}$$

Where the value of Z is obtained from

$$Z = 1.15129 \log \frac{1+r}{1-r}$$

and σ_z obtained from

$$\sigma_z = \frac{1}{\sqrt{N-2.6667}}$$

where N represents the number of age groups.

TABLE 8 - Proportions of Hunters Below Forty Years of Age by Wave of Return and Estimates for Complete and Nonresponse.

A SURVEY DATA

Wave	Total Response Rate (1)	Hunters		
		Potential (2)	Active (3)	Successful (4)
I	0.43	0.40	0.42	0.45
II	0.37	0.46	0.51	0.53
III	0.41	0.50	0.53	0.55
I + II	0.64	0.42	0.45	0.48
I + II + III	0.79	0.43	0.47	0.49
II + III	0.63	0.47	0.52	0.53

B ESTIMATES

Complete Response	0.45***	0.50***	0.52**
Nonresponse	0.53	0.61	0.63

*** Overall X^2 test on individual waves significant at .01 level.

** Overall X^2 test on individual waves significant at .05 level.

* Overall X^2 test on individual waves significant at .10 level.

Figure 13- Proportions of Hunters Below Age Forty
by Cumulative Percentage Response

(Source: table 8)

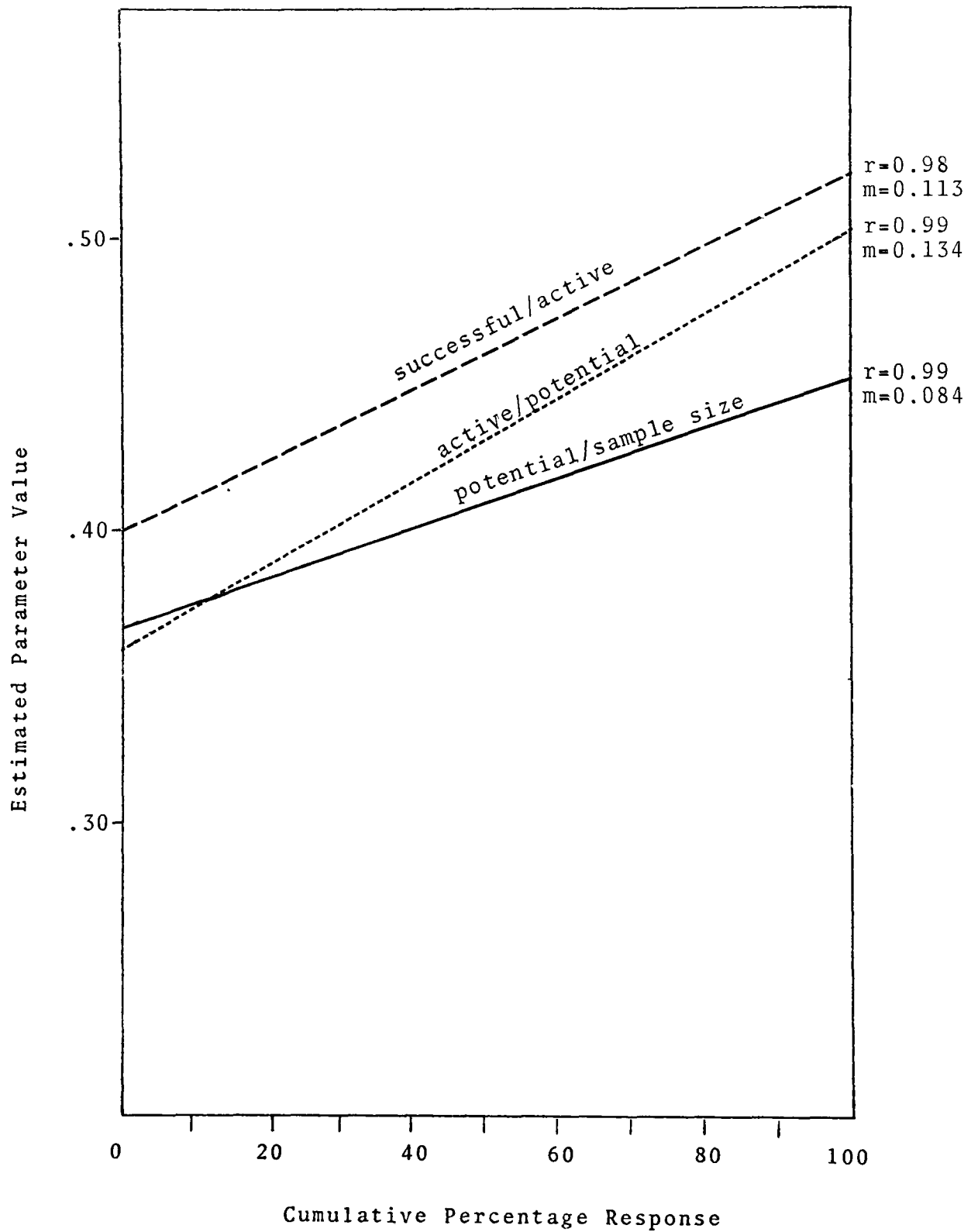


TABLE 9 - Proportions of Hunters by Age Groups in Sample for Cumulative Response Waves.

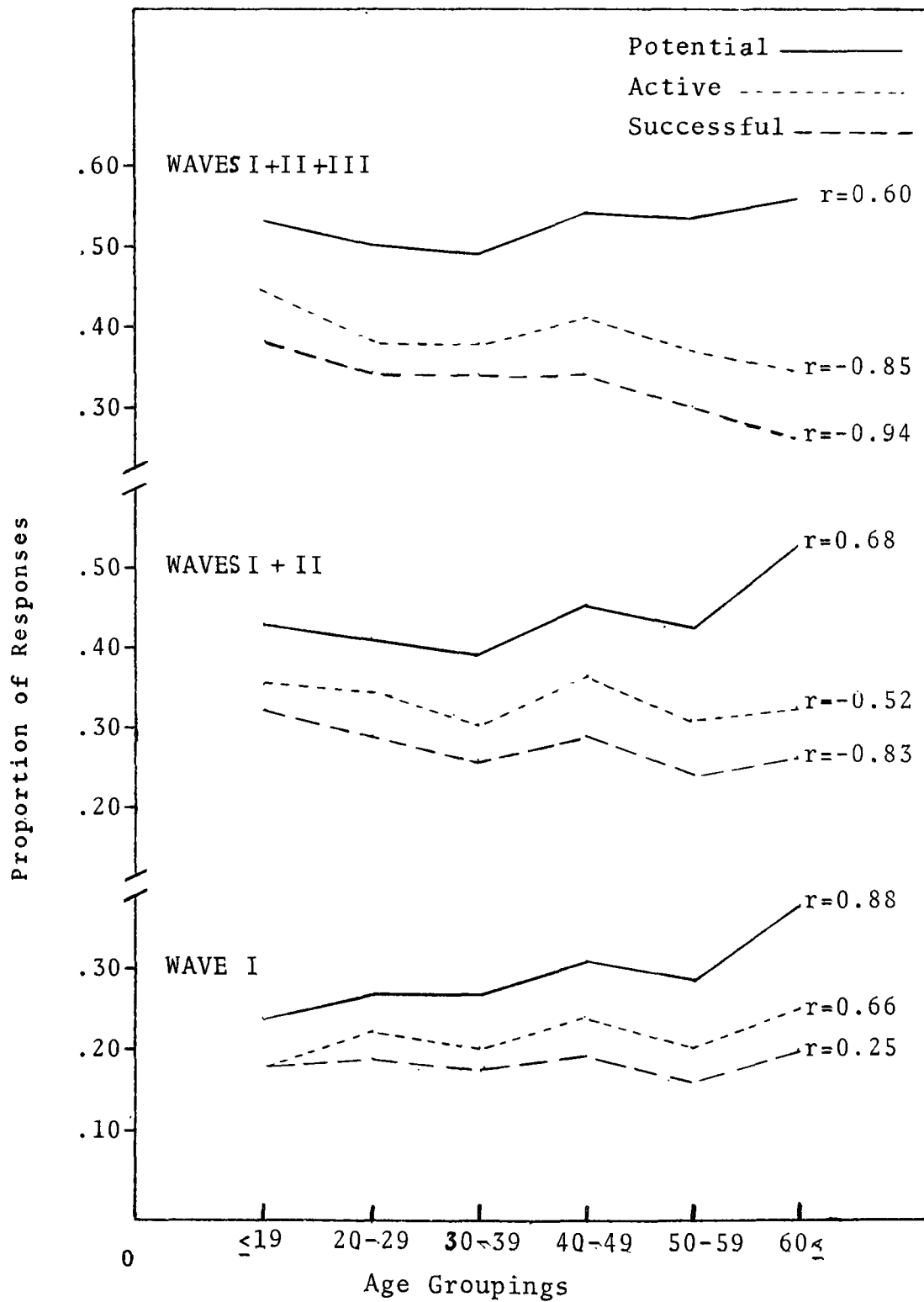
Waves	Age groups	n ¹ (1)	Potential n (2)	(2)/(1) (3)	Active n (4)	(4)/(1) (5)	Successful n (6)	(6)/(1) (7)
I	<19	268	64	0.24	49	0.18	46	0.17
	20-29	528	142	0.27	115	0.22	102	0.19
	30-39	536	145	0.27	109	0.20	94	0.18
	40-49	541	167	0.31	130	0.24	101	0.19
	50-59	544	157	0.29	108	0.20	85	0.16
	60≤	538	204	0.38	135	0.25	109	0.20
				r=0.88***		r=0.66		r=0.25
I + II	<19	268	112	0.42	95	0.35	87	0.32
	20-29	528	217	0.41	178	0.34	155	0.29
	30-39	536	208	0.39	162	0.30	141	0.26
	40-49	541	243	0.45	195	0.36	157	0.29
	50-59	544	229	0.42	163	0.30	131	0.24
	60≤	538	274	0.51	168	0.31	133	0.25
				r=0.68		r=-0.52		r=-0.83**
I + II + III	<19	268	143	0.53	117	0.44	104	0.39
	20-29	528	262	0.50	206	0.39	177	0.34
	30-39	536	265	0.49	207	0.39	180	0.34
	40-49	541	290	0.54	224	0.41	184	0.34
	50-59	544	290	0.53	203	0.37	161	0.30
	60≤	538	301	0.56	182	0.34	141	0.26
				r=0.60		r=-0.85**		r=-0.94**

1 n indicates the sample size and is identical in cumulative waves; r is the Pearson correlation coefficient.

*** Z test on r significant at .01 level.

** Z test on r significant at .05 level.

Figure 14- Proportions of Hunters by Age Groupings in Sample for Cumulative Percentage Response.
(Source: table 9)



increasing the response rate among the younger age groups for potential hunters and decreasing the positive relationship between age and response to a non-significant level. Since the sample selection consisted of equally represented age groups it is seen that follow-ups have the effect of bringing the response rate of potential hunters in line with the stratified sample thus increasing the representativeness of the respondents with respect to the selected sample. The implication of error due to nonresponse are illustrated in figure 14. As successive waves increase the representativeness of the sample with respect to age the positive relationship between age and success and activity, observed among early respondents, becomes increasingly negative and significant ($r=-0.94p<.05$; $r=-0.85p<.05$). This apparent decline in the proportion of active and successful hunters is pronounced for hunters over fifty years of age.

4) Mean days of hunting

Table 10 and figure 15 present the means days spent hunting waterfowl and the standard errors by wave of return for active and successful hunters. The data reveal that successful hunters consistently hunt more days than active hunters. Also, late respondents tend to hunt more days than early respondents; the differences for active and successful hunters respectively are significant between waves I and III ($t(\infty df)=1.976$ $p<.05$; $t(\infty df)=2.335$ $p<.05$) and between II and III ($t(\infty df)=1.971$ $p<.05$).

TABLE 10 - Mean Days of Hunting for Hunters by Wave of Return and Estimates for Complete and Nonresponse.

A SURVEY DATA

Wave	Total Response (1)	Active Hunters Days (2)	Std. Error (3)	Successful Hunters Days (4)	Std. Error (5)
I	0.43	7.4 ¹	0.27	7.9 ¹	0.30
II	0.37	7.5	0.43	8.0 ³	0.49
III	0.41	8.7	0.60	9.7	0.71
I + II	0.64	7.5 ²	0.23	7.9 ²	0.26
I + II + III	0.79	7.7	0.21	8.2	0.24
II + III	0.63	8.0	0.35	8.7	0.41

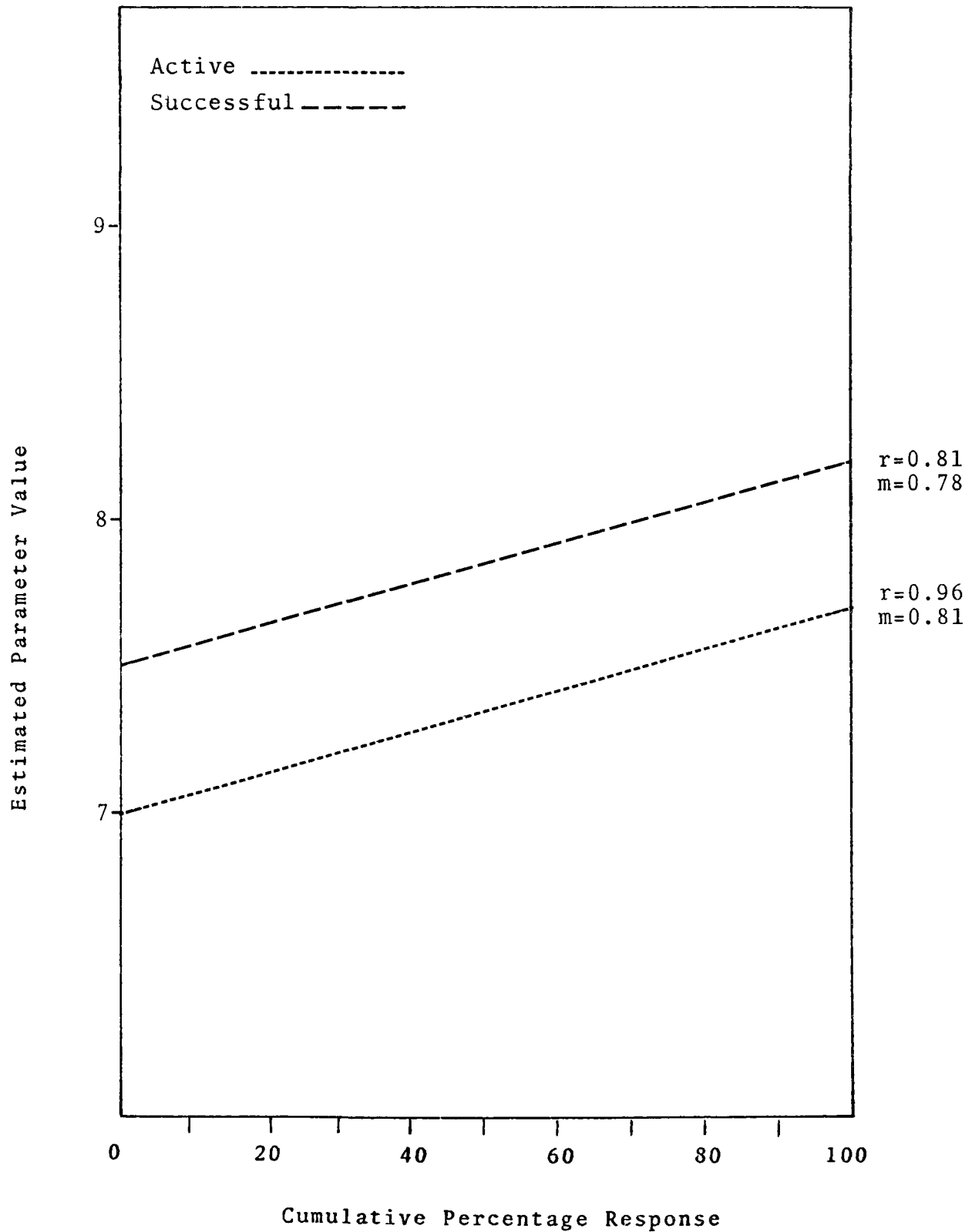
B ESTIMATES

Complete Response	7.8	8.3
Nonresponse	8.2	8.7

- 1 t test for difference between waves I and III significant at .05 level.
2 t test for difference between waves I + II AND III significant at .10 level
3 t test for difference between waves II and III significant at .05 level.

Figure 15 - Mean Days of Hunting Waterfowl for Hunters
by Cumulative Percentage Response

(Source: table 10)



5) Mean Waterfowl harvest

Table 11 and figures 16 and 17 exhibit how the mean waterfowl kill and kill per day for successful hunters tend to decrease over successive waves of response. None of the differences between the waves were found to be significant at the .10 level.

Undeliverable Questionnaires

Another interesting aspect of nonresponse is the number of questionnaires returned as undeliverables by the post-office. When the number of such questionnaires is high it is important to determine if non-delivery is random and to distinguish between refusals and non-recipients before they are deleted from the survey sample. Of the 206 undeliverable questionnaires¹ in this study, only one questionnaire was refused. The reasons for non-delivery are examined in table 12 and figure 18 and the characteristics of these non-recipients are studied in table 13. Table 12 and figure 18 disclose, based on the results of three successive waves, the most common reasons for non-delivery in decreasing importance:

- 1) addressee is unknown
- 2) addressee has moved to an unknown address,
- 3) the address is unknown, incorrect or incomplete,
- 4) the letter has not been claimed,
- 5) the recipient is deceased.

¹ This constitutes about 6% of the sample selected.

TABLE 11 - Mean Waterfowl Kill, Kill per Day and Standard Errors for Successful Hunters by Wave of Return and Estimates for Complete and Nonresponse.

A SURVEY DATA

Wave	Total Response Rate (1)	Mean Kill (2)	Std. Error (3)	Kill Per Day (4)	Std. Error (5)
I	0.43	14.5	0.72	1.83	0.30
II	0.37	12.7	1.04	1.59	0.50
III	0.41	13.0	1.23	1.34	0.71
I + II	0.64	13.9	0.59	1.75	0.26
I + II + III	0.79	13.8	0.53	1.68	0.24
II + III	0.63	12.9	0.80	1.49	0.41

B ESTIMATES

Complete Response	13.3	1.60
Nonresponse	11.4	1.30

Figure I6 - Mean Waterfowl Kill for Successful Hunters
by Cumulative Percentage Response

(Source: table II)

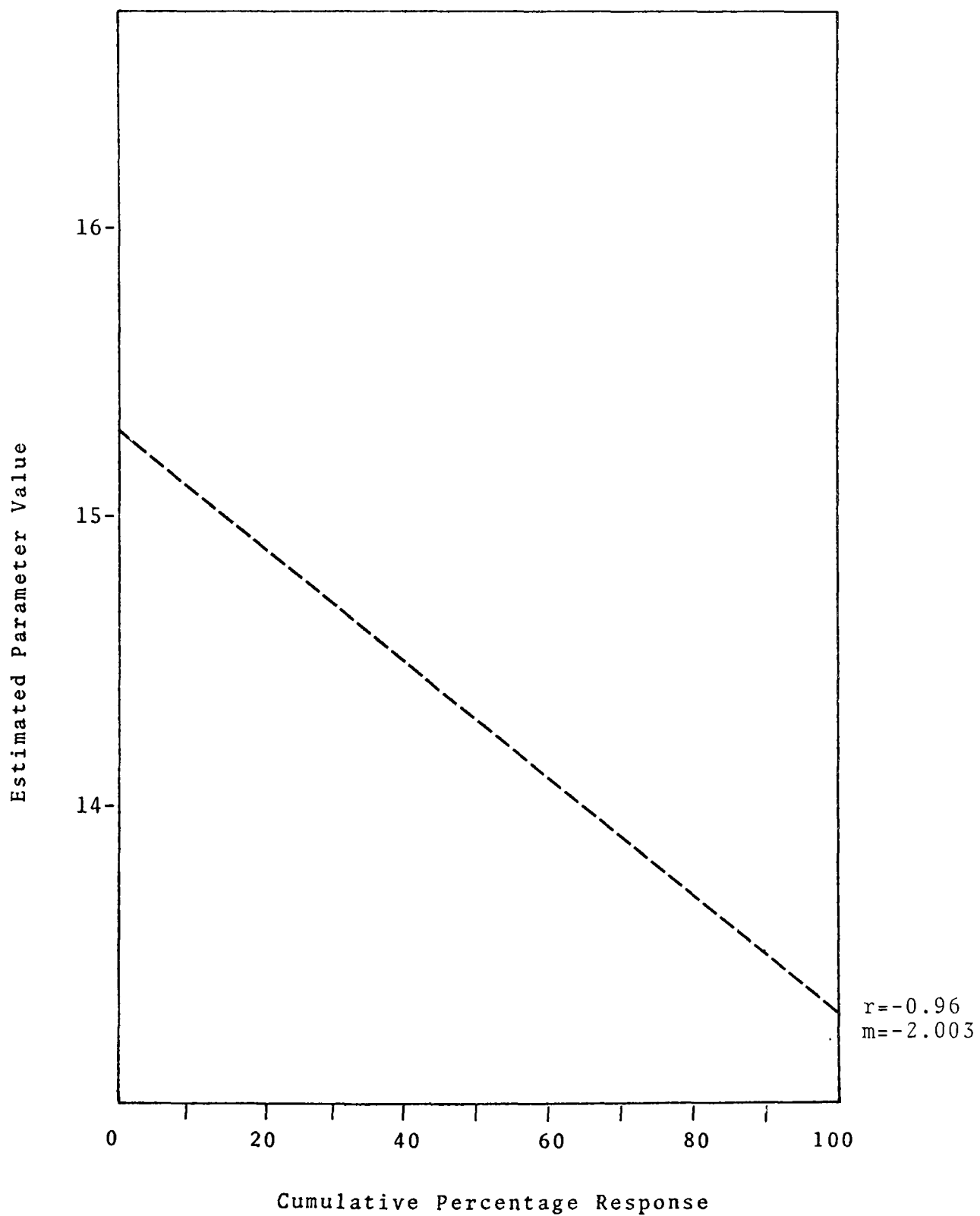


Figure 17 - Waterfowl Kill per Day for Successful
Hunters by Cumulative Percentage Response

(Source: table II)

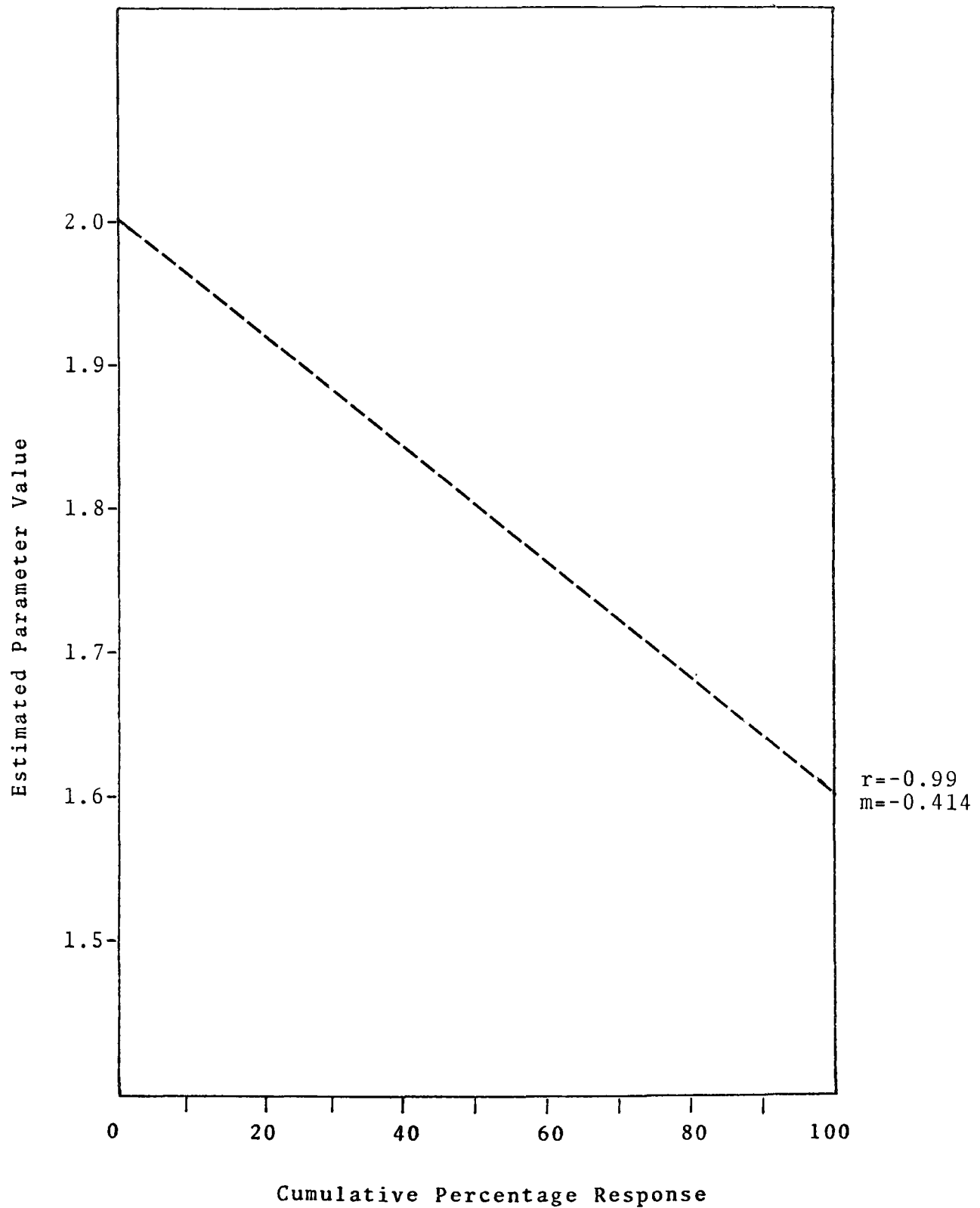


TABLE 12 - Relative Frequency of Reasons for Undelivered Questionnaires by Wave of Return and Estimates for Complete Response.

A SURVEY DATA

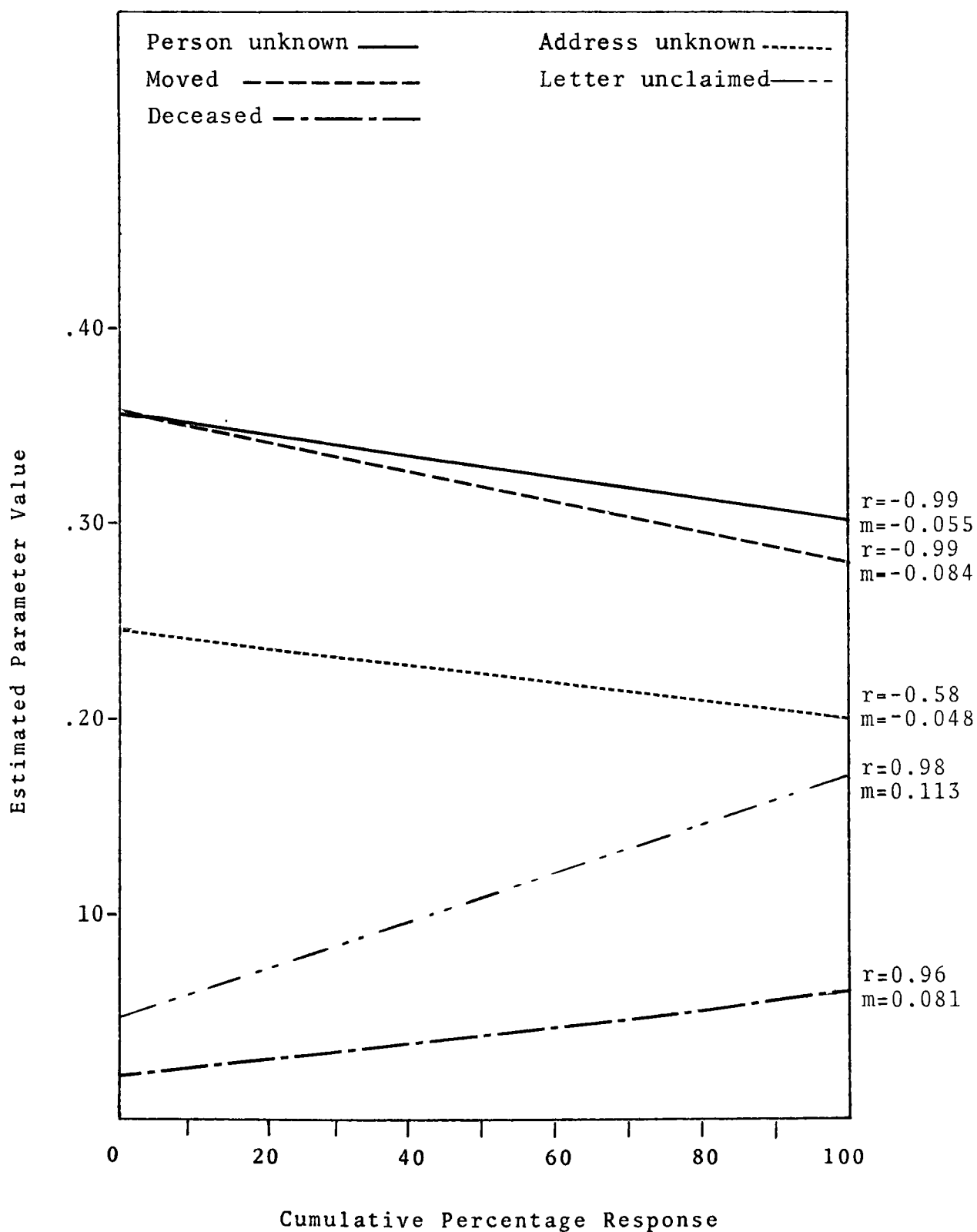
Wave	Total Response Rate (1)	Number Undelivered (2)	Proportion of Undeliverables				
			Unclaimed (3)	Address Unknown (4)	Moved (5)	Deceased (6)	Person Unknown (7)
I	.43	140	0.10	0.22	0.32	0.02	0.33
II	.37	26	0.24	0.24	0.16	0.08	0.28
III	.41	35	0.21	0.09	0.27	0.15	0.27
I + II	.64	166	0.13	0.23	0.30	0.03	0.32
I + II + III	.79	201	0.14	0.20	0.29	0.05	0.31
II + III	.63	61	0.22	0.16	0.22	0.12	0.28

B ESTIMATES

Complete Response	0.17*	0.20	0.27	0.06**	0.30
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** Overall χ^2 test on individual waves significant at .01 level.
 * Overall χ^2 test on individual waves significant at .10 level.

Figure I8- Relative Frequency of Reasons for Undelivered
Questionnaires by Cumulative Percentage
Response
(Source: table I2)



Since the sample selection is based on a file which is one year out of date it is very likely that the proportion of migrants and deceased would be lower if the sample was drawn from a more current frame. However the major cause of non-delivery is the fact that both the names and addresses of the recipients are unknown, incorrect or incomplete¹. By looking at the proportions over the three cumulative mailings it is estimated that, for complete response, the rate of unclaimed questionnaires and deceased addressees would increase while the rate of unknown addressees, unknown addresses, and migrants would decrease. The differences between waves are significant for unclaimed questionnaires (X^2 (2 df) = 4.89 < .10) and ~~deceased~~ (X^2 (2 df) = 9.40 p < .10).

Table 13 sheds additional light on some of the characteristics of non-recipients. The data implies that the majority of non-recipients are:

- 1) below forty years of age,
- 2) Ontario residents living in non-metropolitan zones,
- 3) have purchased a permit in the last two previous years.

The trend over successive waves and the estimates for complete response imply that these characteristic are higher still although no significant difference was found between waves.

Percentage Error Due to Nonresponse

Table 14 and figure 19 examine the effect of a varying

1 This accounts for 51% of all undeliverable questionnaires

TABLE 13 - Selected Characteristics of Non-Recipients of Questionnaires by Wave of Return and Estimates for Complete Response.

A SURVEY DATA

Wave	Total Response Rate (1)	Number Non-Recipients (2)	Proportion of Non-Recipients			
			Age Below 40 (3)	Ontario Resident (4)	Metropolitan Resident (5)	Purchased permit in 1969 and 1970 (6)
I	.43	140	0.54	0.82	0.28	0.71
II	.37	26	0.61	0.95	0.24	0.71
III	.41	35	0.58	0.89	0.13	0.88
I + II	.64	166	0.55	0.84	0.27	0.71
I + II + III	.79	201	0.56	0.84	0.24	0.74
II + III	.63	61	0.59	0.91	0.18	0.81

B ESTIMATES

Complete Response			0.57	.86	0.22	0.75
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TABLE 14 - Estimated Percentage Error Due to Incomplete Response for Selected Variables for Active and Successful Hunters.

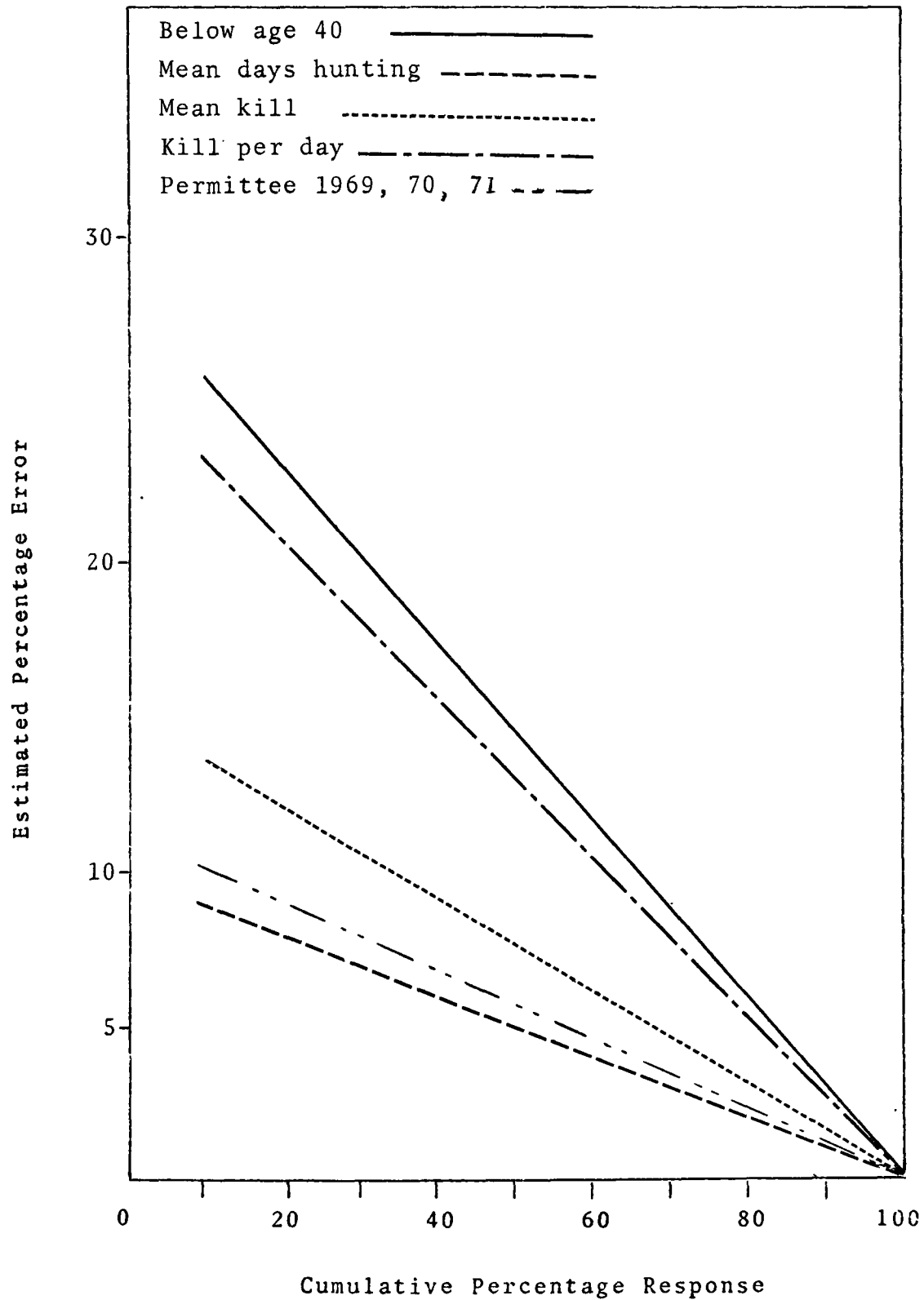
Given	Regression Estimates									
	Active Hunters					Successful Hunters				
Percent response	below age 40		Permittee in 1969-70-71		Mean days hunting		Mean kill		Kill per day	
	P ¹	% error ²	P	% error	D	% error	K	% error	K/D	% error
10	0.37	26.0	0.87	10.1	7.1	9.0	15.1	13.5	1.97	23.1
20	0.39	22.0	0.86	8.9	7.2	7.7	14.9	12.0	1.93	20.6
30	0.40	20.0	0.85	7.6	7.3	6.4	14.7	10.5	1.89	18.1
40	0.42	16.0	0.84	6.3	7.4	5.1	14.5	9.0	1.85	15.6
50	0.43	14.0	0.83	5.1	7.4	5.1	14.3	7.5	1.80	12.5
60	0.44	12.0	0.82	3.8	7.5	3.8	14.1	6.0	1.76	10.0
70	0.46	8.0	0.81	2.5	7.7	1.3	13.9	4.5	1.72	7.5
80	0.47	6.0	0.80	1.3	7.7	1.3	13.7	3.0	1.68	5.0
90	0.49	2.0	0.80	1.3	7.8	0	13.5	1.5	1.64	2.5
Complete response	.50	0.0	.79	0	7.8	0	13.3	0	1.60	0

1 proportion among respondents

2 error in percent

Figure 19- Estimated Percentage Error Due to Incomplete Response for Selected Variables.

(Source: table I4)



response rate on selected variables for active and successful hunters using the regression estimate. The percentage error was computed by expressing the differences between the parameter value estimated for complete response and the estimate for lower response rates as a proportion of the estimate for complete response. It is indicated that on one hand nonresponse results in underestimation of the number of hunters below age forty and the number of recreation days spent hunting waterfowl; on the other hand nonresponse results in overestimation of hunters with previous experience, mean waterfowl harvest and mean daily harvest. Nonresponse bias is highest with respect to age of hunters, kill per day and mean kill. Using this regression model it is shown that a total response rate of 80% would be required to reduce the bias due to nonresponse to a 5% level when estimating kill per day.

In view of the data presented here it is clear that some error due to nonresponse exists in the self-administered Migratory Game Bird Harvest Survey. Some of the implications of nonresponse bias and the accuracy of the method used to estimate this error is discussed in chapter V.

CHAPTER V

IMPLICATIONS OF NONRESPONSE BIAS

The data in chapter IV reveal significant differences between response waves as well as trends over cumulative waves indicating that incomplete response from the sample results in biased estimates of several parameter values of the population. This chapter discusses some of the implications of nonresponse bias with respect to the demographic characteristics and the rate of involvement of nonresponding hunters and comments on the accuracy and usefulness of the regression method of estimating the bias.

The variables viewed over successive waves indicate the presence and direction of nonresponse bias. Although many of the trends are mild, the data provide clues exhibiting the characteristics nonrespondents tend to have. Nonrespondents:

- 1) Comprise fewer permit buyers, active hunters and successful hunters,
- 2) have less previous experience,
- 3) are younger,
- 4) live in non-metropolitan zones within the province ,
- 5) hunt more days,
- 6) kill fewer waterfowl.

Based on data from undeliverable questionnaires, non-recipients are mainly characterized by the following:

- 7) addressee is unknown
- 8) addressee has moved
- 9) address unknown
- 10) questionnaire unclaimed.

Further insights into nonresponse may be obtained if the findings are grouped into categories dealing with demographic and hunter participation characteristics.

Demographic Characteristics of Nonrespondents

The place of residence may have an effect on whether or not the addressee will participate in the mail survey. Although no significant differences were observed between hunters residing within the province of Ontario and non-residents, the trends suggest that non-residents, particularly among successful hunters, may be more motivated to respond (table 5). On the other hand the motivation of Ontario hunters living in metropolitan zones differs from non-metropolitan residents (table 6, figure II). It may be argued that the level of education is lower in rural areas making the task of reading, understanding and completing the self-administered questionnaire more difficult. However there is some indication that nonrespondents are fewer among successful hunters. Presumably hunters residing outside the province and those living in urbanized zones must, in order to reach their hunting sites, travel greater distances, invest more money and time resulting in more formally organized hunting trips. It seems likely that hunters who must travel outside their place of residence to find game are sensitive to the role of game surveys in resource management and are more willing to respond.

The effect of successive mailings on the age distribution of hunters is felt mostly on the youngest and eldest

age groups (table 9, figure 14). The high incidence of activity and success among hunters below 40 years of age suggest that hunting is a sport requiring youthful vigor and physical fitness (table 8, figure 13). There is some indication that waterfowl hunting activity is not as important to hunters above 40 years of age since a high proportion of them buy permits only. It is not uncommon for potential hunters in this age category to respond to the questionnaire stating that they buy a permit to help waterfowl management. This fact is further substantiated by the high incidence of early returns for this age group.

There is evidence that hunting success is more important to hunters below 40 years of age. The widening gap between active and successful hunters in figure 14 indicates that a larger proportion of the active hunters below 40 responding in mailing I were successful than after three consecutive mailings. This suggests that error due to nonresponse may be greater than expected when the sampling frame consists largely of hunters below 40 years of age, the number of mailings limited to one or two and the response rate low.

Hunter Participation and Involvement

Research elsewhere indicates that nonrespondents tend to have less interest in the topic under investigation (Suchman and McCandless, 1940), show lower participation and involvement (Catton and Larson, 1959; Donald, 1960; Kivlin, 1965) and have a lower rate of success (Ellis et al, 1970) in the

activity surveyed. These studies suggest that one of the most promising lines of approach may lie in the assessment of the interest and involvement of respondents and nonrespondents in a particular investigation.

If the proportion of permit buyers, active and successful hunters and hunters with previous experience are taken as indicators of participation in the sport then the data show an inverse relationship between hunter participation and response in the survey (tables 3, 7; figures 9, 12). It also suggests that early, late and nonrespondents are motivated to different degrees and that the number of stimuli required to elicit response varies inversely with the member's involvement and interest.

If this model of nonresponse is valid one might expect nonrespondents to have a lower kill and hunt fewer days. Although kill decreases over successive waves the data display an increase in days of hunting among late and nonrespondents (table 10, 11; figures 15, 16). This apparent contradiction may be due to several reasons: It is likely that sportsmen recall their hunting experiences in association with their waterfowl harvest. If this is the case, hunter participation, involvement and skill would be measured best in terms of kill and kill per day. It may also be important to distinguish participation in the sport as we have defined it from participation as the hunters perceive it.

For example, the trends in figure 14 suggest that the type and degree of involvement in the survey topic varies among age groups. Although activity and success decrease among potential and active hunters respectively as successive waves are applied, the rate of success diminishes most for active hunters below 40 years of age and especially among those below 20 years. On the basis of this evidence it seems clear that response rates are inversely related to hunter participation and involvement and that the relationship is strongest for hunters in the youngest age groups. In view of the fact that kill per day decreases over successive waves it may further be hypothesized that the aspirations of success are highest for younger hunters. Assuming these data are valid measures of hunter participation skill and even hunter satisfaction it would seem logical to expect that nonrespondents require the inducement of follow-up mailings before reporting the results of their hunting experiences. Atwood (1956) and Sen (1971) have indicated that response errors which cause an upward bias in the kill estimates and a downward bias in days hunted may originate from pride, prestige and memory failure. These findings reflect the importance of kill and kill per day for the hunter. Consequently, late and nonrespondents probably tend to perceive themselves as having little to report on the questionnaire and therefore little to contribute to waterfowl management since they are less active or less successful than anticipated.

The fact that a higher proportion of respondents to the follow-up waves are less involved in hunting partly explains why the speed with which questionnaires are completed and returned

increases significantly over successive waves (table 4, figure 10). Although the harvest questionnaire is only one page in length, it does ask detailed questions on the species shot and the dates of the hunting trips over a four month period. Such a task requires motivation and a good memory. It is seen that potential and active hunters respectively, who have less information to report than successful hunters, have the fastest rate of return.

The fact remains that a decreasing hard core of the sample does not respond. An examination of undeliverable questionnaires sheds additional light on the problem (table 12, figure 17). The undeliverable questionnaires returned revealed that a small but increasing proportion of the addressees were deceased or were simply not claiming the questionnaires. The fact that over 50% of the undeliverables are composed of addressees whose names are unknown and addresses incomplete indicates that some of the potential hunters may not want to be involved in mail Harvest surveys and suggests the existence of problems in the method of distribution of hunting permits. These may be partly explained by the fact that permit buyers give incomplete personal information when purchasing a permit and that postal clerks are either not able to or do not make the effort required to successfully complete the permit with the correct data. Since table 13 indicates that undeliverables tend to increase among addresses who have bought a permit previously it is likely that a proportion of those renewing their permits and who are aware of the waterfowl surveys

intentionally give incomplete information in an effort to be excluded from all mail surveys.

Method of Estimation and Practical Considerations

Data from the special survey support the assumption that linear extrapolation across successive waves indicates the existence, direction and the extent of nonresponse error in the Migratory Game Bird Harvest Survey. To accomplish this it was necessary to have a representative sample of the population and data from at least three mailings. In many cases the extent of the bias is not considerable and it is likely that many of the differences across the waves are not significant due to limited number of observations¹.

The ability of the method to predict the direction of bias due to nonresponse with respect to kill is consistent with trends in nonresponse bias observed elsewhere.

(Martinson and Whitesell, 1964; McDonald and Dillman, 1968; Sen, 1971). The data in tables 3 to 11 and figures 9 to 16 demonstrate that linear extrapolation is possible in twenty-one out of twenty-two cases. Examination of the values denotes that the accuracy of the prediction is high since twenty out of twenty-one r coefficients exceed the value 0.80;; 17 coefficients are greater than 0.90 and 12 are better than 0.98. In all cases where the coefficients are low the number of observations were small.

¹ Also, Yates' correction for continuity, when applied to the χ^2 test for the 2 X 2 table, may tend to over-correct and lead us to the conclusion that a difference is not significant.

This method of adjusting the results of a mail survey for incompleteness seem reasonably precise. In cases where sample parameters such as age, the proportion of hunters renewing their permits or residing in non-metropolitan zones are known the predictive ability of the method is reasonably effective in view of the evidence presented in table 15.

TABLE 15 - Comparison of Selected Characteristics of Potential Hunters in Sample with Estimates for Complete Response.

Characteristic	Proportions	
	Estimate	Sample
Hunters below age 40	0.45	0.45
Hunters renewing permits in 1970	0.77	0.80
Hunters residing in non-metropolitan zones	0.87	0.85

The significant differences observed between response waves confirm the importance of follow-ups as a means of reducing nonresponse bias self-administered mail surveys. From a practical standpoint it is important to determine just how many follow-ups should be used to minimize nonresponse bias. The data revealed significant differences between responses to wave I and wave II with respect to four variables:

- 1) proportion of potential hunters ($X^2(1df)=4.09$ $p<.05$),
- 2) proportion of active ($X^2(1df)=2.74$ $p<.10$) and successful ($X^2(1df)=3.61$ $p<.10$) hunters residing in non-metropolitan areas,
- 3) proportion of potential ($X^2(1df)=3.99$ $p<.05$) active ($X^2(1df)=6.82$ $p<.01$) and successful ($X^2(1df)=3.98$ $p<.05$) hunters below age forty.
- 4) proportion of potential ($X^2(1df)=3.18$ $p<.10$) active ($X^2(1df)=8.25$ $p<.01$) and successful ($X^2(1df)=8.25$ $p<.01$) hunters buying permits in 1970 and 1969.

The data also revealed significant differences between responses to cumulated waves I and II and wave III with respect to five variables:

- 5) Proportion of active hunters ($X^2(1df)=3.77$ $p<.10$)
- 6) Proportion of successful hunters ($X^2(1df)=3.37$ $p<.10$)
- 7) Proportion of potential hunters residing in non-metropolitan areas ($X^2(1df)=3.14$ $p<.10$)
- 8) Proportion of potential ($X^2(1df)=5.15$ $p<.05$) and active ($X^2(1df)=3.65$ $p<.10$) hunters below age forty.

- 9) Mean number of days hunting waterfowl for active
 $(t(\infty df)=1.87 \text{ } p<.10)$ and successful $(t(\infty df)=2.38 \text{ } p<.05)$
 hunters.

These differences suggest that a survey comprised of two waves would reduce the bias to a non-significant level for the variables in 1, 2 and 4 above but not for variable 5, 6, 7, 8 and 9.

The data collected by Migratory Game Bird Harvest Surveys using two waves are mainly intended to provide estimates relating to the number of days of hunting and the number of birds harvested. Although results from the special study revealed no significant differences between waves for waterfowl kill the data suggest a trend toward overestimating waterfowl kill. The use of a third wave and the regression estimate for complete response reduces the mean harvest by about 5 percent and the mean harvest per day by 9 percent. By the above method, correction for the significant nonresponse bias related to days of hunting results in a 5 percent increase in recreation days. Although the data in this study confirms the existence and direction of nonresponse bias the error with respect to these two variables is not serious.¹

1 It should be noted that these percentage errors are estimated from data based on two response waves having a total response rate of 64 percent. The percentage error will likely be larger in the Migratory Game Bird Harvest Survey where the response rate is lower. The errors are higher still when comparing estimates for complete response with those based on wave I.

Irrespective of the level of significance of the findings in this study the trends over successive mailings reveal a better picture of the hunter population since the risk of error due to nonresponse is reduced as returns are increased. However it is often argued that the cost incurred to achieve each additional increment of response may tend to nullify one of the important reasons favoring the mail survey technique. Are additional expenditures always justified by a significant increase in the response rate?

Chapters VI and VII examine the relative effectiveness of several techniques which may be used to maximize returns within the framework of two-wave and three-wave mail surveys.

CHAPTER VI

RESPONSE INDUCTION

In view of the nonresponse bias in the Migratory Game Bird Harvest Survey it is only fitting that the investigator devote some effort to find methods of minimizing the bias. Although the regression estimate described in Chapter III and applied in Chapter IV is useful for disclosing and correcting for error due to nonresponse the method remains an estimate only and is subject to variability. The soundest method of reducing nonresponse bias would be to eliminate nonresponse or at least to induce response to the highest level possible.

This chapter examines the relative success of the experimental response induction techniques used in the special study on nonresponse¹. The survey results are presented in a manner showing which techniques or treatments induce the highest response, which are more effective than the Migratory Game Bird Harvest Survey method and which provide the highest quality of questionnaire completion and the most reliable data.

1 These techniques are referred to as "treatments" and are described in detail in Chapter III.

Affect of Follow-ups and Questionnaire Design on Response

Tables 16 to 18 reveal how the response rate to a mail questionnaire is affected by follow-ups, the nature of the follow-up method and questionnaire design. The influence of follow-ups on the rate of returns is shown in Table 16. The 43 percent response rate in the first mailing is increased to 63 percent and 74 percent respectively when one or two follow-ups are used. The use of three successive waves thus results in a 72 percent increase in response over the initial mailing. Although the use of successive waves results in a significantly higher response rate it is seen that each follow-up attempt yields diminishing returns when the nature of the questionnaire and the same class of postage are controlled over successive waves. Table 17 examines the response induced when five different follow-up methods are utilized. While the response rate to the letter reminder in wave II was only 14 percent the rate of returns to the reminder including another copy of the questionnaire and a return envelope varied from 35 to 38 percent resulting in significant percentage increases ($p(z > 8.99) < .01$) over the letter reminder. Although the follow-up in wave II using the short questionnaire resulted in a 9 percent increase in response over the long questionnaire the result is not significant ($p(z > 1.32) < .20$). Of the two classes of postage used in wave III registered mailing was significantly more effective in inducing response ($p(z > 8.47) < .01$) and resulted in an 83 percent increase in returns over first-class postage.

One of the main purposes of the study was to investigate whether a redesigned questionnaire format and incentives would increase survey participation. Table 18 compares the effect of four questionnaire types on the rate of returns in the first mailing with the Migratory Game Bird Harvest questionnaire (treatment A).

TABLE 16 - Effect of Follow-ups on the Rate of Returns¹.

Treatment	Questionnaires delivered by wave ²			Questionnaires returned by wave			Percent Returned ³	Percent Increase in returns	
	I	II	III	I	II	III		over wave I	over wave II
1 wave	3219	-	-	1373	-	-	43	-	-
2 waves	3206	900	-	1373	316	-	63	47	-
3 waves	3202	896	295	1373	316	91	74	72	17

1 Dash denotes absence of observation.

2 Based on treatments A, B, C, E combined.

3 Responses to the second and third waves are weighted in accordance with the method shown in appendix 15 to adjust for subdivision of nonresponse group in follow-up waves.

TABLE 17 - Effect of Various Follow-up Methods on the Rate of Returns¹.

Treatment	Follow-ups delivered	Questionnaires returned	Percent returned	Standard error	Percent Increase in returns
Wave II ONLY					
Letter reminder only	429	62	14	.017	-
Letter reminder with long questionnaire	900	316	35	.016	150***
Letter reminder with short questionnaire	916	351	38	.016	171***
Wave III ONLY					
First class postage	576	169	29	.019	-
Registered mail	540	287	53	.021	83***

¹ Dash denotes absence of observation.

*** Z test for differences between proportions significant at .01 level.

TABLE 18 - Effect of Questionnaire Type on Rate of Returns and Percentage Increase over Treatment A.

Treatment ¹	Questionnaires Delivered	Questionnaires Returned	Percent Returned	Standard Error	Percent Increase Over A
A	814	277	34	.017	-
B	799	359	45	.018	32 ***
C	806	383	48	.018	41 ***
D	802	368	46	.018	35 ***
E	800	354	44	.018	29 ***

¹ Symbols are defined in Figure 8.

*** Z test for difference in proportions significant at .01 level.

It is seen that the two redesigned questionnaires, B($p(z > 4.44) < .01$) and E($p(z > 4.04) < .01$), the anonymous schedule, D($p(z > 4.85) < .01$) and the form mailed with the incentive, C($p(z > 5.65) < .01$) all induced a significantly higher response rate than treatment A. Although treatments C and D respectively tend to be the most successful, the differences between techniques B, C, D and E are not significant.

Comparison of Experimental Treatments with Harvest Survey Method

Tables 19 and 20 explore interactions among selected treatments. Table 19 examines the combined effects of questionnaire type and follow-up method on the rate of returns in a survey involving one follow-up of nonrespondents. The Migratory Game Bird Harvest Survey design, AA, is compared to:

- 1) treatments BB, CC and EE in which the same questionnaire is used in both waves. The incentive sent with questionnaire C in the first was not enclosed in the follow-up.
- 2) treatment DL in which a reminder letter only was sent in the second wave.
- 3) treatments AK, BK, DK, EK in which a short questionnaire was sent in the follow-up.

The letter reminder, DL, is clearly less effective than any other treatment in inducing responses. The remaining treatments which make use of redesigned questionnaires consistently show a higher rate of returns than treatment AA. In a survey framework consisting of two mailings the most effective treatments, CC, EE, CK, and EK, yielded a significant 14 percent increase in response ($p(z > 2.63) < .01$).

The special study was not designed to study the effect of a new pre-season contact mailing and a redesigned covering letter¹.

1 Both methods are outlined in Chapter III.

TABLE 19 - Combined Effect of Questionnaire Type and Follow-up Method on the Rate of Returns in a Two-Wave Survey and Percentage Increase over Treatment AA¹.

Treatment ²	Questionnaires delivered		Questionnaires returned ³		Percent Returned	Standard Error	Percent Increase Over AA
	Wave I	Wave II	Wave I	Wave II			
AA	809	256	277	94	58	.022	-
BB	797	213	359	62	61	.021	5
CC	801	205	383	71	66	.021	14***
EE	799	226	354	89	66	.021	14***
DL	797	429	368	62	54	.018	-7
AK	807	269	277	117	63	.022	9
BK	795	222	359	75	64	.021	10**
CK	805	210	383	75	66	.021	14***
EK	797	215	354	84	66	.021	14***

1 Dash denotes absence of observation.

*** Z test for differences in proportions significant at .01 level.

** Z test for differences in proportions significant at .05 level.

2 Symbols defined in Figure 8. Z test for difference in proportions between AA and AK based on returns to Wave II only.

3 Returns to Wave II weighted as shown in Appendix 15.

However, it was possible to examine the effect of this variable by comparing the rate of returns from the control group, AA, in the special study with the response rate in the 1971 Migratory Game Bird Harvest Survey for Ontario. Since both samples were surveyed using similar mail survey techniques any significant difference in rates of returns after two mailings should be attributed, in part, to the contact mailing which is intended to prepare and involve the addressee by informing him that he has definitely been selected to participate in a survey. The data in table 20 reveal that the response rate to treatment AA, in the special study, was 14 percent higher than in the Harvest Survey. This significant increase in response ($p(z>3.88)<.01$) may be due to the modifications outlined earlier and also to the fact that the August contact mailing in the Harvest Survey took place several weeks before the opening of the hunting season.

Table 21 examines the combined effects of questionnaire type and follow-up method on the rate of returns in a survey consisting of two follow-ups of nonrespondents. The Harvest Survey design, treatment AA, and a three wave version of this design, treatment AAA, are compared to:

- 1) treatments BBB, CCC and EEE in which the initial questionnaires were sent by first-class mail in both follow-up waves. In the case of treatment CCC the incentive was sent in the first wave only.
- 2) treatments AAR, BBR, CCR, EER in which the initial questionnaire is sent in both follow-ups and the final follow-up sent by registered mail.

TABLE 20 - Response Rates to Treatment AA and to Migratory Game Bird Harvest Survey in Ontario, 1971

Treatment	Questionnaires Delivered	Returns after 2 Mailings	Percent Returned	Standard Error	Percent Increase
1971 Harvest Survey (no Contact Mailing)	6539	3311 ¹	51	.006	-
Special Survey (with Contact Mailing)	809	469	58	.017	14***

¹ Presented in Cooch et al. 1972, Page 10.

*** Z test for differences in proportions significant at .01 level.

- 3) treatments AKK, BKK, CKK, EKK, in which a short questionnaire is used in both follow-ups instead of the longer initial questionnaire, and all schedules are sent by first-class mail.
- 4) treatments AKR, BKR, CKR, EKR in which a short questionnaire is used in both follow-ups and the final follow-up sent by registered mail.

All treatments involving three waves yield a much higher proportion of returns than treatment AA. The average percentage increase in response over AA is lowest for questionnaires sent by first-class mail (approximately 29 percent) and highest for those treatments sent by registered mail (approximately 43 percent). The percentage increases over AA for independent samples are all significant ($p(z > 4.16) < .01$).

The new treatments and redesigned questionnaires studied yielded a higher rate of returns than treatment AAA and almost all were significant. The most significant increases in response over AAA are due to registered mailing ($p(z > 3.05) < .01$). Although treatments CCC($p(z > 1.98) < .05$), CKK($p(z > 1.95) < .05$), and EKK($p(z > 1.70) < .10$) are significantly more effective than AAA they are not significantly different from treatments BBB, EEE and AKK.

TABLE 21 - Effect of Questionnaire Type and Follow-up Method on the Rate of Returns in a Survey Involving Three Waves and Percentage Increase over Treatments AA and AAA¹.

Treatment	Questionnaires delivered by wave			Questionnaires returned by wave			Percent Returned	Standard error	Percent increase ² over	
	I	II	III	I	II	III			AA	AAA
AA	809	256	-	277	94	-	58	.020	-	-
AAA	808	255	84	277	94	24	70	.026	21	-
BBB	794	210	73	359	62	27	76	.026	31***	8
CCC	801	205	70	383	71	22	77	.024	33***	10**
EEE	799	226	68	354	89	18	75	.024	29***	7
AAR	807	254	75	277	94	43	82	.026	41	17***
BBR	792	208	70	359	62	35	81	.025	40***	16***
CCR	801	205	64	383	71	34	84	.023	45***	20***
EER	796	223	66	354	89	34	84	.023	45***	20***
AKK	807	269	73	277	117	23	75	.025	29	07
BKK	794	221	76	359	75	15	71	.024	22***	01
CKK	804	209	66	383	75	21	77	.024	33***	10**
EKK	796	214	66	354	84	19	76	.024	31***	9*
AKR	804	266	76	277	117	45	85	.023	47	21***
BKR	790	217	65	359	75	32	82	.025	41***	17***
CKR	802	207	65	383	75	30	82	.023	41***	17***
EKR	792	210	59	354	84	34	86	.023	48***	23***

1 Symbols are defined in Figure 8; returns are weighted using method in Appendix 15; difference in proportions for AAA, AAR, AKK and AKR is based on independent samples only using Z test.

2 Z test for difference in proportions is significant at levels .01 (***), .05 (**) or .10 (*).

Quality of Questionnaire Completion and Reliability of Data

Although significant increases in response are induced using some of the treatments outlined above an important consideration is the quality and reliability of the responses obtained using these techniques. The researcher might assume that data provided by a treatment yielding a significantly higher rate of returns may be lower in quality because of the nature of the potential nonrespondents who normally would not have replied had a less persuasive treatment been utilized. Do late respondents who have shown a lower motivation to reply tend to complete the questionnaire less meticulously?

The quality of the data provided by the various treatments was examined by comparing the incidence of answered questions and the extent of editing involved for each questionnaire. Table 22 indicates the incidence of unanswered questions for several treatments. The number of nonresponses of each of the 11 questions are expressed as a proportion of the number of questionnaires completed¹. It is possible to evaluate the overall quality of questionnaire completion over successive waves by comparing the "total" nonresponse proportion in wave I to the proportions for the "long questionnaire" and "first-class postage" in waves II and III respectively².

1 "Unanswered questions" is defined in accordance with the definition of "unknowns" given in the edit instructions in APPENDIX 11 and include answers which are obviously incorrect.

"Questionnaires completed" includes all questionnaires received from 1971 permit buyers.

2 These three categories are comparable since they involve long questionnaires and first-class postage in each wave.

A comparison of these proportions in the "mean nonresponse per question" column reveals an increase from .07 in the first mailing to .14 and .12 in following waves indicating that questionnaires returned by potential nonrespondents are more likely to receive less attention, are more incomplete and are more likely to be of a lower quality. It is seen that increasing the rate of response to questionnaires may result in a higher rate of nonresponse to certain questions. Although this trend is observed to some extent in most of the questions it is preponderant in questions two, three and ten dealing with previous hunting experience, province of hunting and the duck calendar respectively.

A comparison of the five treatments in wave I reveals that the Harvest questionnaire, A, has a mean nonresponse proportion approximately twice as large as that of any other treatment. The major differences occur in questions one to six which have been modified on the redesigned questionnaires B, C, D and E. All questions considered the incidence of nonresponse by questions in wave I tends to be lowest for treatment C, the group receiving the incentive. A comparison of the long and short questionnaires in wave II and the use of first-class and registered postage in wave III reveal that shorter questionnaires and registered postage tend to minimize the proportion of unanswered questions in follow-up mailings.

In previous years the amount of editing required on the Harvest schedule for the question dealing with the place of hunting has tended to be high while the number of bird bands reported has been low and the banding data incomplete. Table 23 compares the

TABLE 22 - Incidence of Unanswered Questions by Completed Questionnaire for Selected Treatments.

Proportion of nonresponses by question ¹																	
		1	2		3	4	5	6	7	8	9		10		11		Mean non response per Question ³
Treatment	Completed Question- naires	Buy Permit	Hunt in 1970	1969	Prov- ince	Hunting Place Town	Dist- ance	Direc- tion	Days Hunted Water- fowl	Other birds	Birds Killed Water- fowl ²	Other birds	Calendar Kill	Days	Banding Data Number Reported	Data	
Wave I																	
A	188	.21	.30	.27	.05	.05	.13	.10	.02	.02	.00	.00	.11	.13	.00	.02	.13
B	238	.15	.09	.12	.02	.03	.04	.02	.01	.01	.00	.00	.10	.15	.00	.01	.07
C	271	.17	.08	.10	.00	.00	.01	.01	.00	.00	.00	.00	.09	.08	.00	.01	.05
D	266		.13	.18	.02	.02	.02	.03	.02	.02	.01	.01	.16	.09	.01	.02	.07
E	251	.16	.10	.14	.01	.01	.02	.04	.01	.01	.01	.01	.16	.10	.01	.01	.07
Total	1214	.13	.13	.16	.02	.02	.04	.04	.01	.01	.01	.01	.12	.11	.01	.01	.07
Wave II																	
Long question- aire	200	.21	.24	.26	.07	-	-	-	.01	.01	.04	.04	-	-	.05	.05	.14
Short question- aire	233	.19	.13	.20	.00	-	-	-	.00	.00	.00	.00	-	-	.00	.01	.08
Wave III																	
First-class postage	58	.17	.28	.31	.03	.03	.05	.05	.02	.02	.00	.00	.14	.22	.00	.02	.12
Registered mail	87	.22	.22	.25	.01	.00	.00	.01	.01	.01	.00	.01	.11	.20	.01	.01	.10

1 Question order as in treatments B C D E. Dash denotes absence of observation.

2 Ccots are omitted in Wave II.

3 Mean is computed by summing proportions in each question and dividing by the number of questions.

Harvest questionnaire, A, to other treatments with respect to the quality of completion in these two subject areas. Respondents are asked to report the direction and distance of the place where they did most of their hunting from the nearest town. The redesigned questionnaires are considerably more successful in obtaining one answer only with regard to distance but no gain in quality of completion is observed concerning the direction. The redesigned questionnaires tend to increase the number of banded birds reported as well as band data and considerably reduce the proportion of non-applicable data¹.

In order to ensure maximum survey efficiency and data quality it is important for a self-administered schedule to reduce the amount of "editing" to a minimum. In this study four categories of questions within selected treatments were evaluated with respect to the amount of editing required². The results are presented in table 24. An overall view of questionnaire editing over successive waves is obtained by comparing the "total" proportion of edits in wave I to the proportions for the "long questionnaire" and "first-class postage" in waves II and III respectively³. A comparison of these proportions in the "mean proportion of edits" column reveals

-
- 1 "Non-applicable data" consists of entries which are obviously not related to bird banding.
 - 2 The editing instructions are presented in APPENDIX II. Questions were evaluated on criteria such as answers entered improperly, conflicting answers and rounding of fractions.
 - 3 The three categories are comparable since they involve long questionnaires and first-class postage in each wave.
-

TABLE 23 - Quality of Completion for Questions on Place of Hunting and Banded Birds by Treatment in Wave 1.

Treat- ment	Place of hunting			Banded birds			
	Number of question- naires completed	Proportion showing several distances	Proportion showing several directions	Number of question- naires completed	Proportion reporting banded birds	Proportion with complete band data	Proportion with non- applicable data
A	188	.12	.12	123	.02	.02	.13
B	238	.00	.12	149	.06	.05	.03
C	271	.00	.11	170	.06	.05	.03
D	266	.03	.12	161	.08	.07	.00
E	251	.00	.11	155	.17	.15	.02

an increase from .12 to .16 as successive waves are applied. A comparison of the mean proportion of edits among the treatments in wave I shows that the amount of editing required in A is nearly twice as high as for the redesigned questionnaires although the response rate is significantly lower. The decrease in amount of editing is due mostly to improvements in the format of questions dealing with the "place of hunting" and "days of hunting and birds harvested". The data also indicate that questionnaire length (wave II) and the rate of postage (wave III) affect the amount of editing. The substantial decrease in editing on the short questionnaire is due mostly to the simplified question concerning the various species of birds harvested. A better overall decrease in editing is observed for questionnaires sent by registered mail.

Another important measure of the quality of survey data is reliability. Reliability may be measured by comparing responses to similar questions on the same questionnaire to determine inconsistencies. In this study it was possible to investigate reliability by examining duck harvests and days of hunting using data from question-numbers seven, nine and ten¹. The greater the differences between the duck kill reported in these questions the lower the reliability of the data². The mean differences in kills for selected

1 Question numbers are those of treatments B, C, D, E.

2 The total duck kill in the calendar (question ten) was subtracted from the duck kill reported in question seven. Since respondents were asked to exclude Sea Ducks from the Calendar it was expected that the difference, if any, would be slight and positive.

TABLE 24 - Amount of Editing Required for Categorized Questions within Selected Treatments¹

Proportion of edits by question category						
Treatment	Number of questionnaires completed	Buy permit and Province of hunting	Hunting place	Days hunted and Birds harvested	Duck Calendar	Mean proportion of edits ²
Wave I						
A	188	.13	.20	.40	.07	.20
B	238	.10	.04	.27	.05	.12
C	271	.13	.06	.25	.06	.12
D	266	.04	.04	.23	.02	.08
E	251	.11	.00	.24	.05	.10
Total	1214	.10	.06	.27	.05	.12
Wave II						
Long	200	.12	-	.29	-	.10
Short	233	.11	-	.03	-	.03
Wave III (long questionnaires only)						
First-class postage	58	.14	.09	.36	.07	.16
Registered mail	87	.08	.02	.18	.01	.08

1 Question order as in treatment B,C,D,E - Dash denotes absence of observations.

2 Mean is computed by summing proportions and dividing by the number of categories.

treatments are shown in table 25. Although none of the mean differences are statistically significant at the 10 percent level, they tend to be approximately twice as high in the current Harvest questionnaire (-.13) than in the redesigned questionnaires.

Reliability was also examined by comparing data for significant differences between selected treatments. The comparisons were based on the mean harvests and days hunting for successful hunters of Ducks, waterfowl and other migratory game birds, and are exhibited in Table 26. As expected, hunter success and activity are highest for waterfowl and Ducks¹. There are no significant differences between treatments:

- 1) in wave I, with respect to all mean kills and mean days of hunting for "other" migratory game birds,
- 2) in wave II, with respect to mean waterfowl kills and days of hunting for long and short questionnaires, and
- 3) in wave III, with respect to mean kills and days of hunting for class of postage used.

However, the significant differences observed in wave I between treatments A and C ($t(\infty df) = 2.08$ $p < .05$) regarding mean days of hunting waterfowl and in waves II and III between the long and short questionnaires ($t(\infty df) = 1.70$ $p < .10$) regarding mean duck kill suggest that the incentive used and the absence of the Duck calendar on the questionnaire have a major affect on the survey data.

¹ The mean kills and days hunted for treatment A are comparable to the data collected in Ontario in the 1971 Migratory Game Bird Harvest Survey (Cooch et al. 1972, 11), indicating that treatment A adequately represents the Harvest Survey.

TABLE 25 - Inconsistencies Between Questions on Duck Harvest and Duck
Calendar for Treatments in Wave 1.

Treatment	Number of questionnaires	Mean differences in duck kill ¹	Standard error
A	123	-.13	.23
B	149	.01	.08
C	170	-.08	.07
D	161	.05	.09
E	155	-.05	.14

1 Differences between means using t test are not significant at .10 level.

TABLE 26 - Mean Kills¹ AND Days Hunting for Ducks, Waterfowl and Other Migratory Game Birds for Selected Treatments¹.

Treatment	Mean kills and standard errors						Mean days hunting and standard errors			
	Ducks		Waterfowl		Others		Waterfowl		Others	
	K	S.E.	K	S.E.	K	S.E.	D	S.E.	D	S.E.
Wave I										
A	9.4	1.2	14.0	1.80	4.44	1.82	6.9	.59	3.19	.81
B	9.5	.91	13.5	.97	3.76	.96	7.6	.50	2.62	1.35
C	10.4	1.2	14.0	1.33	4.81	1.35	8.7**	.63	3.13	1.33
D	11.1	1.2	14.8	1.33	4.27	1.53	7.9	.67	3.50	.89
E	11.3	1.4	15.6	1.60	4.00	1.81	7.9	.63	2.83	.87
Wave II										
Long questionnaire	7.9	1.6	12.7	1.7	-	-	7.0	.63	-	-
Short questionnaire	11.3*	1.2	12.4	1.2	-	-	8.5	.71	-	-
Wave III										
First-class postage	11.8	2.2	13.8	2.2	-	-	10.1	1.00	-	-
Registered mail	9.2	1.3	12.5	1.4	-	-	9.4	.99	-	-
Long questionnaire	8.0	1.8								
Short questionnaire	12.0*	1.6								

¹ Dash denotes insufficient number of observations.

** t test for difference in means significant at .05 level.

* t test for difference in means significant at .10 level.

The analysis in this chapter clearly indicates the effect various response induction techniques have on the response rate as well as the quality and reliability of survey data. The implications of these results and the usefulness of these treatments will be discussed in Chapter VII.

CHAPTER VII

DISCUSSION OF RESPONSE INDUCTION TECHNIQUES

The special study reveals that response rates and the quality of data can be improved in the Migratory Game Bird Harvest Survey when self-administered mail survey technology is controlled by the investigator. The affect of questionnaire design and follow-up methods on response induction and data quality are summarized and discussed in this chapter.

Design of the Survey Questionnaire

It was seen that inducements such as a questionnaire ensuring respondent anonymity or an incentive in the form of a colourful waterfowl identification guide do not seem to increase response as much as do changes in questionnaire format and overall attractiveness (Table 18).

The increase in response is attributed to several changes in format which are common to treatments B, C, D and E. These include:

- 1) the use of coloured ink and shaded answer spaces,
- 2) larger type size,
- 3) a questionnaire heading and ending,
- 4) brief instructions,
- 5) minimum reading,
- 6) a one page schedule with translation on the reverse side,
- 7) a logically interdependent series of questions asking easier questions first, and
- 8) a simple standard method of answering the structured schedule.

The fact that the rate of returns in treatments B and E are virtually the same suggests that the size of paper on which a questionnaire is printed using the same type size may not affect the response rate. The non-significant increase in response over treatment B and E provided by the incentive and the anonymous schedule does not seem to warrant the added expense and labor. Questionnaires B and E both seem highly recommendable in a survey consisting of one mailing only since they induce 32 percent and 29 percent increases in response respectively over treatment A. The choice of either schedule should take into account such factors as data quality (tables 22, 23, 24 and 29) and convenience in survey procedures.

Response Induction Using One Follow-up --

The effectiveness of follow-ups as a means of reducing nonresponse was clearly disclosed in table 16. Furthermore, the methods used in following-up nonrespondents have also emerged as important variables affecting the rate of returns (tables 17, 19).

In a survey including only one follow-up (table 19) the use of a letter reminder only, although useful, was clearly less effective than follow-ups including a copy of the questionnaire. The use of a shorter, simpler questionnaire (treatment K) in the follow-up did not prove to be more effective than the full-length questionnaires (treatments A, B, C, E) in a survey involving two waves. It is apparent that two treatment combinations which make use of a long questionnaire in both mailings (EE, CC) are as effective as the most successful treatments making use of an incentive or short questionnaires (CK, EK). Although it was

observed in table 18 that questionnaires B and E were about equally effective in a survey consisting of only one mailing it is seen that in a two wave survey the response rate to EE is significantly higher ($p(z>1.68)<10$) than BB (table 19).

Based on the response rate, treatment EE, the use of questionnaire E with one follow-up of nonrespondents, seems highly recommendable. Treatment EE not only provides the researcher with a 14 percent increase in response over the Harvest Survey method, AA, but is also less costly and more convenient to use than treatments involving incentives, C, and a different follow-up questionnaire, K.

Response Induction Using Two Follow-ups.

The use of a second follow-up as a means of increasing returns is a very useful technique but its effectiveness may be subject to decreasing returns (table 16). Table 21 revealed that the effectiveness of a second follow-up of nonrespondents varied significantly depending on the technique used. With respect to the Harvest Survey method, treatment AA, increases in response ranging from 21 to 48 percent were observed. It was confirmed that the nature of the questionnaire and the type of postage used in follow-ups are related to the effectiveness of the follow-up. Three wave treatments composed of questionnaires B, C, E and K increased response rates by as much as 10 percent over treatment AAA. There were no significant differences in response between the redesigned full-length questionnaires and the short questionnaires. However, there is evidence that the use of special postage such as registered mail is much more

influential on nonrespondents in the third wave than questionnaire format and provide increases as high as 48 percent over treatment AA and 23 percent over AAA.

The most successful treatment, EKR, consisting of questionnaire E in mailing I, a short questionnaire (K) in mailing II, and finally, a short questionnaire sent by registered mail (R), resulted in an estimated overall response rate of 86 percent; this response rate represents an increase of 48 percent over treatment AA.

It is noteworthy that the mean percentage increase in response tends to be highest for treatments involving successive waves in which a new technique is incorporated into each wave. Although these data suggest that potential nonrespondents are most captivated and induced to respond by a complex treatment like EKR it remains one of the most costly and operationally difficult survey techniques to implement of all treatments studied. From a more practical standpoint, a treatment such as EER making use of the same questionnaire in all waves and registered mail in the final wave is more convenient to administer than EKR and much less costly than CCR which included an incentive. In the case where the inconvenience and higher costs of special methods such as shorter questionnaires, special class postage and incentives are a major concern, treatments BBB and EEE, yielding response rates of 76 and 75 percent respectively, seem highly recommendable. Of the two, questionnaire E would provide the added benefit of a longer and clearer layout which facilitates both editing and keypunching.

Data Quality

Although it is customary in mail studies to send reminders to nonrespondents in order to decrease the impact of nonresponse error it should not be assumed that the quality of the data reported in the survey is equal for each mailing. As a general rule a person's ability to recall events is inversely related to the length of time elapsed since their occurrence; the shorter the recall period the less likelihood of error due to memory failure¹. Consequently, replies to questionnaires from the first mailing should be considered more reliable than answers obtained from follow-ups which may be mailed from four to eight weeks after the initial wave. Treatments inducing high response rates in early questionnaire mailings should therefore provide the researcher with more reliable information. Treatments B and E (table 18) and treatment EE (table 19), for example, showed significant early gains in response over the Harvest Survey questionnaire at no additional cost. It would seem advisable to recommend questionnaire E provided that it is not inferior to the Harvest Survey schedule in other aspects of data quality such as incomplete questions, amount of editing, inconveniences and bias attributable to the treatment.

1 Studies by A.R. Sen (1973, 913-924) have shown that lengthening the recall period led to the hunter reporting significantly higher kill and activity.

Findings based on this special mail survey indicate that the incidence of nonresponse to individual questions and the amount of editing of questionnaires required tend to increase with follow-up waves (tables 22 and 24). This suggests that late respondents and potential nonrespondents who have a lower motivation to respond tend to reply less meticulously. However this finding does not necessarily indicate that the cost of additional mailings is offset by very marginal gains in the proportion of adequate or acceptable responses. It might be argued that the ability of late respondents or potential nonrespondents to answer questions and their motivation to reply are interrelated factors affecting the reliability of the data reported in follow-up mailings. However, from the viewpoint of data quality, the present study indicates that some treatments concerned with redesigned survey questionnaires and follow-up methods will improve the reliability of the Harvest data as well as the overall response rate. The quality of information reported in the mail survey is dependent on the treatment that elicits the reply. Treatments making use of questionnaire E, the short questionnaire and registered mail tend to reduce the proportion of nonresponses to individual questions and the amount of editing involved in preparing the schedules for data processing and analysis.

The redesigned questionnaires also elicited responses of a higher quality with respect to "place of hunting" and "banding data" (table 23). The data suggest that changes such as

- 1) the special note intended for inactive hunters in question 1
- 2) the relocation of the questions on previous hunting experience and province of hunting, and
- 3) the redesign of the question dealing with the place of hunting,

result in substantial decreases in nonresponse to these questions even when the total number of hunters responding is increased significantly using treatments B,C,D and E.

Although these redesigned questionnaires induce a higher proportion of correct answers to the question, the fact remains that approximately 12 percent of the respondents who hunt near a given town report travelling to several hunting sites within a fairly constant radius (table 23). The data suggest that many hunters do not hunt in one specific location and that it is difficult to improve the quality of answers to this question without further research with respect to the place of hunting.

With regard to the question on banded birds all redesigned questionnaires show some improvement in quality of answers. This is due, in part, to the fact that a large arrow clearly links the first part of the question dealing with the number of banded birds with the second part dealing with the banding data thereby minimizing misinterpretations of the question. All redesigned schedules also tend to increase the number of banded birds reported.

The internal consistency of survey data based on a comparison of the duck kill reported in two questions on the schedules tended to be higher on the redesigned questionnaires (table 25). The smaller differences observed in the redesigned questionnaires suggest that responses are more consistent when all questions are printed on the same page. The negative mean differences in kill indicate that successful hunters tend to report slightly more ducks as they fill in the days and weeks of the detailed calendar than in the preceding question on total duck kill only. It is also possible that respondents tend to include other species

killed in the calendar. Although these differences are not significant the fact remains that all redesigned schedules tended to minimize the inconsistency.

Reliability, which was measured by comparing several administrations of similar questionnaires with respect to mean harvests and days of hunting, seems questionable for treatments C and K (table 26). The fact that there are no significant differences among the treatments in wave I regarding days hunted except between A and C suggests that the use of an incentive related to the subject matter of the questionnaire may cause an upward bias in the response. The significant differences found between the short and full-length questionnaires suggest that the absence of the Duck Calendar results in over-reporting of the duck kill. A possible explanation is that the presence of the calendar on the questionnaire facilitates recall inasmuch as the respondent is able to visualize every month, week and day of the hunting season and to recollect when the trips were made. This hypothesis is supported by studies indicating that the reports of hunters which are subject to memory bias result in significantly higher estimates of kill and activity (Sen, 1973). The fact that the kill and days reported in the anonymous questionnaire (D) does not differ appreciably from other treatments brings a definite advantage in the Harvest mail survey operations.

Further analysis is needed before the reliability of treatments K and C can be established and these questionnaires recommended. Since it is felt that an upward bias may affect the Harvest Survey estimates if either of these two treatments is adopted on a national scale it is not recommended at this

time that the incentive or the short questionnaire be implemented without further investigation.

Summary and Recommendations

Error due to nonresponse will be reduced when one or preferably two follow-ups are sent to nonrespondents. As a general rule follow-ups induce decreasing returns but the effectiveness of reminders may be increased significantly by varying the method of follow-up. Reminders accompanied by another copy of the questionnaire and a preaddressed postage-paid return envelope are more effective than letter reminders alone. Follow-ups sent by registered mail which include a questionnaire and a return envelope are even more effective.

The quality of questionnaire completion with respect to nonresponse by question and the amount of editing called for tends to decrease as the rate of response is increased using successive mailings. On the other hand when redesigned questionnaires and registered mailing are used both the response rate and the quality of responses show substantial increases over the current Harvest questionnaire, A, and survey procedures.

The ability to place the respondent's name and address directly on the schedule without influencing the results greatly facilitates the mailing and processing of questionnaires. Furthermore, the use of the full-length questionnaire means it is possible to obtain some additional information with respect to the general area of hunting and the temporal distribution for Duck hunting activity with virtually no effect on the response rate. The presence of a calendar on the questionnaire brings an advantage where data pertaining

to the amount of time spent hunting is required. The calendar is a visual cue aiding the recall of activities with respect to the months and weekends of the hunting season.

In view of the significant gains in response rates, data quality and reliability induced by a redesigned questionnaire, an additional follow-up and the use of registered mailing, treatment EER, providing an estimated 84 percent total response rate, emerges as the most highly recommendable survey method examined in this special study. However the use of three mailings, each of which include a covering letter, a questionnaire and a self-addressed postage-paid reply envelope, not to mention the added expense of registered mail in the final wave, may prove to be a costly operation in a national survey based on a large sample. Treatment EER, which involved three mailings sent by first-class mail, will provide an estimated 75 percent rate of returns. Furthermore, keypunch operators have made the remark that questionnaire E is easier to keypunch than questionnaire A or B in view of its extended format and shaded answer spaces. It is also substantially less expensive to administer than treatment CCC if one considers the added cost of the incentives valued at 25 cents each.

Treatment EE is not as effective as treatments involving three mailings but it will provide the researcher with a total response rate of 66 percent; it results in a significant 14 percent increase in response and higher data quality over the current Harvest Survey design, AA, at about the same cost. Treatment EE provides the same response rate as treatment CC, which is more expensive to administer, and is free of the upward bias with regard to duck kill in the short questionnaire.

Little has been said about respondent preparation and involvement mainly because the study was not specifically intended to study this factor. A comparison of tables 19, 20 and 21 reveals that treatments EE and EKR respectively used along with a special preseason mailing result in 29 and 69 percent increases in response over the 1971 Harvest Survey for Ontario. On the basis of this evidence it would also seem advisable to use one of the recommended treatments in conjunction with a contact mailing sent approximately one week before the season opening providing the sample members with a record card and informing them that they will definitely be receiving a questionnaire at the end of the hunting season.

CHAPTER VIII

GENERAL SUMMARY AND CONCLUSIONS

Restatement of the Research Problem

Because it is almost impossible to obtain answers from every person in a large sample regardless of the data collection method used it is important to examine survey results for the existence, direction and extent of bias due to differences between respondents and nonrespondents. Although scientifically selected samples will ensure adequate representation of the population, findings based on surveys with partial returns may not be representative of the sample.

This thesis has examined some practice procedures for minimizing error due to nonresponse in self-administered mail surveys and provided insights into an important problem which is often overlooked in survey research. Two dimensions of the problem were analyzed: the extent to which respondents differ from nonrespondents and the effectiveness of techniques to maximize the response proportion.

Assuming that follow-ups probe deeper into the core of nonrespondents, a statistical method for estimating parameter values of a population while correcting for nonresponse bias was devised; this method consists of a linear regression with coordinate values X , the cumulative response rate, and Y , a corresponding respondent characteristic, in which the parameter value for complete response is estimated based on observations in three response waves.

The effectiveness of several response induction techniques was also tested. These included changes in questionnaire format, anonymity, an incentive, special class postage and follow-ups. The special study was based on a representative sample of 4,200 1970 Migratory Game Bird Permit purchasers in Ontario.

General Findings and Discussion

Study findings presented in chapters IV and V revealed that late respondents and potential nonrespondents had a significantly lower level of participation and involvement in the topic investigated as indicated by the proportions of potential, active and successful hunters and hunters with previous experience; with respect to demographic variables, it was estimated that nonresponse was higher among residents of non-metropolitan areas and members of the sample below forty years of age. With respect to resource management nonresponse bias is small but results in overestimation of waterfowl harvests and underestimation of the number of recreation days spent hunting. The findings suggest that nonresponse bias is more serious for personal characteristics of the sample members than for resource management data.

Experimental results from the response induction methods examined in chapters VI and VII revealed significant increases in the rate of returns and improvements in the quality of data collected with respect to the current Harvest Survey method, AA. These gains are attributed to the design of the questionnaire and the nature of the techniques used to follow-up nonrespondents.

The design of the questionnaire was improved by such factors as colored ink, shaded answer spaces, an attractive questionnaire heading and brief instructions, minimum reading, a one page unilingual schedule with the translation on the reverse side, a logically interdependent series of questions asking easier questions first and a simple standard method of answering the structured schedule. One of the most successful survey methods tested involved a redesigned schedule, questionnaire E, in the initial mailing and two follow-ups of nonrespondents; the first follow-up consisted of a letter reminder accompanied by another copy of the questionnaire and a pre-addressed postage-paid return envelope; the second follow-up although similar to the first, was sent by registered mail.

Findings in this study should warn researchers against making the assumption that respondents and nonrespondents do not differ. They should also serve as an encouraging example that nonresponse bias can be dealt with adequately. By employing a combination of the techniques developed in this study to:

- a) maximize returns using effective response induction methods over three successive waves and
- b) extrapolate the population value of a parameter corresponding to complete response based on cumulative returns using the linear regression,

should improve the accuracy of data obtained in surveys failing to achieve a 100 percent response rate.

This method of correction for nonresponse bias is based on data collected from early, late and very late respondents and rests on the assumption that the continuum from highly motivated

persons to individuals who normally would not have cooperated is indicative of the direction and extent of error due to nonresponse. Evidence presented here indicates that the method is valid in the Migratory Game Bird Harvest Survey as it has been shown to be in a variety of other areas. Furthermore, since this method has the advantage of being inexpensive, and simple, requiring no additional data and utilizing only the variables with which the research is concerned it should be given serious consideration as a means of exploring and correcting error due to nonresponse in the national Migratory Game Bird Harvest Survey, as a periodical check, as well as in other sample surveys.

Because the self-administered mail questionnaire, like other survey methods, is an imposition on the time and privacy of a human being, overcoming nonresponse requires persuasion and persistence. It was demonstrated how attention to procedural techniques and details do result in significant increases in the rate of participation. When used within the constraints outlined in chapter I, the mail questionnaire should be considered an effective research instrument which may be used at a cost per response cheaper than use of the personal interview. Based on research elsewhere (Scott, 1961) it does not appear that mail survey responses are generally any less accurate than those given by interview; furthermore there is some indication that socially less acceptable responses are more readily elicited by mail questionnaires.

Recommendations for Further Research

There is need for further research in several adjacent areas. Part of this study was concerned with the effect of several variables on the response rate and less attention was given to determining whether significant interaction effects exist among two or more factors applied simultaneously to increase the response rate. Although findings in this study suggest that the variables investigated operate independently and there are basically no interaction effects this area can be important since, for example, individual factors which improve response rates might in combination with other factors actually reduce the response.

A systematic and cumulative body of findings concerning the effectiveness of the self-administered mail questionnaire should be created through a series of experimental studies. However, in view of the time and costs involved it is likely that very few of these specialized studies will ever be undertaken. An alternate approach would be to encourage further research on the mail questionnaire technique as a routine part of every self-administered mail survey and insuring that methodological details are disclosed to facilitate replication.

The evaluation of other types of errors in surveys and especially the total error in survey findings seems largely neglected. Perhaps most progress has been made in the sampling and in the statistical application stages; classical confidence intervals are used to explain random sampling fluctuations, but the intervals may be minor sources of error compared with errors of measurement,

non-response or frame bias. The accumulation of bias from these and other possible sources may be referred to as "total survey error". The total error may be somewhat arbitrarily divided into the following strata for analytical purposes.

- (1) sampling errors
- (2) instrumentation errors
- (3) nonresponse errors
- (4) response errors
- (5) processing errors.

Although the study of each of these errors taken individually may reveal small and non-significant differences, the total survey error may be considerable.

Appendix 1

The covering letter sent to
all previous year's Migratory Game Bird Permit buyers
each August up to 1971 inclusive.

(The "gold card" is shown in appendix 2)



OUR FILE NO.
NOTRE DOSSIER N°

DEPARTMENT OF FISHERIES AND FORESTRY
MINISTÈRE DES PÊCHES ET DES FORÊTS
OTTAWA

YOUR FILE NO.
VOTRE DOSSIER N°

Dear Sir:

We are mailing this letter to the address you gave to the post office when you bought a Canada migratory game bird hunting permit for the 1970 season.

You will find enclosed an abstract of the 1971 Migratory Birds Regulations for the province in which you bought your 1970 permit. It is a pleasure to be able to supply you with it and I hope it will be useful to you.

If you will be hunting in a different province this year, you will find the Regulations on the notice board of the post office. We distribute those posters every year. Abstracts are also available at post offices. We cannot guarantee all post offices will receive them until sometime after the permits go on sale. Many provincial licence vendors will also have supplies of the abstracts.

We are using records of permit sales to carry out two different surveys. The waterfowl harvest survey is intended to tell us more about the numbers of birds taken and when and where they are taken. About one in ten of all waterfowl hunters in Canada will receive a hunting record card informing them that their names have been drawn to receive a questionnaire at the end of the season. The hunting record is a gold coloured card.

If you find a hunting record card in this envelope, you will receive a questionnaire at the end of the season. We would like you to fill in the questionnaire and return it to us then. Do not send us back the hunting record card. It is for your own use.

The species composition survey will give us information on the kinds of birds hunted. We send out envelopes to a sample of hunters before the season starts and ask them to return to us one wing from each duck they shoot, and the tail feathers of each goose. Our biologists examine these parts and can tell us the species of bird, its sex, and whether it is a young bird of that year or an adult.

We realize there is some work involved in responding to the surveys, particularly for those hunters who might be included in both surveys. However, the only reason for the existence of the permit and the surveys is to find out enough about waterfowl hunting in Canada to enable us to work more effectively towards the maintenance and improvement of the sport in Canada. We do not publish the names of hunters or of the harvest of any single hunter.

I wish you a successful and pleasant hunting season.

Yours sincerely,

John S. Tener,
Director,
Canadian Wildlife Services.

Encl.



OUR FILE NO.
NOTRE DOSSIER N°

**DEPARTMENT OF FISHERIES AND FORESTRY
MINISTÈRE DES PÊCHES ET DES FORÊTS**

YOUR FILE NO.
VOTRE DOSSIER N°

OTTAWA

Monsieur,

Nous vous expédions cette lettre à l'adresse que vous avez donnée au bureau de poste, en 1970, quand vous avez acheté un permis canadien de chasse aux oiseaux migrateurs considérés comme gibier.

Vous trouverez sous ce pli, un résumé de Règlement de 1971 concernant les oiseaux migrateurs à l'égard de la province dans laquelle vous avez acheté votre permis de 1970. Nous sommes heureux d'être en mesure de vous fournir ce document qui, nous l'espérons, vous sera utile.

Si vous allez chasser cette année dans une autre province, vous pourrez prendre connaissance du règlement ayant trait à cette autre province au tableau d'affichage du bureau de poste. Chaque année, nous distribuons aux bureaux de poste des affiches à cette fin. Vous pourrez aussi obtenir votre résumé de Règlement dans les bureaux de poste. Toutefois, nous ne pouvons assurer que tous les bureaux de poste les auront reçus au moment de la mise en vente des permis. Bon nombre de vendeurs de permis, dans les diverses provinces, pourront aussi fournir ces résumés.

Nous utilisons les registres de vente de permis pour effectuer deux enquêtes distinctes: l'enquête sur les prises d'oiseaux aquatiques est destinée à mieux nous renseigner sur le nombre d'oiseaux qui ont été pris ainsi que sur le jour et l'endroit de leur capture. Environ dix chasseurs d'oiseaux aquatiques sur cent recevront un registre personnel de chasse leur apprenant que leurs noms ont été choisis et qu'ils recevront un questionnaire à la fin de la saison. Le registre de chasse est une carte dorée.

Si vous trouvez sous ce pli une carte de registre de chasse, vous recevrez un questionnaire à la fin de la saison. Vous serez alors appelé à remplir ce questionnaire, que vous voudrez bien nous renvoyer. Ne nous renvoyez pas, toutefois, le registre de chasse, car il est destiné à votre usage personnel.

L'enquête portant sur la composition des espèces d'oiseaux chassés nous fournira des renseignements sur les espèces d'oiseaux qu'on chasse. Avant le début de la saison, nous envoyons des enveloppes à un groupe-type de chasseurs auxquels nous demandons de bien vouloir nous faire parvenir une aile de chaque canard et les rectrices de chaque oie sauvage qu'ils abattent. En examinant ces parties, nos biologistes pourront nous dire à quelle espèce l'oiseau appartient, quel est son sexe et s'il s'agit d'un jeune oiseau de l'année ou d'un adulte.

Nous vous rendons compte du travail que cette enquête imposera à ceux qui y collaborent, en particulier à ceux qui participeront aux deux enquêtes. Cependant, les permis et les enquêtes n'ont d'autre but que de nous fournir assez de renseignements, au sujet de la chasse aux oiseaux aquatiques au Canada, pour nous permettre de travailler plus efficacement au maintien et à l'amélioration des conditions dans lesquelles on pratique ce sport au Canada. Nous ne publions pas les enquêtes fournies par un seul chasseur.

Je vous souhaite une heureuse saison de chasse.

Veuillez agréer, monsieur, l'assurance de ma considération.

Le directeur du Service
canadien de la faune

John S. Tener

Appendix 2

The "gold card" and covering letter sent to all
members selected for the Special survey
in late August, 1971.

Gold Card

front

Your name has been selected from our records of waterfowl hunters who bought a Canada migratory game bird permit at the Post Office last year.

You will receive a questionnaire after the waterfowl hunting season asking you about your hunting this year.

Please return the questionnaire to us whether or not you bought a permit and hunted waterfowl this year.

Please keep this card. On the reverse side keep a record of your hunting throughout the coming season.

DO NOT MAIL THIS RECORD, but use it later, to help answer the questionnaire you will receive.

Thank you.



Nous vous avons choisi parmi ceux des chasseurs d'oiseaux aquatiques qui sont inscrits dans nos registres et qui ont acheté l'an dernier, au bureau de poste, un permis canadien de chasse aux oiseaux migrateurs considérés comme gibier.

Une fois terminée la saison de chasse auxoiseaux
acquatiques, vous recevrez un questionnaire à propos de
votre chasse cette année.

Veuillez nous renvoyer le questionnaire, que vous ayez acheté un permis ou non et que vous ayez chassé ou non les oiseaux aquatiques, cette année.

Veillez conserver la présente carte. Au verso, vous établirez le bilan de votre chasse au cours de la prochaine saison de chasse.

VEUILLEZ CONSERVER LA PRÉSENTE CARTE
dont vous vous servirez plus tard pour remplir le ques-
tionnaire que nous vous enverrons.

Merci.

CWS-0-72 (6-70)

[Back](#)

Personal Waterfowl Hunting Record

Instruction: 1. Fill out one line every day you hunt waterfowl, including days you shoot nothing. Use ZERO when this is the correct report.

2. Please enter your records immediately after each hunt.
(We find this most important in keeping accurate records)

Do Not Record Waterfowl Shot By Others

3. DO NOT MAIL this card. Use it to help answer the Questionnaire you will receive after the season.

(Keep This Card Handy – See Reverse Side)

Registre personnel de chasse aux oiseaux aquatiques

Indications: 1. Faire les inscriptions voulues sur une seule ligne par jour de chasse, y compris les jours où l'on rentre bredouille. Dans ce dernier cas, inscrire 0 (zéro).

2. Faire les inscriptions voulues après chaque chasse.
(Cela facilite la tenue exacte du registre.)

Ne pas inscrire à votre compte les oiseaux abattus
par d'autres.

3. CONSERVER la présente carte. Elle servira à établir les réponses au questionnaire qui vous sera adressé une fois la saison terminée.

(Garder la présente carte sous la main - Voir au verso)

[illegible]



Environment
Canada

Environnement
Canada

September, 1971

Dear Hunter,

The Canadian Wildlife Service wishes to maintain, and if possible, to improve migratory game bird hunting. To do that we need information from people like yourself.

You have been selected at random to participate in one of our surveys. In a few weeks you will receive a questionnaire regarding this season's harvest. The questionnaire is brief and will require only a few minutes of your time to complete.

Because we are contacting only a sample of all hunters it is especially important that your completed questionnaire be returned. All answers will be held in strict confidence.

Enclosed is a gold card which you will find helpful for keeping a record of your kill this season. It will help you answer the questionnaire quickly and accurately.

I hope you will have a very pleasant hunting season.

Cordially,

John S. Tener,
Director,
Canadian Wildlife Service.

(FRANCAIS AU VERSO)



Environnement
Canada

Environnement
Canada

Septembre, 1971

Ami chasseur,

Le Service canadien de la faune s'efforce d'assurer et d'améliorer la chasse aux oiseaux migrateurs. Pour y parvenir, nous avons besoin de la collaboration de personnes comme vous.

Nous vous avons choisi au hasard, espérant que vous voudrez participer à une de nos enquêtes. Dans quelques semaines, vous recevrez un questionnaire pour la prochaine saison de chasse. Comme il est assez court, il ne vous faudra que quelques minutes pour le remplir.

Puisque nous communiquons avec un nombre restreint de chasseurs, nous vous prions donc instamment de nous retourner ce questionnaire après l'avoir bien rempli. Toutes les réponses resteront confidentielles.

Je vous expédie sous ce pli une carte dorée qui vous aidera à inscrire vos prises au cours de la saison de chasse. Vous pourrez ensuite vous en servir pour répondre correctement et rapidement au questionnaire.

Je vous remercie bien sincèrement de votre collaboration et je vous souhaite une bonne chasse.

Bien à vous,

Le Directeur du Service
canadien de la faune,


John S. Tener

(ENGLISH ON REVERSE)

Appendix 3

Covering letters used in the first mailing
for questionnaires A, B, C, D, E.



Environment
Canada

Environnement
Canada

A, B, E

Dear Hunter,

- Enclosed is the short questionnaire to which I referred in my letter last September. It will take only a few minutes of your time to complete.

This study is of special importance at this time. In planning for the future, the Canadian Wildlife Service is very much interested in your hunting experience this season.

- Your cooperation in completing the questionnaire and returning it as soon as possible will be very much appreciated. All answers will be treated confidentially. A postage paid reply envelope is -- enclosed for your convenience.

I thank you in advance for your assistance in waterfowl management.

Cordially,

John S. Tener,
Director,
Canadian Wildlife Service.

Encls.

- Please note:- If you did not hunt this season please answer questions 1 and 2 only and return the questionnaire. All returns are equally important.
- Any comment you may wish to add is welcomed.

(FRANCAIS AU VERSO)



Ami chasseur,

- Je vous expédie sous ce pli le petit questionnaire dont je vous ai parlé dans ma lettre de septembre dernier. Il vous faudra seulement quelques minutes pour le remplir.

La présente enquête est d'une importance particulière. En prévision des besoins à venir, le Service canadien de la faune aurait grand profit à connaître le résultat de vos activités de chasse pendant cette saison.

- Vous nous rendriez service en remplissant le questionnaire et en le renvoyant aussitôt que possible dans l'enveloppe affranchie ci-jointe. Les réponses seront traitées confidentiellement.

Je vous remercie à l'avance de votre participation à la conservation de la faune.

Bien à vous,

Le Directeur du Service
canadien de la faune



John S. Tener

Pièces jointes

A noter:

- Si vous n'avez pas chassé cette saison, veuillez répondre aux deux premières questions seulement et retourner le questionnaire. Votre réponse est très importante.
- Vos commentaires seront bien accueillis.

(ENGLISH ON REVERSE)



Dear Hunter,

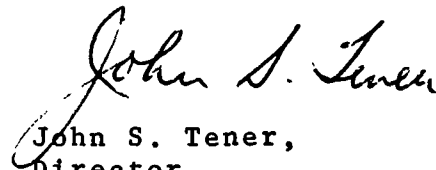
-- Enclosed is the short questionnaire to which I referred in my letter last September. It will take only a few minutes of your time to complete.

This study is of special importance at this time. In planning for the future, the Canadian Wildlife Service is very much interested in your hunting experience this season.

-- Your cooperation in completing the questionnaire and returning it as soon as possible will be very much appreciated. All answers will be treated confidentially. A postage paid envelope is enclosed for your convenience.

-- As a token of our appreciation you will also find enclosed the booklet "Ducks at a Distance". I thank you in advance for your assistance in water-fowl management.

Cordially,


John S. Tener,
Director,
Canadian Wildlife Service.

Please note: - If you did not hunt this season please answer questions 1 and 2 only and return the questionnaire. All returns are equally important.
- Any comment you may wish to add is welcomed.

(FRANCAIS AU VERSO)



Ami chasseur,

- Je vous expédie sous ce pli le petit questionnaire dont je vous ai parlé dans ma lettre de septembre dernier. Il vous faudra seulement quelques minutes pour le remplir.

La présente enquête est d'une importance particulière. En prévision des besoins à venir, le Service canadien de la faune aurait grand profit à connaître le résultat de vos activités de chasse pendant cette saison.

- Vous nous rendriez service en remplissant le questionnaire et en le renvoyant aussitôt que possible dans l'enveloppe affranchie ci-jointe. Les réponses seront traitées confidentiellement.

- En guise d'appréciation, il nous fait plaisir de vous expédier sous ce pli la brochure intitulée "Les canards vus à distance."

Je vous remercie à l'avance de votre participation à la conservation de la faune.

Bien à vous,

Le Directeur du Service
canadien de la faune



John S. Tener

Pièces jointes

A noter:

- Si vous n'avez pas chassé cette saison, veuillez répondre aux deux premières questions seulement et retourner le questionnaire. Votre réponse est très importante.
- Vos commentaires seront bien accueillis.

(ENGLISH ON REVERSE)



Environment
Canada

Environnement
Canada

D

Dear Hunter,

--

Enclosed is the short questionnaire to which I referred in my letter last September. It will take only a few minutes of your time to complete.

This study is of special importance at this time. In planning for the future, the Canadian Wildlife Service is very much interested in your hunting experience this season.

Your cooperation in completing the questionnaire and returning it as soon as possible will be very much appreciated. All answers will be treated confidentially and no signature is required.

I thank you in advance for your assistance in waterfowl management.

Cordially,

John S. Tener,
Director,
Canadian Wildlife Service.

Please note:- If you did not hunt this season please answer questions 1 and 2 only and return the questionnaire. All returns are equally important.

- Any comment you may wish to add is welcomed.

(FRANCAIS AU VERSO)



Environnement
Canada

Environnement
Canada

Ami chasseur,

- Je vous expédie sous ce pli le petit questionnaire dont je vous ai parlé dans ma lettre de septembre dernier. Il vous faudra seulement quelques minutes pour le remplir.

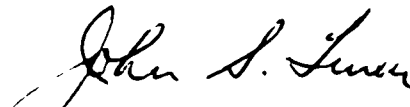
La présente enquête est d'une importance particulière. En prévision des besoins à venir, le Service canadien de la faune aurait grand profit à connaître le résultat de vos activités de chasse pendant cette saison.

- Vous nous rendriez service en remplissant le questionnaire et en le renvoyant aussitôt que possible dans l'enveloppe affranchie ci-jointe. Les réponses seront traitées confidentiellement et aucune signature n'est exigée.

Je vous remercie à l'avance de votre participation à la conservation de la faune.

Bien à vous,

Le Directeur du Service
canadien de la faune



John S. Tener

Pièces jointes

A noter:

- Si vous n'avez pas chassé cette saison, veuillez répondre aux deux premières questions seulement et retourner le questionnaire. Votre réponse est très importante.
- Vos commentaires seront bien accueillis.

(ENGLISH ON REVERSE)

Appendix 4

Covering letters used in the second mailing
(first follow-up) for questionnaires A, B, C, D, E, K.



Environnement
Canada

Environnement
Canada

Ami chasseur,

Au cas où vous n'auriez pu nous renvoyer le petit questionnaire que je vous ai expédié dernièrement, je prends la liberté de vous adresser ce petit mot, vous rappelant que:

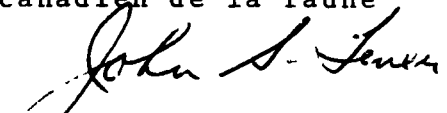
- Le Service canadien de la faune attache beaucoup d'importance à vos réponses;
- elles contribueront à améliorer la conservation du gibier au Canada;
- vos réponses seront traitées confidentiellement.

-- Nous serions heureux d'incorporer à notre enquête les données résultant de vos activités de chasse. Vous trouverez sous ce pli un autre questionnaire, dont vous pourriez avoir besoin. Seriez-vous assez bon de le remplir et de le mettre à la poste aujourd'hui même? Si vous avez déjà renvoyé le premier questionnaire, je vous prie de ne pas tenir compte de la présente lettre.

De nouveau, je vous remercie sincèrement de votre collaboration.

Bien à vous,

Le Directeur du Service
canadien de la faune



John S. Tener

Pièce jointe

A noter:

- Si vous n'avez pas chassé cette saison, veuillez répondre aux deux premières questions seulement et retourner le questionnaire. Votre réponse est très importante.
- Vos commentaires seront bien accueillis.

(ENGLISH ON REVERSE)



Dear Hunter,

Just in case you have not had a chance to return the short questionnaire I sent you recently, I am sending you this letter as a reminder that -

- Your answers are important to the Wildlife Service.
- Your answers will help maintain and improve waterfowl management in Canada.
- Your answers will be held confidential.

We would like to include your hunting experience in our survey. For your convenience I am sending you another questionnaire. Would you please complete it and mail it today? If you have already returned the previous questionnaire please excuse this letter - and again, my sincere thanks for your help.

Cordially,

John S. Tener,
Director,
Canadian Wildlife Service.

Please note:- If you did not hunt this season please answer questions 1 and 2 only and return the questionnaire. All returns are equally important.

- Any comment you may wish to add is welcomed.



Environnement
Canada

Environnement
Canada

Ami chasseur,

Au cas où vous n'auriez pu nous renvoyer le petit questionnaire que je vous ai expédié dernièrement, je prends la liberté de vous adresser ce petit mot, vous rappelant que:

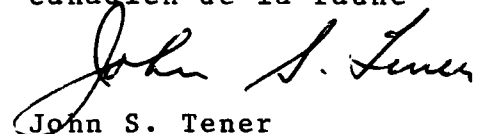
- Le Service canadien de la faune attache beaucoup d'importance à vos réponses;
- elles contribueront à améliorer la conservation du gibier du Canada;
- vos réponses seront traitées confidentiellement;
- aucune signature n'est exigée.

-- Nous serions heureux d'incorporer à notre enquête les données résultant de vos activités de chasse. Vous trouverez sous ce pli un autre questionnaire, dont vous pourriez avoir besoin. Seriez-vous assez bon de le remplir et de le mettre à la poste aujourd'hui même? Si vous avez déjà renvoyé le premier questionnaire, je vous prie de ne pas tenir compte de la présente lettre.

De nouveau, je vous remercie sincèrement de votre collaboration.

Bien à vous,

Le Directeur du Service
canadien de la faune



John S. Tener

Pièce jointe

A noter:

- Si vous n'avez pas chassé cette saison, veuillez répondre aux deux premières questions seulement et retourner le questionnaire. Votre réponse est très importante.
- Vos commentaires seront bien accueillis.

(ENGLISH ON REVERSE)



Dear Hunter,

Just in case you have not had a chance to return the short questionnaire I sent you recently, I am sending you this letter as a reminder that -

- Your answers are important to the Wildlife Service.
- Your answers will help maintain and improve waterfowl management in Canada.
- Your answers will be held in strict confidence.
- No signature is required.

We would like to include your hunting experience in our survey. Would you please help us by completing the questionnaire and mailing it today? If you have already returned the questionnaire please excuse this letter - and again, my sincere thanks for your help.

Cordially,

John S. Tener,
Director,
Canadian Wildlife Service.

Please note:- If you did not hunt this season please answer questions 1 and 2 only and return the questionnaire. All returns are equally important.

- Any comment you may wish to add is welcomed.

(FRANCAIS AU VERSO)

Appendix 5

Covering letters used in the third mailing
(second follow-up) for treatments A, B, C, E, K, R.



Environment
Canada

Environnement
Canada

*We do need your help.
Please reply before February 22.
This is our last mailing.*

Dear Hunter,

Just in case you have not had a chance to return the short questionnaire I sent you recently, I am sending you this letter as a reminder that -

- Your answers are important to the Wildlife Service.
- Your answers will help maintain and improve waterfowl management in Canada.
- Your answers will be held confidential.

We would like to include your hunting experience in our survey. For your convenience I am sending you another questionnaire. Would you please complete it and mail it today? If you have already returned the previous questionnaire please excuse this letter - and again, my sincere thanks for your help.

Cordially,

John S. Tener,
Director,
Canadian Wildlife Service.

Please note:- If you did not hunt this season please answer questions 1 and 2 only and return the questionnaire. All returns are equally important.

- Any comment you may wish to add is welcomed.

(FRANCAIS AU VERSO)



Environment
Canada

Environnement
Canada

*Votre aide nous est indispensable
Prière de répondre avant le 22 février.
C'est le dernier questionnaire.*

Ami chasseur,

Au cas où vous n'auriez pu nous renvoyer le petit questionnaire que je vous ai expédié dernièrement, je prends la liberté de vous adresser ce petit mot, vous rappelant que:

- Le Service canadien de la faune attache beaucoup d'importance à vos réponses;
- elles contribueront à améliorer la conservation du gibier au Canada;
- vos réponses seront traitées confidentiellement.

Nous serions heureux d'incorporer à notre enquête les données résultant de vos activités de chasse. Vous trouverez sous ce pli un autre questionnaire, dont vous pourriez avoir besoin. Seriez-vous assez bon de le remplir et de le mettre à la poste aujourd'hui même? Si vous avez déjà renvoyé le premier questionnaire, je vous prie de ne pas tenir compte de la présente lettre.

De nouveau, je vous remercie sincèrement de votre collaboration.

Bien à vous,

Le Directeur du Service
canadien de la faune

John S. Tener

Pièce jointe

A noter:

- Si vous n'avez pas chassé cette saison, veuillez répondre aux deux premières questions seulement et retourner le questionnaire. Votre réponse est très importante.
- Vos commentaires seront bien accueillis.

Appendix 6

Treatment A

(Migratory Game Bird Harvest Questionnaire
in use up to 1971 inclusive)



ENVIRONNEMENT
CANADA

ENVIRONNEMENT
CANADA

CANADIAN WILDLIFE SERVICE
SERVICE CANADIEN DE LA FAUNE

1. Did you purchase a Canada migratory game bird hunting permit at the Post Office this year?

Avez-vous acheté, cette année, un permis canadien de chasse aux oiseaux migrateurs considérés comme gibier?

Please return the questionnaire even if you did not buy a permit this year. *Prière de retourner le questionnaire, même si vous n'avez pas acheté de permis, cette année.*

Yes ☐
Oui ☐

No ☐
Non ☐

If yes give permit No.
Dans l'affirmative,
inscrivez-en le numéro

2. In this question, "waterfowl" means all Ducks (including Merganser, Scoter, Eider, and Old-squaw), all Geese (including Brant), and American Coots (mud hens).

In this question, other migratory game birds means Rails, Gallinules, Snipe, Doves, Pigeons, Cranes or Woodcock.

Count one day for every date on which you hunted waterfowl. If you did not hunt at all during the season, place only a zero (0) in question 2, and mail the questionnaire.

NUMBER OF DAYS on which you hunted waterfowl this season.

NOMBRE TOTAL DE JOURS où vous avez chassé les oiseaux aquatiques, cette saison.

NUMBER OF DAYS on which you hunted other migratory game birds.

NOMBRE DE JOURS où vous avez chassé d'autres oiseaux migrateurs considérés comme gibier.

2. Dans la présente question, l'expression "oiseaux aquatique" signifie tous les canards (y compris les becs-scie, les macreuses, les eiders et les ka-kawis), toutes les oies (y compris la barmache cravant) et les foulques d'Amérique (poules d'eau).

Dans cette question, oiseaux migrateurs signifie les râles, les gallinules, les bécassines, les tourterelles, les pigeons, les grues et les bécasses.

Comptez un jour pour chaque date à laquelle vous avez chassé les oiseaux aquatiques. Si vous n'avez pas chassé de la saison, n'inscrivez qu'un zéro (0) à la question 2, et mettez le questionnaire à la poste.

- Place numbers in all spaces below to show your own personal hunting totals. Place a zero (0) for any kind of bird you did not shoot. Do not include birds killed or crippled by other hunters.

Indiquez le nombre total de vos prises personnelles dans les cases ci-dessous. Marquez un zéro (0) si vous n'avez abattu aucun oiseau des espèces indiquées. Ne mentionnez pas les oiseaux abattus ou blessés par d'autres chasseurs.

I KILLED AND RETRIEVED:
J'AI ABATTU ET RAPPORTÉ:

I KILLED AND RETRIEVED ALSO:
J'AI ABATTU ET RAPPORTÉ AUSSI:

Ducks
canards

Coots (mud hens)
foulques (poules d'eau)

Sea Ducks
canards de mer

Canada Geese
Barmache du Canada
Other Geese (including
Brant)
Autres oies barmaches
(cravant comprises)

Snipe
bécassines
Woodcock
bécasses
Mourning Doves
tourterelles tristes

Band-tailed Pigeons
pigeons du Pacifique
Gallinules
gallinules
Cranes
grues

4. How many of the birds you shot THIS SEASON wore metal leg-bands?
Parmi les oiseaux que vous avez abattus, cette saison, combien portaient des bagues métalliques?

Ducks ☐ Canada Geese ☐ Other Geese ☐ Coots ☐ Others ☐
canards Bernache du Canada Autres oies foulques Autres

Kind of Bird Genre d'oiseau	Band Number Numéro de Bague	Date Taken Date de prise				Place Taken Lieu de prise		Has This Band Been Reported Previously? Cette bague a-t-elle déjà été rapportée?
		Mon. Mois	Day Jour	Yr. Année	Prov.	Nearest Town Localité la plus proche	Local Area Région	

5. Please circle the province or territory where you did most of your hunting for migratory birds this season.

Prière d'encercler le nom de la province ou du territoire où vous avez surtout chassé, cette saison, les oiseaux migrateurs.

- 01 Nfld. — T.-N. 05 Que. — P.Q. 09 Alta. — A/b.
02 P.E.I. — I.-P.-É. 06 Ont. 10 B.C. — C.-B.
03 N.S. — N.-É. 07 Man. 11 N.W.T. — T.N.-O.
04 N.B. — N.-B. 08 Sask. 12 Yukon

6. Print Name of City, Town or Village (with Post Office) near place where most of your hunting was done, in rectangular box.

Inscrire en lettres moulées dans le rectangle le nom de la localité (Bureau de poste) le plus proche de l'endroit où vous avez chassé le plus.

Indicate with "X" in one of the circles showing direction from town to place where most of your hunting was done.

Indiquer par un "X" dans le cercle approprié dans quelle direction se trouve, par rapport à la localité, l'endroit où vous avez chassé le plus.

Give the distance in miles (approx.) from town nearest to place where most of your hunting was done.

Donner approximativement, en milles, la distance entre la localité et l'endroit où vous avez chassé le plus.

Northwest Nord-ouest North Nord Northeast Nord-est

Distance in Miles Distance en milles

8. 1. 2.

West Ouest East Est

7. 3. 4.

Southwest Sud-ouest South Sud Southeast Sud-est

Town — Localité

Distance in Miles Distance en milles

6. 5.

7. Did you hunt Migratory Game Birds in Canada?

Avez-vous chassé, au Canada, des oiseaux migrateurs considérés comme gibier?

In 1969 Yes Oui No
En 1969 Oui Non

In 1970 Yes Oui No
En 1970 Oui Non

8. DUCK CALENDAR: We would like to know when during the season you killed your ducks and how many you killed each day (except Merganser and sea ducks, i.e. Scoter, Eider, and Old-squaw, which in some places have special regulations).

Leave blank all dates you did not hunt waterfowl.

On days you hunted waterfowl during the duck season, show in the correct date-spaces the NUMBER OF DUCKS ONLY that you yourself killed and retrieved. DO NOT show other birds (geese, coots, sea ducks, etc.) in the calendar.

For all days of the ducks season on which you hunted but did not kill any ducks mark zero (0) in the proper date-spaces. Mark zero even if you killed other birds, (such as geese, sea ducks, etc.)

8. CALENDRIER DE LA CHASSE AU CANARD: Nous aimerions savoir quand au cours de la saison, vous avez abattu des canards et combien vous en avez abattu chaque jour, (à l'exception des bec-scie et des canards de mer, c'est-à-dire, les macreuses, les eiders et les kakawis, à l'égard desquels il existe, en certains endroits, des règlements spéciaux).

Laissez en blanc toutes les dates où vous n'avez pas chassé les oiseaux aquatiques.

Pour les jours où vous avez chassé les oiseaux aquatiques, pendant la saison de chasse aux canards, indiquez, à la date voulue, le NOMBRE DE CANARDS SEULEMENT que vous avez vous-même abattus et rapporté. NE PAS INDIQUER au calendrier les autres oiseaux (oies, foulques, canards de mer et autres).

Pour tous les jours de la saison de chasse aux canards où vous avez chassé mais n'avez pas abattu de canard, inscrivez zéro (0) à la date voulue. Inscrivez zéro même si vous avez abattu d'autres oiseaux (te que oies, canards de mer et autres).

September 1971 <i>Septembre</i>						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		
D	L	M	M	J	F	S

October 1971 <i>Octobre</i>						
S	M	T	W	T	F	S
				1	2	
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						
D	L	M	M	J	F	S

November 1971 <i>Novembre</i>						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				
D	L	M	M	J	V	S

December 1971 <i>Décembre</i>						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
27	28	29	30	31		
D	L	M	M	J	F	S

January 1972 <i>Janvier</i>						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					
D	L	M	M	J	F	S

9. In August we sent you a card to keep a record of your harvest. Did you find it useful?

En août, nous vous avons envoyé une fiche pour y noter vos prises. L'avez-vous trouvée utile?

Yes Oui No Non

Appendix 7

Treatment B

(Redesigned Migratory Game Bird Harvest Questionnaire

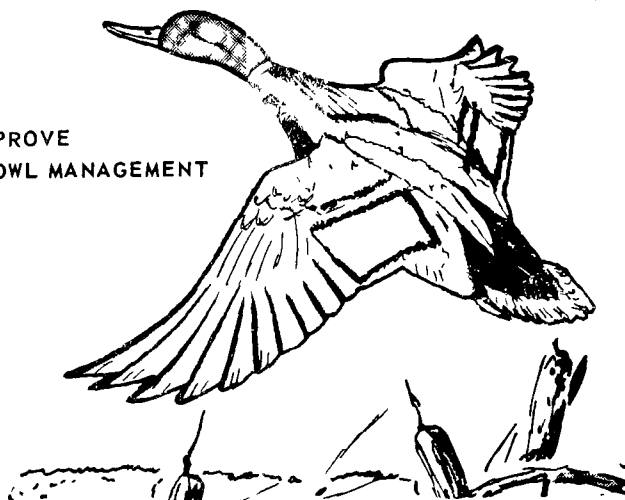
Printed on 8½" x 11" paper using blue ink)

CANADIAN WILDLIFE SERVICE

1971 MIGRATORY GAME BIRD HUNTING SURVEY

PLEASE ANSWER THIS SHORT QUESTIONNAIRE
JUST CHECK (✓) OR FILL IN THE BLUE SPACES

HELP IMPROVE
WATERFOWL MANAGEMENT



1 DID YOU BUY A CANADA MIGRATORY GAME BIRD
HUNTING PERMIT AT THE POST OFFICE THIS YEAR?

YES ☐ → IF YES GIVE
NO ☐ PERMIT NUMBER

2 DID YOU HUNT MIGRATORY
GAME BIRDS IN CANADA?

THIS SEASON IN 1970 IN 1969
YES ☐ YES ☐ YES ☐
NO ☐ NO ☐ NO ☐

IF YOU DID NOT HUNT
THIS SEASON PLEASE
COMPLETE QUESTIONS
1 & 2 ONLY AND
RETURN THE
QUESTIONNAIRE

3 SHOW
ONE PROVINCE
WHERE YOU DID
MOST OF YOUR
HUNTING FOR GAME
BIRDS THIS SEASON

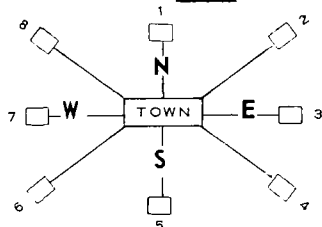
- NFLD. ☐ 1
P.E.I. ☐ 2
N.S. ☐ 3
N.B. ☐ 4
QUE. ☐ 5
ONT. ☐ 6
MAN. ☐ 7
SASK. ☐ 8
ALTA. ☐ 9
B.C. ☐ 10
N.W.T. ☐ 11
YUKON ☐ 12

4 PRINT NAME OF TOWN (WITH A POST
OFFICE) NEAREST THE PLACE
WHERE YOU DID MOST OF YOUR
HUNTING THIS SEASON

5 HOW FAR IS THE
HUNTING PLACE
FROM THAT TOWN

 MILES

6 SHOW THE DIRECTION OF THE
HUNTING PLACE FROM THAT TOWN



7 NUMBER OF DAYS ON WHICH YOU HUNTED
"WATERFOWL" (DUCKS, GEESE, COOTS) THIS SEASON

 DAYS

8 NUMBER OF DAYS ON WHICH YOU HUNTED "OTHER"
MIGRATORY GAME BIRDS
(RAILS, GALLINULES, SNIPE, DOVES, BAND-
TAILED PIGEONS, CRANES, WOODCOCK)

 DAYS

9 NUMBER OF BIRDS YOU KILLED AND RETRIEVED:

DUCKS		SEA DUCKS		COOTS	
CANADA GEESE		OTHER GEESE (INCLUDING BRANT)		SNIPE	
WOODCOCK		MOURNING DOVES		BAND- TAILED PIGEONS	
GALLINULES		CRANES		UNKNOWN	

10 DUCK CALENDAR: SHOW IN THE CALENDAR THE NUMBER OF
DUCKS YOU KILLED & RETRIEVED FOR EACH DAY YOU HUNTED
DURING THE REGULAR DUCK SEASON.

PLEASE DO NOT INCLUDE MERGANSER & SEA DUCKS
MARK ZERO (0) WHEN YOU HUNTED BUT KILLED NO DUCKS.
LEAVE BLANK ALL DATES NOT HUNTED

SEPTEMBER 1971							OCTOBER 1971							
S	M	T	W	T	F	S	S	M	T	W	T	F	S	
				1	2	3	4					1	2	
5	6	7	8	9	10	11	3	4	5	6	7	8	9	
12	13	14	15	16	17	18	10	11	12	13	14	15	16	
19	20	21	22	23	24	25	17	18	19	20	21	22	23	
26	27	28	29	30			24	25	26	27	28	29	30	31

11 HOW MANY OF THE BIRDS
YOU SHOT THIS SEASON
HAD METAL LEG-BANDS?

DUCKS CANADA
GEESE
OTHER
GEESE OTHERS

NOVEMBER 1971						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

DECEMBER 1971							
S	M	T	W	T	F	S	
				1	2	3	4
5	6	7	8	9	10	11	
12	13	14	15	16	17	18	
19	20	21	22	23	24	25	
26	27	28	29	30	31		

JANUARY 1972						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

SPECIES	BAND NUMBER	DATE TAKEN			PLACE TAKEN		HAVE YOU REPORTED THIS BAND BEFORE
		DAY	MONTH	YEAR	PROVINCE	NEAREST TOWN	
							YES ☐ NO ☐
							YES ☐ NO ☐
							YES ☐ NO ☐

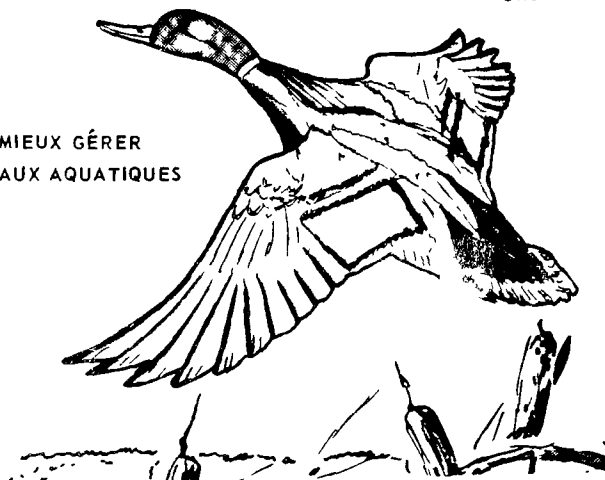
PLEASE RETURN THE QUESTIONNAIRE TODAY IN THE PREPAID ENVELOPE - THANKS AGAIN!

SERVICE CANADIEN DE LA FAUNE

RELEVÉ DE CHASSE AUX OISEAUX MIGRATEURS, 1971

VEUILLEZ RÉPONDRE À CE PETIT QUESTIONNAIRE
COCHEZ (✓) OU REMPLISSEZ LES CARRÉS BLEUS

AIDEZ À MIEUX GÉRER
LES OISEAUX AQUATIQUES



1 AVEZ-VOUS OBTENU, CETTE ANNÉE, UN PERMIS DE CHASSE
AUX OISEAUX AQUATIQUES CONSIDÉRÉS COMME GIBIER ?

OUI ☐
NON ☐

INSCRIVEZ-EN
LE NUMÉRO

2 AVEZ-VOUS CHASSÉ, AU CANADA, DES OISEAUX
MIGRATEURS CONSIDÉRÉS COMME GIBIER ?

CETTE SAISON
OUI ☐
NON ☐

EN 1970
OUI ☐
NON ☐

EN 1969
OUI ☐
NON ☐

SI VOUS N'AVEZ PAS
CHASSÉ CETTE SAISON,
RÉPONDEZ AUX
QUESTIONS 1 ET 2
SEULEMENT, PUIS
RETOURNEZ NOUS
LE QUESTIONNAIRE

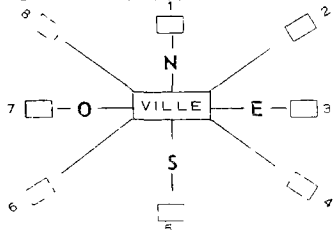
3 INDIQUEZ
UNE PROVINCE
OÙ VOUS AVEZ
SURTOUT CHASSÉ
LES OISEAUX
MIGRATEURS
CETTE SAISON ?

- T.N. ☐ 1
I.P.E. ☐ 2
N.E. ☐ 3
N.B. ☐ 4
QUÉ. ☐ 5
ONT. ☐ 6
MAN. ☐ 7
SASK. ☐ 8
ALB. ☐ 9
C.B. ☐ 10
T.N.O. ☐ 11
YUKON ☐ 12

4 ÉCRIVEZ LE NOM DE LA LOCALITÉ
(AYANT UN BUREAU DE POSTE) LA
'PLUS PROCHE DE L'ENDROIT OÙ
VOUS AVEZ SURTOUT CHASSÉ ?

5 QUELLE EST LA
DISTANCE ENTRE
L'ENDROIT DE CHASSE
ET CETTE LOCALITÉ ?

6 QUELLE EST LA DIRECTION DE
L'ENDROIT DE CHASSE PAR RAPPORT
À CETTE LOCALITÉ ?



7 LE NOMBRE DE JOURS OÙ VOUS AVEZ CHASSÉ
DES OISEAUX AQUATIQUES (CANARDS, OIES,
FOULQUES) CETTE SAISON

JOURS

8 LE NOMBRE DE JOURS OÙ VOUS AVEZ CHASSÉ D'AUTRES
OISEAUX MIGRATEURS
(RÂLES, GALLINULES, BÉCASSINES, TOUTERELLES,
PIGEONS DU PACIFIQUE, GRUES, BÉCASSES)

JOURS

9 LE NOMBRE D'OISEAUX QUE VOUS AVEZ ABATTUS ET RAPPORTÉS:

CANARDS		CANARDS DE MER		FOULQUES (POULES D'EAU)	
BÉRIACHES DU CANADA		AUTRES OIES BERNACHES (CRAVANT COMPRIS)		BÉCASSINES	
BÉCASSES		TOUTERELLES TRISTES		PIGEONS DU PACIFIQUE	
GALLINULES		GRUES		INCONNUS	

10 CALENDRIER DE LA CHASSE AU CANARD: MONTRÉZ SUR LE
CALENDRIER LE NOMBRE DE CANARDS ABATTUS ET RAPPORTÉS
POUR CHAQUE JOUR OÙ VOUS AVEZ CHASSÉ DURANT LA
SAISON RÉGULIÈRE

(À L'EXCEPTION DES BECS-SCIE ET DES CANARDS DE MER)
INSCRIVEZ ZÉRO (0) LORSQUE VOUS AVEZ CHASSÉ SANS ABATTRE
DE CANARDS.
LAISSEZ EN BLANC LES DATES OÙ VOUS N'AVEZ PAS CHASSÉ

SEPTEMBRE 1971

D	L	M	M	J	V	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

OCTOBRE 1971

D	L	M	M	J	V	S
				1	2	
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

11 PARMI LES OISEAUX QUE
VOUS AVEZ ABATTUS
CETTE SAISON, COMBIEN POR-
TAIENT UNE BAGUE MÉTALLI-
QUE ?

CANARDS BÉCASSINES DU CANADA
AUTRES OIES AUTRES
BÉCASSES

NOVEMBRE 1971

D	L	M	M	J	V	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

DÉCEMBRE 1971

D	L	M	M	J	V	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

JANVIER 1972

D	L	M	M	J	V	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

ESPÈCE	NUMÉRO DE BAGUE	DATE DE PRISE			LIEU DE PRISE		AVEZ-VOUS RAPPORTÉ CETTE BAGUE DÉJÀ ?
		MOIS	JOUR	ANNÉE	PROVINCE	LOCALITÉ LA PLUS PROCHE	
							OUI ☐ NON ☐
							OUI ☐ NON ☐
							OUI ☐ NON ☐

VEUILLEZ ENVOYER LE QUESTIONNAIRE DES AUJOURD'HUI DANS L'ENVELOPPE PRÉ-AFFRANCHIE - MERCI

Appendix 8

Treatment E ,C

(Redesigned Migratory Game Bird Harvest Questionnaire

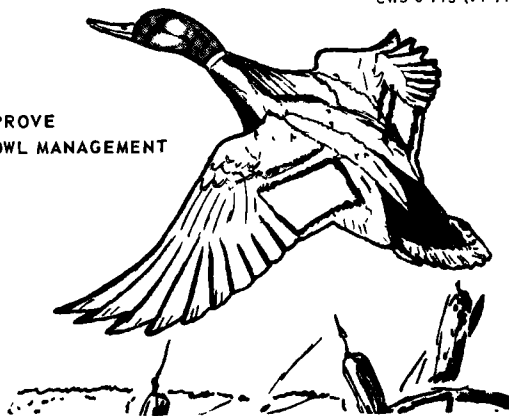
Printed on 8½" x 14" paper using blue ink)

CANADIAN WILDLIFE SERVICE

1971 MIGRATORY GAME BIRD HUNTING SURVEY

PLEASE ANSWER THIS SHORT QUESTIONNAIRE
JUST CHECK (✓) AND FILL IN THE BLUE SPACES

HELP IMPROVE
WATERFOWL MANAGEMENT



1 DID YOU BUY A CANADA MIGRATORY GAME BIRD HUNTING PERMIT AT THE POST OFFICE THIS YEAR?

YES ☐ IF YES PLEASE
NO ☐ GIVE PERMIT NO.

IF YOU DID NOT
HUNT THIS SEASON
PLEASE COMPLETE
QUESTIONS 1 & 2
ONLY AND RETURN
THE QUESTIONNAIRE

2 DID YOU HUNT MIGRATORY GAME BIRDS IN CANADA?

THIS SEASON IN 1970 IN 1969
YES ☐ YES ☐ YES ☐
NO ☐ NO ☐ NO ☐

3 SHOW ONE PROVINCE WHERE YOU DID MOST
OF YOUR HUNTING FOR MIGRATORY GAME
BIRDS THIS SEASON.

N.F.L.D. ☐ 1 P.E.I. ☐ 2 N.S. ☐ 3
N.B. ☐ 4 QUE. ☐ 5 ONT. ☐ 6
MAN. ☐ 7 SASK. ☐ 8 ALTA. ☐ 9
B.C. ☐ 10 N.W.T. ☐ 11 YUKON ☐ 12

4 PRINT THE NAME OF THE TOWN (WITH A POST OFFICE) NEAREST THE PLACE
WHERE YOU DID MOST OF YOUR HUNTING THIS SEASON.

5 HOW FAR IS THE HUNTING PLACE FROM THAT TOWN MILES

6 SHOW THE DIRECTION OF THE HUNTING PLACE FROM THAT TOWN NORTH ☐ 1 EAST ☐ 2 SOUTH ☐ 3 WEST ☐ 4
NORTH ☐ 5 NORTH ☐ 6 SOUTH ☐ 7 SOUTH ☐ 8
EAST WEST EAST WEST

7 NUMBER OF DAYS ON WHICH YOU HUNTED "WATERFOWL" (DUCKS, GEESE, COOTS) THIS SEASON DAYS

8 NUMBER OF DAYS ON WHICH YOU HUNTED "OTHER" MIGRATORY GAME BIRDS (RAILS, GALLINULES, SNIPE, DOVES,
BAND-TAILED PIGEONS, CRANES, WOODCOCK) DAYS

9 NUMBER OF BIRDS YOU KILLED & RETRIEVED

DUCKS SEA DUCKS COOTS CANADA GEESE OTHER GEESE SNIPE
WOODCOCK MOURNING DOVE BAND-TAILED PIGEONS GALLINULES CRANES UNKNOWN

10 DUCK CALENDAR.
SHOW IN THE CALENDAR THE NUMBER OF DUCKS YOU KILLED & RETRIEVED FOR EACH DAY YOU HUNTED DURING THE
REGULAR DUCK SEASON.
PLEASE DO NOT INCLUDE MERGANSER & SEA DUCKS
MARK ZERO (0) WHEN YOU HUNTED BUT KILLED NO DUCKS.
LEAVE BLANK ALL DATES NOT HUNTED

SEPTEMBER 1971						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

OCTOBER 1971						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

11 HOW MANY OF THE BIRDS
YOU SHOT THIS SEASON
HAD METAL LEG-BANDS?

DUCKS CANADA GEESE
OTHER GEESE OTHERS

NOVEMBER 1971						
S	M	T	W	T	F	S
1	2	3	4	5	6	
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

DECEMBER 1971						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

JANUARY 1972						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

SPECIES	BAND NUMBER	DATE TAKEN			PLACE TAKEN		HAVE YOU REPORTED THIS BAND BEFORE
		DAY	MONTH	YEAR	PROVINCE	NEAREST TOWN	
							YES ☐ NO ☐
							YES ☐ NO ☐
							YES ☐ NO ☐

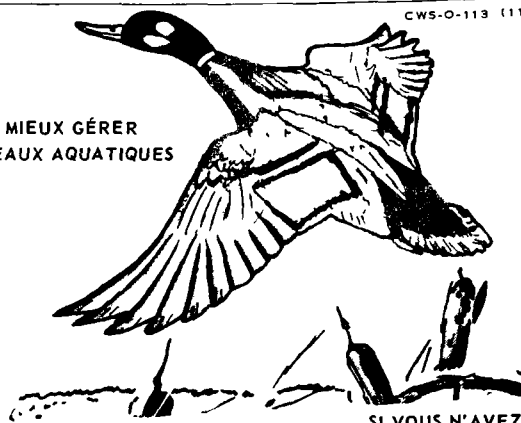
PLEASE RETURN THE QUESTIONNAIRE TODAY IN THE PREPAID ENVELOPE - THANKS AGAIN

SERVICE CANADIEN DE LA FAUNE

RELEVÉ DE CHASSE AUX OISEAUX MIGRATEURS, 1971

VEUILLEZ RÉPONDRE À CE PETIT QUESTIONNAIRE
COCHER () OU REMPLISSEZ LES CARRÉS BLEUS

AIDEZ À MIEUX GÉRER
LES OISEAUX AQUATIQUES



1 AVEZ-VOUS OBTENU, CETTE ANNÉE, UN PERMIS DE CHASSE AUX OISEAUX AQUATIQUES CONSIDÉRÉS COMME GIBIER?

OUI ☐
NON ☐

INSCRIVEZ-EN LE NUMÉRO

SI VOUS N'AVEZ PAS CHASSÉ CETTE SAISON, RÉPONDEZ AUX QUESTIONS 1 ET 2 SEULEMENT, PUIS RETOURNEZ-NOUS LE QUESTIONNAIRE

2 AVEZ-VOUS CHASSÉ, AU CANADA, DES OISEAUX MIGRATEURS CONSIDÉRÉS COMME GIBIER?

CETTE SAISON
OUI ☐
NON ☐

EN 1970
OUI ☐
NON ☐

EN 1969
OUI ☐
NON ☐

3 INDIQUEZ UNE PROVINCE OÙ VOUS AVEZ SURTOUT CHASSÉ LES OISEAUX MIGRATEURS CETTE SAISON?

IN ☐ 1
NB ☐ 4
MAN ☐ 7
CB ☐ 9

PE ☐ 2
QUÉ ☐ 5
SASK ☐ 8
TNO ☐ 11

NE ☐ 3
ONT ☐ 6
ALB ☐ 9
YUKON ☐ 12

4 ÉCRIVEZ LE NOM DE LA LOCALITÉ (AYANT UN BUREAU DE POSTE) LA PLUS PROCHE DE L'ENDROIT OÙ VOUS AVEZ SURTOUT CHASSÉ?

5 QUELLE EST LA DISTANCE ENTRE L'ENDROIT DE CHASSE ET CETTE LOCALITÉ?

MILLES

6 QUELLE EST LA DIRECTION DE L'ENDROIT DE CHASSE PAR RAPPORT À CETTE LOCALITÉ?

NORD ☐ 1
NORD EST ☐ 5

EST ☐ 2
NORD OUEST ☐ 6

SUD ☐ 3
SUD EST ☐ 7

OUEST ☐ 4
SUD OUEST ☐ 8

7 LE NOMBRE DE JOURS OÙ VOUS AVEZ CHASSÉ DES OISEAUX AQUATIQUES (CANARDS, OIES, FOULQUES) CETTE SAISON

 JOURS

8 LE NOMBRE DE JOURS OÙ VOUS AVEZ CHASSÉ D'AUTRES OISEAUX MIGRATEURS (RÂLES, GALLINULES, BÉCASSINES, TOURTERELLES, PIGEONS DU PACIFIQUE, GRUES, BÉCASSES)

 JOURS

9 LE NOMBRE D'OISEAUX QUE VOUS AVEZ ABATTUS ET RAPPORTÉS

CANARDS	CANARDS DE MER	FOULQUES (POULES D'EAU)	BERNACHES DU CANADA	AUTRES OIES BERNACHES (CRAVANT COMPRIS)	BÉCASSINES
BÉCASSES	TOURTERELLES TRISTES	PIGEONS DU PACIFIQUE	GALLINULES	GRUES	INCONNUS

10 CALENDRIER DE LA CHASSE AU CANARD
MONTREZ SUR LE CALENDRIER LE NOMBRE DE CANARDS ABATTUS ET RAPPORTÉS POUR CHAQUE JOUR OÙ VOUS AVEZ CHASSÉ DURANT LA SAISON RÉGULIÈRE
(À L'EXCEPTION DES BECS-SCIE ET DES CANARDS DE MER)
INSCRIVEZ ZÉRO (0) LORSQUE VOUS AVEZ CHASSÉ SANS ABATTRE DE CANARDS.
LAISSEZ EN BLANC LES DATES OÙ VOUS N'AVEZ PAS CHASSÉ

SEPTEMBRE 1971						
D	L	M	M	J	V	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

OCTOBRE 1971						
D	L	M	M	J	V	S
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

11 PARMI LES OISEAUX QUE VOUS AVEZ ABATTUS CETTE SAISON, COMBIEN PORTAIENT UNE BAGUE MÉTALLIQUE?

CANARDS BERNACHES DU CANADA
AUTRES OIES BERNACHES AUTRES

NOVEMBRE 1971						
D	L	M	M	J	V	S
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

DÉCEMBRE 1971						
D	L	M	M	J	V	S
6	7	8	9	10	11	
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

JANVIER 1972						
D	L	M	M	J	V	S
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

ESPECE	NUMERO DE BAGUE	DATE DE PRISE			LIEU DE PRISE		AVEZ-VOUS RAPPORTÉ CETTE BAGUE DÉJÀ?
		MOIS	JOUR	ANNÉE	PROVINCE	LOCALITÉ LA PLUS PROCHE	
							OUI ☐ NON ☐
							OUI ☐ NON ☐
							OUI ☐ NON ☐

VEUILLEZ RENVoyer LE QUESTIONNAIRE DES AUJOURD'HUI DANS L'ENVELOPPE PRE-AFFRANCHIE - MERCI!

Appendix 9

Treatment K

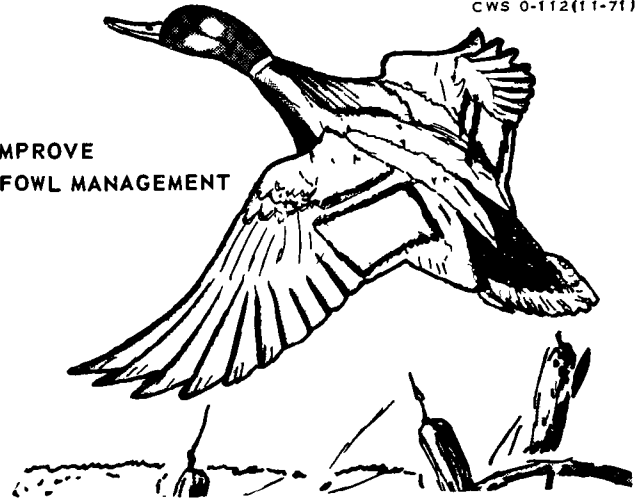
(Redesigned Migratory Game Bird Harvest Questionnaire
excluding Duck Calendar and three questions on place of hunting,
Printed on 8½" x 11" paper using blue ink)

CANADIAN WILDLIFE SERVICE

1971 MIGRATORY GAME BIRD HUNTING SURVEY

PLEASE ANSWER THIS SHORT QUESTIONNAIRE
JUST CHECK (✓) OR FILL IN THE BLUE SPACES

HELP IMPROVE
WATERFOWL MANAGEMENT



1. DID YOU BUY A CANADA MIGRATORY GAME BIRD HUNTING PERMIT AT THE POST OFFICE THIS YEAR?

YES ☐ → IF YES PLEASE
NO ☐ GIVE PERMIT NO.

IF YOU DID NOT
HUNT THIS SEASON
PLEASE COMPLETE
QUESTIONS 1 & 2
ONLY AND RETURN
THE QUESTIONNAIRE

2. DID YOU HUNT
MIGRATORY GAME BIRDS IN CANADA?

THIS SEASON
YES ☐
NO ☐

IN 1970
YES ☐
NO ☐

IN 1969
YES ☐
NO ☐

3. SHOW ONE PROVINCE WHERE YOU DID MOST
OF YOUR HUNTING FOR MIGRATORY GAME
BIRDS THIS SEASON

NFLD. ☐ 1 P.E.I. ☐ 2 N.S. ☐ 3
N.B. ☐ 4 QUE. ☐ 5 ONT. ☐ 6
MAN. ☐ 7 SASK. ☐ 8 ALTA. ☐ 9
B.C. ☐ 10 N.W.T. ☐ 11 YUKON ☐ 12

4. NUMBER OF DAYS ON WHICH YOU HUNTED "WATERFOWL" (DUCKS, GEESE, COOTS.)

 DAYS

5. NUMBER OF DAYS ON WHICH YOU HUNTED "OTHER" MIGRATORY GAME BIRDS
(RAILS, GALLINULES, SNIPE, DOVES, BAND-TAILED PIGEONS, CRANES, WOODCOCK)

 DAYS

6. NUMBER OF BIRDS YOU KILLED & RETRIEVED:

DUCKS

SEA DUCKS

CANADA GEESE

OTHER GEESE
(INCLUDING BRANT)

SNIPE

WOODCOCK

UNKNOWN

7. HOW MANY OF THE BIRDS YOU SHOT THIS SEASON HAD METAL LEG-BANDS?
IF ANY, PLEASE ENTER BAND INFORMATION BELOW

DUCKS CANADA GEESE OTHER GEESE OTHERS

SPECIES	BAND NUMBER	DATE TAKEN			PLACE TAKEN		HAVE YOU REPORTED THIS BAND BEFORE
		DAY	MONTH	YEAR	PROVINCE	NEAREST TOWN	
							YES ☐ NO ☐
							YES ☐ NO ☐
							YES ☐ NO ☐

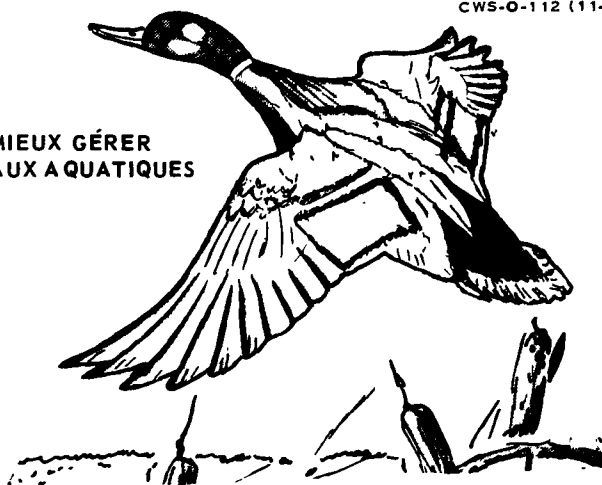
PLEASE RETURN THE QUESTIONNAIRE TODAY IN THE PREPAID ENVELOPE - THANKS AGAIN!

SERVICE CANADIEN DE LA FAUNE

RELEVÉ DE CHASSE AUX OISEAUX MIGRATEURS, 1971

VEUILLEZ RÉPONDRE À CE PETIT QUESTIONNAIRE
COCHEZ (✓) OU REMPLISSEZ LES CARRÉS BLEUS

AIDEZ À MIEUX GÉRER
LES OISEAUX AQUATIQUES



1 AVEZ-VOUS OBTENU, CETTE ANNÉE, UN PERMIS
DE CHASSE AUX OISEAUX AQUATIQUES CONSIDÉRÉS
COMME GIBIER?

OUI ☐
NON ☐

INSCRIVEZ-EN
LE NUMÉRO

--	--	--	--	--	--	--	--	--	--

SI VOUS N'AVEZ PAS
CHASSÉ CETTE
SAISON, RÉPONDEZ
AUX QUESTIONS 1 ET
2 SEULEMENT, PUIS
RETOURNEZ NOUS
LE QUESTIONNAIRE

2 AVEZ-VOUS CHASSÉ, AU CANADA, DES OISEAUX
MIGRATEURS CONSIDÉRÉS COMME GIBIER?

CETTE SAISON

OUI ☐
NON ☐

EN 1970

OUI ☐
NON ☐

EN 1969

OUI ☐
NON ☐

3 INDIQUEZ UNE PROVINCE OÙ VOUS AVEZ
SURTOUT CHASSÉ LES OISEAUX MIGRATEURS
CETTE SAISON?

T.N. ☐ 1

I.P.E. ☐ 2

N.É. ☐ 3

N.B. ☐ 4

QUÉ. ☐ 5

ONT. ☐ 6

MAN. ☐ 7

SASK. ☐ 8

ALB. ☐ 9

C.B. ☐ 10

T.N.O. ☐ 11

YUKON ☐ 12

4 LE NOMBRE DE JOURS OÙ VOUS AVEZ CHASSÉ DES 'OISEAUX AQUATIQUES'
(CANARDS, OIES, FOULQUES) CETTE SAISON

--	--	--	--	--	--	--	--	--	--

 JOURS

5 LE NOMBRE DE JOURS OÙ VOUS AVEZ CHASSÉ D'AUTRES OISEAUX MIGRATEURS:
(RÂLES, GALLINULES, BÉCASSINES, TOUTERELLES, PIGEONS DU PACIFIQUE, GRUES, BÉCASSES)

--	--	--	--	--	--	--	--	--	--

 JOURS

6 LE NOMBRE D'OISEAUX QUE VOUS AVEZ ABATTUS ET RAPPORTÉS:

CANARDS ☐

CANARDS
DE MER ☐

BERNACHES
DU CANADA ☐

AUTRES OIES
BERNACHES
(CRAVANT
COMPRISES) ☐

BÉCASSINES ☐

BÉCASSES ☐

INCONNUE ☐

7 PARMI LES OISEAUX QUE VOUS AVEZ ABATTUS CETTE SAISON,
COMBIEN PORTAIENT UNE BAGUE MÉTALLIQUE?
SI VOUS EN AVEZ, VEUILLEZ REMPLIR LES ESPACES CI-DESSOUS

CANARDS ☐ BERNACHES
DU CANADA ☐ AUTRES
OIES BER-
NACHES ☐ AUTRES ☐

ESPÈCE	NUMÉRO DE BAGUE	DATE DE PRISE			LIEU DE PRISE		AVEZ-VOUS RAP- PORTÉ CETTE BAGUE DÉJÀ?
		MOIS	JOUR	ANNÉE	PROVINCE	LOCALITÉ LA PLUS PROCHE	
							OUI ☐ NON ☐
							OUI ☐ NON ☐
							OUI ☐ NON ☐

VEUILLEZ RENVoyer LE QUESTIONNAIRE DÈS AUJOURD'HUI DANS L'ENVELOPPE PRÉ-AFFRANCHIE - MERCI!

Appendix 10

Treatment D

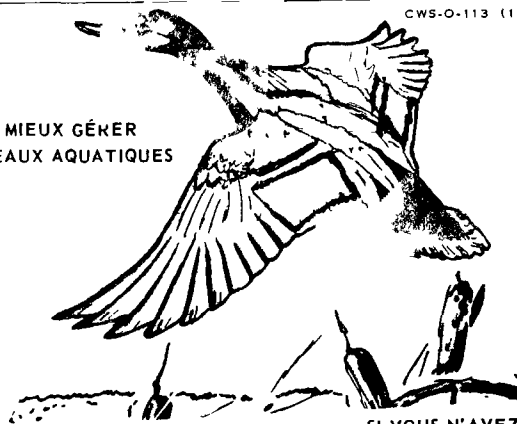
(Redesigned Migratory Game Bird Harvest Questionnaire
sent without name and address of hunter)

SERVICE CANADIEN DE LA FAUNE

RELEVÉ DE CHASSE AUX OISEAUX MIGRATEURS, 1971

VEUILLEZ RÉPONDRE À CE PETIT QUESTIONNAIRE
COCHER () OU REMPLISSEZ LES CARRÉS BLEUS

AIDEZ À MIEUX GÉRER
LES OISEAUX AQUATIQUES



AUCUNE SIGNATURE N'EST REQUISE

- 1 AVEZ-VOUS OBTENU, CETTE ANNÉE, UN PERMIS DE CHASSE AUX OISEAUX AQUATIQUES CONSIDÉRÉS COMME GIBIER?

OUI ☐
NON ☐

- 2 AVEZ-VOUS CHASSÉ, AU CANADA, DES OISEAUX MIGRATEURS CONSIDÉRÉS COMME GIBIER?

CETTE SAISON
OUI ☐
NON ☐

EN 1970
OUI ☐
NON ☐

EN 1969
OUI ☐
NON ☐

SI VOUS N'AVEZ PAS CHASSÉ CETTE SAISON, RÉPONDEZ AUX QUESTIONS 1 ET 2 SEULEMENT, PUIS RETOURNEZ-NOUS LE QUESTIONNAIRE

- 3 INDIQUEZ UNE PROVINCE OÙ VOUS AVEZ SURTOUT CHASSÉ LES OISEAUX MIGRATEURS CETTE SAISON?

IN ☐ 1
NB ☐ 4
MAN ☐ 7
CB ☐ 9

PE ☐ 2
QUÉ ☐ 5
SASK ☐ 8
TNO ☐ 11

NE ☐ 3
ONT ☐ 6
ALB ☐ 9
YUKON ☐ 12

- 4 ÉCRIVEZ LE NOM DE LA LOCALITÉ (AYANT UN BUREAU DE POSTE) LA PLUS PROCHE DE L'ENDROIT OÙ VOUS AVEZ SURTOUT CHASSÉ?

- 5 QUELLE EST LA DISTANCE ENTRE L'ENDROIT DE CHASSE ET CETTE LOCALITÉ?

MILLES

- 6 QUELLE EST LA DIRECTION DE L'ENDROIT DE CHASSE PAR RAPPORT À CETTE LOCALITÉ?

NORD ☐ 1 EST ☐ 2 SUD ☐ 3 OUEST ☐ 4
NORD ☐ 5 EST ☐ 6 SUD ☐ 7 SUD ☐ 8
OUEST ☐ 6 EST ☐ 7 OUEST ☐ 8

- 7 LE NOMBRE DE JOURS OÙ VOUS AVEZ CHASSÉ DES OISEAUX AQUATIQUES (CANARDS, OIES, FOULQUES) CETTE SAISON

 JOURS

- 8 LE NOMBRE DE JOURS OÙ VOUS AVEZ CHASSÉ D'AUTRES OISEAUX MIGRATEURS (RÂLES, GALLINULES, BÉCASSINES, TOURTERELLES, PIGEONS DU PACIFIQUE, GRUES, BÉCASSES)

 JOURS

- 9 LE NOMBRE D'OISEAUX QUE VOUS AVEZ ABATTUS ET RAPPORTÉS

CANARDS CANARDS DE MER FOULQUES (POULES D'EAU) BERNACHES DU CANADA AUTRES OIES BERNACHES (CRAVANT COMPRISES) BÉCASSINES
BÉCASSES TOURTERELLES TRISTES PIGEONS DU PACIFIQUE GALLINULES GRUES INCONNUS

- 10 CALENDRIER DE LA CHASSE AU CANARD:
MONTREZ SUR LE CALENDRIER LE NOMBRE DE CANARDS ABATTUS ET RAPPORTÉS POUR CHAQUE JOUR OÙ VOUS AVEZ CHASSÉ DURANT LA SAISON RÉGULIÈRE (À L'EXCEPTION DES BECS-SCIE ET DES CANARDS DE MER)
INSCRIVEZ ZÉRO (0) LORSQUE VOUS AVEZ CHASSÉ SANS ABATTRE DE CANARDS.
LAISSEZ EN BLANC LES DATES OÙ VOUS N'AVEZ PAS CHASSÉ

SEPTEMBRE 1971												
D	L	M	M	J	V	S						
				1	2	3	4					
5	6	7	8	9	10	11						
12	13	14	15	16	17	18						
19	20	21	22	23	24	25						
26	27	28	29	30								

OCTOBRE 1971												
D	L	M	M	J	V	S						
					1	2						
3	4	5	6	7	8	9						
10	11	12	13	14	15	16						
17	18	19	20	21	22	23						
24	25	26	27	28	29	30	31					

- 11 PARMI LES OISEAUX QUE VOUS AVEZ ABATTUS CETTE SAISON, COMBIEN PORTAIENT UNE BAGUE MÉTALLIQUE?

CANARDS BERNACHES DU CANADA
AUTRES OIES BERNACHES AUTRES

NOVEMBRE 1971												
D	L	M	M	J	V	S						
7	8	9	10	11	12	13						
14	15	16	17	18	19	20						
21	22	23	24	25	26	27						
28	29	30										

DÉCEMBRE 1971												
D	L	M	M	J	V	S						
				1	2	3	4					
5	6	7	8	9	10	11						
12	13	14	15	16	17	18						
19	20	21	22	23	24	25						
26	27	28	29	30	31							

JANVIER 1972												
D	L	M	M	J	V	S						
2	3	4	5	6	7	8						
9	10	11	12	13	14	15						
16	17	18	19	20	21	22						
23	24	25	26	27	28	29						

ESÈCE	NUMÉRO DE BAGUE	DATE DE PRISE			LIEU DE PRISE		AVEZ-VOUS RAPPORTÉ CETTE BAGUE DÉJÀ?
		MOIS	JOUR	ANNÉE	PROVINCE	LOCALITÉ LA PLUS PROCHE	
							OUI ☐ NON ☐
							OUI ☐ NON ☐
							OUI ☐ NON ☐

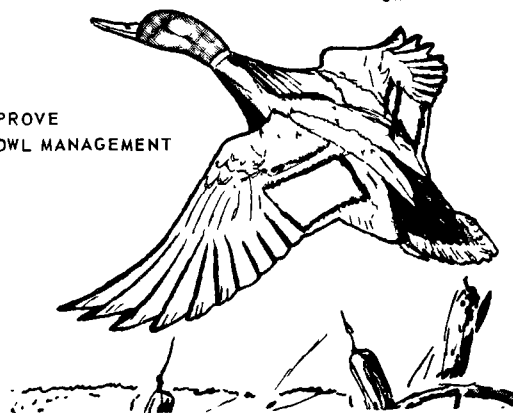
VEUILLEZ RENVoyer LE QUESTIONNAIRE DÈS AUJOURD'HUI DANS L'ENVELOPPE PRÉ-AFFRANCHIE - MERCI!

CANADIAN WILDLIFE SERVICE

1971 MIGRATORY GAME BIRD HUNTING SURVEY

PLEASE ANSWER THIS SHORT QUESTIONNAIRE
JUST CHECK (✓) AND FILL IN THE BLUE SPACES

HELP IMPROVE
WATERFOWL MANAGEMENT



NO SIGNATURE IS REQUIRED

1 DID YOU BUY A CANADA MIGRATORY GAME BIRD HUNTING PERMIT AT THE POST OFFICE THIS YEAR? YES ☐ NO ☐

IF YOU DID NOT HUNT THIS SEASON PLEASE COMPLETE QUESTIONS 1 & 2 ONLY AND RETURN THE QUESTIONNAIRE

2 DID YOU HUNT MIGRATORY GAME BIRDS IN CANADA? THIS SEASON YES ☐ NO ☐ IN 1970 YES ☐ NO ☐ IN 1969 YES ☐ NO ☐

3 SHOW ONE PROVINCE WHERE YOU DID MOST OF YOUR HUNTING FOR MIGRATORY GAME BIRDS THIS SEASON.

N.F.L.D. ☐ 1 P.E.I. ☐ 2 N.S. ☐ 3
N.B. ☐ 4 QUE. ☐ 5 ONT. ☐ 6
MAN. ☐ 7 SASK. ☐ 8 ALTA. ☐ 9
B.C. ☐ 10 N.W.T. ☐ 11 YUKON ☐ 12

4 PRINT THE NAME OF THE TOWN (WITH A POST OFFICE) NEAREST THE PLACE WHERE YOU DID MOST OF YOUR HUNTING THIS SEASON.

5 HOW FAR IS THE HUNTING PLACE FROM THAT TOWN MILES

6 SHOW THE DIRECTION OF THE HUNTING PLACE FROM THAT TOWN NORTH ☐ 1 EAST ☐ 2 SOUTH ☐ 3 WEST ☐ 4
NORTH ☐ 5 NORTH ☐ 6 SOUTH ☐ 7 SOUTH ☐ 8
EAST ☐ WEST ☐ EAST ☐ WEST ☐

7 NUMBER OF DAYS ON WHICH YOU HUNTED "WATERFOWL" (DUCKS, GEESE, COOTS) THIS SEASON DAYS

8 NUMBER OF DAYS ON WHICH YOU HUNTED "OTHER" MIGRATORY GAME BIRDS (RAILS, GALLINULES, SNIPE, DOVES, BAND-TAILED PIGEONS, CRANES, WOODCOCK) DAYS

9 NUMBER OF BIRDS YOU KILLED & RETRIEVED

DUCKS SEA DUCKS COOTS CANADA GEESE OTHER GEESE SNIPE
WOODCOCK MOURNING DOVE BAND-TAILED PIGEONS GALLINULES CRANES UNKNOWN

10 DUCK CALENDAR
SHOW IN THE CALENDAR THE NUMBER OF DUCKS YOU KILLED & RETRIEVED FOR EACH DAY YOU HUNTED DURING THE REGULAR DUCK SEASON.
PLEASE DO NOT INCLUDE MERGANSER & SEA DUCKS
MARK ZERO (0) WHEN YOU HUNTED BUT KILLED NO DUCKS.
LEAVE BLANK ALL DATES NOT HUNTED

SEPTEMBER 1971							OCTOBER 1971						
S	M	T	W	T	F	S	S	M	T	W	T	F	S
				1	2	3					1	2	
5	6	7	8	9	10	11	3	4	5	6	7	8	9
12	13	14	15	16	17	18	10	11	12	13	14	15	16
19	20	21	22	23	24	25	17	18	19	20	21	22	23
26	27	28	29	30			24	25	26	27	28	29	30
													31

11 HOW MANY OF THE BIRDS YOU SHOT THIS SEASON HAD METAL LEG-BANDS?

DUCKS CANADA GEESE
OTHER GEESE OTHERS

NOVEMBER 1971							DECEMBER 1971							JANUARY 1972						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
	1	2	3	4	5	6				1	2	3	4							
7	8	9	10	11	12	13	5	6	7	8	9	10	11	2	3	4	5	6	7	8
14	15	16	17	18	19	20	12	13	14	15	16	17	18	9	10	11	12	13	14	15
21	22	23	24	25	26	27	19	20	21	22	23	24	25	16	17	18	19	20	21	22
28	29	30					26	27	28	29	30	31		23	24	25	26	27	28	29

SPECIES	BAND NUMBER	DATE TAKEN			PLACE TAKEN		HAVE YOU REPORTED THIS BAND BEFORE
		DAY	MONTH	YEAR	PROVINCE	NEAREST TOWN	
							YES ☐ NO ☐
							YES ☐ NO ☐
							YES ☐ NO ☐

PLEASE RETURN THE QUESTIONNAIRE TODAY IN THE PREPAID ENVELOPE - THANKS AGAIN

Appendix 11

Edit instructions for treatment A
(Harvest Survey Questionnaire)
Waves I, II and III.

Edit Instructions for Treatment A Wave I

A Definitions:

- Unknown - a blank which should show an answer which is not available
- or an obviously incorrect answer which cannot be improved
 - * Fill each digit space in the answer box with 9.
- Zero - a blank space which is interpreted as zero
- * Fill each answer box with 0.
- Blanks - a blank space interpreted as not applicable to the hunter
- * leave blank or delete answer.

B EDIT

- Enter date questionnaire received on address label to the right of the group and mailing identification code in accordance with the following codes:
 - First week after date of mailing 1
 - 2nd " " " " 2
 - 3rd " " " " 3
 - 4th " " " " 4
 - 5th " " " " 5
 - 6th " " " " 6
 - 7th " " " " 7
 - 8th " " " " 8
 - 9th " " " " 9

Question #1

- If NO: - go to question #7: if not answered treat as UNKNOWN
 - consider all other questions as BLANKS
 - go to the next questionnaire

- If YES: - verify "this year's" permit number
 (If you do not find 6 digits treat as UNKNOWN)
- edit the remainder of the questionnaire
- If NOT ANSWERED: - treat as UNKNOWN

Question #2

- Part I - Days hunted waterfowl do not have to agree
 with question #8
- Round off fractions
 - Verify each box for one answer only (if 2
 answers take the average)
 - If blank: - fill in with the days reported in
 #8, if available
 - if #8 not useful look at question
 #3 and #4 for waterfowl hunting
 activity:
 - if activity treat as UNKNOWN
 - if no activity treat as ZERO
- Part II - If blank look at question #3 and #4 for "other
 migratory birds" hunting activity:
 - if activity treat as UNKNOWN
 - if no activity treat as ZERO
- If Zero for I and II go to #7 : if not answered treat as UN-
 KNOWN
- : consider all other questions
 as BLANKS
- : go to next questionnaire.

Question #3

- Duck kill: - does not have to agree with kill in #8
- if blank or zero look at #8 and correct if
 necessary
 - if #8 not useful check #4 for ducks
 - if ducks treat as UNKNOWN
 - if no ducks treat as ZERO

-Other kill: - If blank or zeros look at #4 for corresponding species:

- if species treat as UNKNOWN

- if no species treat as ZERO

Question #4

- Photocopy any questionnaire with writing in #4 and attach metal bands, if any, to this copy.

- Compare total number of banded birds shot with number reported in table and enter the appropriate code in the right hand margin of the questionnaire:

- No birds reported : 0

- Two totals match : 1

- Unknown : 9

- Examine table and enter the appropriate code for each of the four lines:

- No birds reported : 0

- Bird reported, answer complete : 1

- " " " incomplete for kind : 2

- " " " " band : 3

- " " " " date : 4

- " " " " place : 5

- " " " " reported : 6

- " " " should be blank : 8

- " " " very or totally incomplete : 9

Question #5

- If blank or several answers examine #6 (town) and complete.

- If #6 not useful treat as UNKNOWN

Question #6

Divide the question into 3 sections and enter the appropriate code for each section in the right hand margin:

1) Town: - indicated legibly : 1

- indicated, not legible : 2

- not indicated : 9

2) Distance: - indicated, one distance : 1

- indicated, more than one: 2

- not indicated : 9

- 3) Direction: - indicated, one only : 1
- indicated, more than one : 2
- not indicated : 9

Question #7

If blank treat as UNKNOWN

Question #8

Examine the answers and enter the number of days hunted and kill for each month (in the right hand margin and according to the following codes) DO NOT include January.

- Monthly Days hunted: - sum the number of zeros (or check marks) and digits
 - examine monthly kill: if hunter reports other birds with Ducks treat as UNKNOWN
 - if #3 shows no Duck kill but kill for other birds calendar should show 0 kill.
 - if all date spaces filled with zeros (or X's) treat as UNKNOWN
 - if blank look at #2, #3, or #4 for duck or waterfowl hunting activity:
 - if activity treat as UNKNOWN
 - if no activity treat as ZERO.
- Monthly kill: - sum digits
 - if hunter reports other birds with ducks treat as UNKNOWN
 - if only zeros or check marks look at #3 and #4 for ducks:
 - if ducks treat as UNKNOWN
 - if no ducks treat as ZERO.

FINALLY ENTER THE FOLLOWING DATA ON QUESTIONNAIRE

- enter age of hunter in right margin

- Count the number of edit corrections in the four questions categories according to the following instructions and enter the totals in the right hand margin. Score one point each time you have to do one of the following. Total score for each category must be 0, 1 or 2. Consider only questions which are answered and do not include Unknowns, Zeros or Blanks.
- Total for question # 1, #5,: (maximum score possible is 2) (Score Value)
 - check (✓) yes or no in #1 (1)
 - indicate the correct province in #5 (1)
- Total for #2 and #3 (maximum score is 2) (Score Value)
 - enter days or kill in answer space (1)
 - delete, round off or average answers (1)
- Total for #6 (maximum score is 2) (Score Value)
 - enter data in any answer space : (town, distance, direction) (1)
 - scratch unwanted data from answer space or modify answer (1)
- Total for #8 (maximum score is 2) (Score Value)
 - when X (or a check mark is used instead of 0 or a digit in any month. (1)
 - enter digits other than Unknown or delete unwanted information in any month. (1)
- Indicate in right margin whether hunter resides in an urban area or not:
 - Look at address label. If name of city, town, or village appears on LIST of Major Urban Areas in Ontario assign code 1
 - If name is not on LIST assign code 2
 - If non-resident of ONTARIO assign code 3.
- Enter Zone of residence (from sample listing) in right margin.

Edit Instructions for Treatment A Wave II

- Check the sample listing to determine whether the schedule in wave II was original or short questionnaire
 - if original questionnaire verify that treatment and mailing code on address label is A2
 - if short questionnaire recode A2 to A4.
- Proceed to edit of questionnaires according to instructions for wave I for original questionnaires and special "Edit instructions for treatment K" for short questionnaires.

F.L. Filion
December 1971

Edit Instructions for Treatment A Wave III

Check sample listing to determine whether the schedule in Wave III was original or short questionnaire and if postage was first-class or registered mail.

- if original and first-class verify that treatment and mailing code on address label is A3
- if original and registered recode A3 to A6
- if short and first-class recode A3 to A5
- if short and registered recode A3 to A7

Proceed to edit of questionnaires according to instructions for wave I and II

Appendix 12

Edit instructions for treatments B,C,D,E
(redesigned Harvest Survey questionnaires)
Waves I, II and III.

Edit Instructions for Treatments BCDE Wave I

A Definitions:

- Unknown - a blank which should show an answer which is not available,
- or an obviously incorrect answer which cannot be improved.
- * Fill each digit space in the answer box with 9.
- Zero - a blank space which is interpreted as zero.
- * Fill each answer box with 0.
- Blanks - a blank space interpreted as not applicable to the hunter
- * leave blank or delete answer

B EDIT

- Serial number all D questionnaire using 5 digit "Numbering machine" starting at 11111 in area reserved for address label.
- Since group D has no address label enter "D" in area reserved for label.
- If questionnaire D shows a signature or respondent's name enter "1" before "D1". If no identification enter "0" before "D1".
- Enter date questionnaire received on address label to the right of the group and mailing identification code in accordance with the following codes:

First week after date of mailing:	1
2nd " " " " "	2
3rd " " " " "	3
4th " " " " "	4
5th " " " " "	5
6th " " " " "	6
7th " " " "" "	7
8th " " " " "	8
9th " " " " "	9

- If questionnaires completed on the side with no address label enter "lavel other side" in appropriate space as a reminder for the keypuncher.

Question #1

- If NO: - go to question #2: if #2 not answered treat as UNKNOWN
 - consider all other questions as BLANKS
 - go to the next questionnaire
- If YES: - verify "this years's" permit (except D)
 If you do not find 6 digits treat as UNKNOWN
 - edit the remainder of the questionnaire
- If NOT ANSWERED: treat as UNKNOWN

Question #2

- If blank for 1970 and 1969 treat as UNKNOWN
- If blank for THIS SEASON look at #7, 8, 9, 10, 11 for hunter activity:
 - if no activity check (✓) NO and go to next questionnaire
 - if activity check YES
 - if not indicated treat as UNKNOWN
- If NO - delete any answer from #3 onwards
 - go to next questionnaire
- If YES - go to next question
 - if all other questions blank treat as UNKNOWNNS.

Question #3

- If blank or several answers, examine #4 (town) and complete.
- If #4 not useful treat as UNKNOWN.

Questions #4, 5, 6

Enter the appropriate code for each section in the right hand margin.

- #4 - Town: - indicated legibly : 1
 - indicated, not legible : 2
 - not indicated : 9
- #5 - Distance: - indicated, one distance : 1
 - indicated, more than one : 2
 - not indicated : 9
- #6 - Direction: - indicated, one only : 1
 - indicated, more than one : 2
 - not indicated : 9

Question #7

- Days hunted waterfowl do not have to agree with question #10.
- Round off fractions;
- Verify each box for one answer only (if 2 answers take average)
- If blank: - fill with the days reported in #10, if available,
 - if #10 not useful look at question #9 and #11 for waterfowl hunting activity:
 - if activity treat as UNKNOWN
 - if no activity treat as ZERO

Question #8

If blank look at question #9 and #11 for other migratory birds hunting activity:

- If activity treat as UNKNOWN
- If no activity treat as ZERO.

Question #9

- Duck kill: - Does not have to agree with kill in #10
 - If blank or zero look at #10 and correct if necessary.
 - If #10 not useful check #11 for ducks
 - if ducks treat as UNKNOWN
 - if no ducks treat as ZERO
- Other kill: If blank or zeros look at #11 for corresponding species:

- if species treat as UNKNOWN
- if no species treat as ZERO.

Question #10

Examine the answers and enter the number of days hunted and kill for each month (in the right hand margin according to the following codes) DO NOT include January.

- Monthly Days hunted:
- add number of zeros or check marks and digits
 - if all date spaces filled with zeros or check marks treat as UNKNOWN
 - if blank look at #7, 8, 9, 11 for Duck or waterfowl hunting activity:
 - if activity treat as UNKNOWN
 - if no activity treat as ZERO.
 - examine monthly kill: if hunter reports other birds with Ducks, treat as UNKNOWN
 - if #3 shows no Duck kill but kill for other birds calendar should show 0 kill.

- Monthly kill:
- sum digits
 - if only zeros or check marks look at #9 and #11 for ducks;
 - if ducks treat as UNKNOWN
 - if no ducks, treat as ZERO.
 - if hunter reports other birds with ducks treat as UNKNOWN

Question #11

- Photocopy any questionnaire with writing in #11 and attach metal bands, if any, to the copy.
- Compare total number of banded birds shot with number reported in table and enter the appropriate code in the right margin of the questionnaire:

No birds reported	: 0
Two totals match	: 1
Totals do not match	: 2
Unknown	: 9

- Examine table and enter the appropriate code for each of the four lines:

No bird reported	: 0
Bird reported, answer complete	: 1
" " " incomplete for kind	: 2
" " " " band	: 3
" " " " date	: 4
" " " " place	: 5
" " " " reported	: 6
" " " should be blank	: 8
" " " very or totally incomplete	: 9

FINALLY ENTER THE FOLLOWING DATA ON QUESTIONNAIRE

- Enter age of hunter in right margin.
- Count the number of edit corrections in the four question categories and enter the totals in the right margin. Score one point each time you have to do one of the following. Total score for each category must be 0, 1 or 2. Consider only questions which are answered and do not include Unknowns, Zeros or Blanks.
 - Total for #1, #3: (maximum score possible is 2) (Score Value)
 - check (✓) yes or no in #1 (1)
 - indicate the correct province in #3 (1)
 - Total for #4, #5, #6: (maximum score is 2) (Score Value)
 - enter data in any answer space (1)
(town, distance, direction)
 - scratch unwanted data from answer (1)
space or modify answer.
 - Total for #7, #8, #9: (maximum score is 2) (Score Value)
 - enter days or kill in any (1)
answer space
 - delete unwanted information from any
answer box or modify answers (1)
(i.e. rounding off or averaging)

- Total for #10: (maximum score is 2) Score Value)
 - when X (or a check mark) (1)
is used instead of 0 or a
digit in any month.
 - enter digits other than (1)
Unknown or delete unwanted
information in any month.
- Indicate in right margin whether hunter resides in a major
urban area or not.
 - Look at address on label. If name of city, town or
village appears on LIST of Major Urban areas in Ontario
assign code 1.
 - If name is not on LIST assign code 2.
 - If non-resident of Ontario assign code 3.
- Enter Zone of residence (from sample listing) in right margin.

F.L. Filion
December 1971

Edit Instructions for Treatments BCDE in Wave II

- Recode the treatment and mailing code for treatment D from D1 to D2 for all schedules returned after January 13, 1972 (6th week onwards)
- Check the sample listing to determine whether the schedule in sample groups B, C and E received original or short questionnaires
 - if original questionnaire verify that treatment and mailing code on address label is B2, C2, or E2
 - if short questionnaire recode to B4, C4 and E4
- Proceed to edit of questionnaires according to instructions for wave I for original questionnaires and special "Edit instructions for treatment K" for short questionnaires.

F.L. Filion
December 1971

Edit Instructions for Treatments B, C, E in Wave III

- Check sample listing to determine whether the schedule in sample groups B, C and E in wave III received original or short questionnaires and if postage was first-class or registered mail.
 - if original and first-class verify that treatment and mailing code on address label is B3, C3 or E3
 - if original and registered recode to B6, C6 or E6
 - if short and first-class recode to B5, C5 or E5
 - if short and registered recode to B7, C7 or E7
- Proceed to edit of questionnaires according to instructions for wave I for original questionnaires and special "Edit instructions for treatment K" for short questionnaires.

F.L. Filion
December 1971

Appendix 13

Edit instructions for treatment K
(short questionnaire) Waves II and III.

Edit Instructions for Treatment K, Wave 2

A Definitions:

- Unknown - a blank which should show an answer which is not available
- or an obviously incorrect answer which cannot be improved.
- * Fill each digit space in the answer box with 9.
- Zero - a blank space which is interpreted as zero
- * Fill each answer box with 0.
- Blanks - a blank space interpreted as not applicable to the hunter
- * leave blank or delete answer.

B EDIT

- Change the mailing code (next to treatment code) from 2 to 4 (i.e., A4)
B4, etc.
- Enter date questionnaire received on address label to the right of the group and mailing identification code in accordance with the following codes:

First week after date of mailing:	1
2nd " " " " "	2
3rd " " " " "	3
4th " " " " "	4
5th " " " " "	5
6th " " " " "	6
7th " " " " "	7
8th " " " " "	8
9th " " " " "	9

- If questionnaires completed on the side with no address label enter "label other side" in appropriate space as a reminder for the keypuncher.

Question #1

- If NO: - go to question #2: if #2 not answered treat as UNKNOWN
- consider all other questions as BLANKS
- go to the next questionnaire

- If YES: - verify "this year's" permit number
 (If you do not find 6 digits treat as UNKNOWN
 - edit the remainder of the questionnaire.
- If NOT ANSWERED: treat as UNKNOWN

Question #2

- If blank for 1970 and 1969 treat as UNKNOWN
- If blank for THIS SEASON look at #4, 5, 6, 7 for hunter activity
 - If no activity check No and go to next questionnaire
 - If activity check Yes
 - If not indicated treat as UNKNOWN
- If NO: - delete any answer from #3 onwards
 - go to next questionnaire
- If YES: - go to next question
 - If all other questions are blank treat as UNKNOWN

Question #3

If blank or several answers treat as UNKNOWN.

Question #4

- Round off fractions; verify each box for one answer only (if 2 answers take average)
- If blank: look at question #6 for waterfowl hunting activity:
 - if activity treat as UNKNOWN
 - if no activity treat as ZERO

Question #5

If blank look at question #6 for other migratory birds hunting activity:

- if activity treat as UNKNOWN
- if no activity treat as ZERO

Question #6

- Duck kill: If blank check #7 for ducks
 - if ducks treat as UNKNOWN
 - if no ducks treat as ZERO
- Other kill: If blank or zeros look at #7 for corresponding species:
 - if species treat as UNKNOWN
 - if no species treat as ZERO

Question #7

- Photocopy any questionnaire with writing in #7 and attach metal bands if any to this copy.
- Compare total number of banded birds shot with number reported in table and enter the appropriate code in the right margin of the questionnaire:
 - no birds reported : 0
 - two totals match : 1
 - totals do not match : 2
 - unknown : 9
- Examine table and enter the appropriate code for each of the 3 lines:

No bird reported:

Bird reported, answer completed:

"	"	"	incompleted for kind:
"	"	"	" band:
"	"	"	" date:
"	"	"	" palce:
"	"	"	" reported:
"	"	"	should be blank:
"	"	"	very or totally incomplete:

FINALLY ENTER THE FOLLOWING DATA ON QUESTIONNAIRE

- Enter age of hunter in right margin
- Count the number of edit corrections in the four question categories according to the following instructions and enter the totals in the right margin. Total score for each category must be 0, 1 or 2. Consider only questions which are answered and do not include Unknown, Zeros or Blanks.

Total for #1, #3: (maximum score possible is) (Score Values)

- check (✓) yes or no in #1 (1)

- indicate the correct province in #3 (1)

Total for #4, #5, #6 (maximum score is 2) (Score Values)

- enter kill or days in any answer space(1)

- delete unwanted information from (1)
any answer or modify answers
(i.e., rounding off or averaging)

- Indicate in right margin whether hunter resides in a
major urban area or not

- Look at address on label. If name of city,
town or village appears on LIST of major urban
areas in Ontario assign code 1.

- If name is not on LIST assign code 2.

- If non-resident of ONT. assign code 3.

- Enter Zone of residence from sample listing in right
margin.

Edit Instructions for Treatment K, Wave 3

- Check sample listing to determine whether the schedule in Wave III was mailed by first-class postage or registered mail.
 - if first class postage recode treatment and mailing code from 3 to 5
 - if registered mail recode from 3 to 7.
- Proceed to edit short questionnaires according to instructions from Wave II.

F.L. Filion
December 1971

Appendix 14

Keypunching instructions and field codes
for Treatments A, B, C, D, E and K.



DEPARTMENT OF THE ENVIRONMENT

COMPUTER INFORMATION SYSTEM

INFORMATIQUE

DATA PROCESSING DIVISION
DIVISION DE L'ORDINATION

CARD PUNCHING OR VERIFYING INSTRUCTIONS

INSTRUCTIONS POUR LA PERFORATION ET LA VÉRIFICATION DES CARTES

Job Name - Désignation de la tâche ONTARIO MIGRATORY BIRDS RESPONSE SURVEY		Job No. N° de la tâche G 611	Control Panel No. - N° du tableau des connexions	Operation Name Désignation de l'opération	Function Fonction	Machine type Type de machine
☐ Daily Quotidienne ☐ Weekly Hédomadaire ☐ Term Périodique		☐ Semi-Monthly Bi-mensuelle ☐ Monthly Mensuelle ☐ Quarterly Trimestrielle	☐ Annual Annuelle ☐ Other Autre	Doc in - Entrée prévue Time-Heure Date	Doc out - Sortie prévue Time-Heure Date	Est. volume - Quantité est. Est. time - Temps est. Heure Minutes
Program Card No. - N° de la carte-programme		Special Features Used - Fonctions accessoires utilisées ☐ Alternate Program Programme supplémentaire ☐ Card Reversing Inversion des cartes ☐ Auxiliary Duplicate Reproduction auxiliaire ☐ Self Checking No. N° d'auto-vérification				
24-26-56 SWITCH SETTINGS - POSITION DE LA MANETTE						
on Marche	off Arrêt	Switch - Commutateur				
		Program Unit - Unité programme				
		Auto Feed - Alimantation auto.				
		Auto Ship - Auto Dupl. - On, auto-Dupl. auto				
		Print - Impression				
		Self Checking No. - N° d'auto-vérification				
CARD FIELD - CHAMP DE LA CARTE			Col. From - de To - à	Function* Fonction*	REMARKS - REMARQUES	
1.	1970 Permit number		1	6	PV	
2.	Sample Group			7	PV	Always "A"
3.	Mailing			8	PV	1, 2, 3 or 6 only
4.	Date received			9	PV	1 to 9 only
5.	Question #1 (Buy)			10	PV	1 - yes 2 - no or 9
6.	1971 Permit number		11	16	PV	
7.	Question #2 Days hunted		17	19	PV	
8.	Waterfowl Days hunted Migratory birds		20	22	PV	
9.	Question #3 (Kill)		23	25	PV	Number of Ducks
10.			26	27	PV	" Coots
11.			28	29	PV	" Sea Ducks
12.			30	31	PV	" Canada Geese
13.			32	33	PV	" Other Geese
14.			34	35	PV	" Snipe
15.						*Function - Fonction Duplicate - Reproduction Punch - Perforation Ship - Omission X-Ship - Omission des X Verify - Vérification Self Ch No. - N° d'auto-vér.
16.	TOTAL KEY STROKES PER CARD NOMBRE DE FRAPPES PAR CARTE					
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INSTRUCTIONS POUR LA PERFORATION ET LA VÉRIFICATION DES CARTES

Job Name - Désignation de la tâche	Job No. - N° de la tâche	Control Panel No. - N° du tableau des commandes	Operation Name - Désignation de l'opération	Function - Fonction	Machine type - Type de machine
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☐ Daily - Quotidienne ☐ Weekly - Hebdomadaire ☐ Term - Périodique	☐ Semi-Monthly - Bimensuelle ☐ Monthly - Mensuelle ☐ Quarterly - Trimestrielle	☐ Annual - Annuelle ☐ Other - Autre	Due in - Entrée prévue Time-Heure Date	Due out - Sortie prévue Time-Heure Date	Est. volume - Quantité est. Est. time - Temps est. Heure Minute
--	---	--	---	--	---

Program Card No. - N° de la carte-programme

Special Features Used - Fonctions accessoires utilisées

☐ Alternate Program - Programme supplémentaire	☐ Card Reversing - Inversion des cartes
☐ Auxiliary Duplicate - Reproduction auxiliaire	☐ Self Checking No. - N° d'auto-vérification
☐	☐

24-26-36

SWITCH SETTINGS - POSITION DE LA MANETTE

on Marche	off Arrêt	Switch - Commutateur			
		Program Unit - Unité programme			
		Auto Feed - Alimentation auto			
		Auto Skip - Auto Dupl. - Om. auto-Dupl. auto			
		Print - Impression			
		Self Checking No. - N° d'auto-vérification			

A

CARD FIELD - CHAMP DE LA CARTE

Col.
From-toFunction
Fonction

REMARKS - REMARQUES

1		36	37	PV	Number of Woodcocks
2		38	39	PV	" " Mourning Doves
3		40	41	PV	" " B.T. Pigeons
4		42	43	PV	" " Gallinules
5		44	45	PV	" " Cranes
6	Question #4 (Metal leg-bands)		46	PV	0, 1, 2 or 9 only
7			47	PV	0 " 9 only
8			48	PV	0 " 9 only
9			49	PV	0 " 9 only
10			50	PV	0 " 9 only
11	Question #5 (Province)	51	52	PV	
12	Question #6 (Town)		53	PV	1, 2 or 9 only
13	(Distance)		54	PV	1, 2 or 9 only
14	(Direction)		55	PV	1, 2 or 9 only
15					
16					
TOTAL KEY STROKES PER CARD NOMBRE DE FRAPPES PAR CARTE					

Function - Fonction	Symb
Duplicate - Reproduction	D
Punch - Perforation	P
Skip - Omission	S
X-Skip - Omission des X	XS
Verify - Vérification	V
Self Ch No. - N° d'auto-vérif	Ch

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INSTRUCTIONS POUR LA PERFORATION ET LA VÉRIFICATION DES CARTES

Job Name - Désignation de la tâche	Job No. N° de la tâche	Control Panel No. - N° du tableau des contrôles	Operation Name Désignation de l'opération	Function Fonction	Machine Type Type de machine
------------------------------------	---------------------------	--	--	----------------------	---------------------------------

☐ Daily Quotidienne	☐ Semi-Monthly Bi-mensuelle	☐ Annual Annuelle	Due in - Entrée prévue	Due out - Sortie prévue	Est. volume - Quantité est.	Est. time - Heure
☐ Weekly Hédomadaire	☐ Monthly Mensuelle	☐ Other Autre	Time-Heure	Date	Time-Heure	Date
☐ Term Périodique	☐ Quarterly Trimestrielle					

Program Card No. - N° de la carte-programme

Special Features Used - Fonctions accessoires utilisées

☐ Alternate Program Programme supplémentaire	☐ Card Reversing Inversion des cartes
☐ Auxiliary Duplicate Reproduction auxiliaire	☐ Self Checking No. N° d'auto-vérification
☐	☐

74-76 56	SWITCH SETTINGS - POSITION DE LA MANETTE
Marche	off
Switch - Commutateur	
Program Unit - Unité programme	
Auto Feed - Alimentation auto	
Auto Skip - Auto Dupl. - On, auto-Dupl. auto	
Print - Impression	
Self Checking No. - N° d'auto-vérification	

A

CARD FIELD - CHAMP DE LA CARTE		Col.		Function* Fonction*	REMARKS - REMARQUES
		From - de	To - à		
1. Question #7 (Hunted - 69)			56	PV	1 - Yes or 9 2 - No
2. (Hunted - 70)			57	PV	1 - Yes or 9 2 - No
3. Question #8 (Duck Calendar)		58	59	PV	Days - September
4.		60	61	PV	Kills - "
5.		62	63	PV	Days - October
6.		64	65	PV	Kills - "
7.		66	67	PV	Days - November
8.		68	69	PV	Kills - "
9.		70	71	PV	Days - December
10.		72	73	PV	Kills - "
11. Age		74	75		
12. Editing - 1			76		0, 1 or 2 only
13. " 2			77		" "
14. " 3			78		" "
15. " 4			79		" "
16. Residency			80		0, 1 or 2 only
TOTAL KEY STROKES PER CARD NOMBRE DE FRAPES PAR CARTE					

*Function - Fonction
Duplicate - Reproduction
Punch - Perforation
Skip - Omission
X-Skip - Omission des
Verify - Vérification
Self Ch No. - N° d'auto-
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INSTRUCTIONS POUR LA PERFORATION ET LA VÉRIFICATION DES CARTES

LAND 20-571-677

Job Name - Désignation de la tâche Ontario Migratory Birds Response Survey 1971	Job No. N° de la tâche G851	Control Panel No. - N° du tableau des commandes	Operation Name Désignation de l'opération	Function Fonction	Machine type Type de machine
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☐ Daily Quotidienne	☐ Semi-Monthly Bi-mensuelle	☐ Annual Annuelle	Due in - Entrée prévue	Due out - Sortie prévue	Est. volume - Quantité est.	Est. time - Temps est.
☐ Weekly Hédomadaire	☐ Monthly Mensuelle	☐ Other Autre	Time-Heure	Date		Heure
☐ Term Périodique	☐ Quarterly Trimestrielle					Minutes

Program Card No. - N° de la carte-programme	Special Features Used - Fonctions accessoires utilisées
	☐ Alternate Program Programme supplémentaire
	☐ Card Reversing Inversion des cartes
	☐ Auxiliary Duplicate Reproduction auxiliaire
	☐ Self Checking No. N° d'auto-vérification
	☐

24-26-56	SWITCH SETTINGS - POSITION DE LA MANETTE			
on Marche	off Arrêt	Switch - Commutateur		
		Program Unit - Unité programme		
		Auto Feed - Alimentation auto.		
		Auto Skip - Auto Dupl. - Om. auto-Dupl. auto		
		Print - Impression		
		Self Checking No. - N° d'auto-vérification		

Redesigned questionnaire
(Treatments B, C, D, E.)

CARD FIELD - CHAMP DE LA CARTE	Col.		Function ^a Fonction ^a	REMARKS - REMARQUES
	From-to	To-2		
1. Card Code		1	PV	always '1'
2. 1970 Permit number	2	7	PV	
3. Sample groups		8	PV	B, C, D, E only
4. Mailing		9	PV	1, 2, 3, or 6 only
5. Date received		10	PV	1 to 9 only
6. Question #1 (Buy)		11	PV	yes = 1 no = 2 or 9
7. 1971 Permit number	12	17	PV	
8. Question #2 (hunted) 1971		18	PV	yes = 1 no = 2 or 9
9. 1970		19	PV	yes = 1 no = 2 or 9
10. 1969		20	PV	yes = 1 no = 2 or 9
11. Question #3 (Province)	21	22	PV	
12. Question #4 (Town)		23	PV	1, 2 or 9 only
13. Question #5 (Distance)		24	PV	1, 2 or 9 only
14. Question #6 (Direction)		25	PV	1, 2 or 9 only
TOTAL KEY STROKES PER CARD NOMBRE DE FRAPPES PAR CARTE				

Function - Fonction	Symb.
Duplicate - Reproduction	.
Punch - Perforation	P
Skip - Omission	S
X-Skip - Omission des X	X
Verify - Vérification	V
Self Ch No. - N° d'auto-vér.	CH



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CARD PUNCHING OR VERIFYING INSTRUCTIONS INSTRUCTIONS POUR LA PERFORATION ET LA VÉRIFICATION DES CARTES

Job Name - Désignation de la tâche Ontario Migratory Birds Response Survey 1971			Job No. N° de la tâche G851	Control Panel No. - N° du tableau des connexions	Operation Name Désignation de l'opération	Function Fonction	Machine type Type de machine	
Frequency Fréquence	☐ Daily Quotidienne	☐ Semi-Monthly Bi-mensuelle	☐ Annual Annuelle	Due in - Entrée prévue Time-Heure Date		Due out - Sortie prévue Time-Heure Date		Est. volume - Quantité est. Est. time - Temps est. Heures Minutes
	☐ Weekly Hédomadaire	☐ Monthly Mensuelle	☐ Other Autre					
	☐ Term Périodique	☐ Quarterly Trimestrielle						
	Program Card No. - N° de la carte-programme			Special Features Used - Fonctions accessoires utilisées				
			☐ Alternate Program Programme supplémentaire ☐ Auxiliary Duplicate Reproduction auxiliaire ☐ Card Reversing Inversion des cartes ☐ Self Checking No. N° d'auto-vérification					

24-26-56		SWITCH SETTINGS - POSITION DE LA MANETTE	
on Marche	off Arrêt	Switch - Commutateur	
		Program Unit - Unité programme	
		Auto Feed - Alimentation auto.	
		Auto Skip - Auto Dupl. - On. auto-Dupl. auto	
		Print - Impression	
		Self Checking No. - N° d'auto-vérification	

CARD FIELD - CHAMP DE LA CARTE	Col.		Function* Fonction*	REMARKS - REMARQUES
	From-to	To-2		
1. Question #7 (hunted Waterfowl)	26	28	PV	
2. Question #8 (hunted Migratory birds)	29	31	PV	
3. Question #9 (kill)	32	34	PV	Number of ducks
4.	35	36	PV	Number of sea ducks
5.	37	38	PV	Number of coots
6.	39	40	PV	Number of Canada Geese
7.	41	42	PV	Number of Other geese
8.	43	44	PV	Number of Snipe
9.	45	46	PV	Number of Woodcock
10.	47	48	PV	Number of Mourning Doves
11.	49	50	PV	Number of B.T. Pigeons
12.	51	52	PV	Number of Gallinules
13.	53	54	PV	Number of CRANES
14.	55	56	PV	Number of Unknowns
15.				
16.				
TOTAL KEY STROKES PER CARD NOMBRE DE FRAPPES PAR CARTE				

*Function - Fonction	Symb.
Duplicate - Reproduction	D
Punch - Perforation	P
Skip - Omission	S
X-Skip - Omission des X	XS
Verify - Vérification	V
Self Ch No. - N° d'auto vér.	CK



CARD PUNCHING OR VERIFYING INSTRUCTIONS

INSTRUCTIONS POUR LA PERFORATION ET LA VÉRIFICATION DES CARTES

Job Name - Désignation de la tâche		Job No. N° de la tâche	Control Panel N° - N° du tableau des commandes	Operation Name Désignation de l'opération	Function Fonction	Machine type Type de machine																
Ontario Migratory Birds Response Survey 1971		G851																				
☐ Daily Quotidienne ☐ Weekly Hebdomadaire ☐ Term Périodique ☐ Semi-Monthly Bi-mensuelle ☐ Monthly Mensuelle ☐ Quarterly Trimestrielle ☐ Annual Annuelle ☐ Other Autre		Due in - Entrée prévue Time-Heure Date Due out - Sortie prévue Time-Heure Date		Est. volume - Quantité est. Est. time - Temps est. Heures Minutes																		
Program Card No. - N° de la carte-programme		Special Features Used - Fonctions accessoires utilisées ☐ Alternate Program Programme supplémentaire ☐ Card Reversing Inversion des cartes ☐ Auxiliary Duplicate Reproduction auxiliaire ☐ Self Checking No. N° d'auto-vérification ☐																				
24-26-36 SWITCH SETTINGS - POSITION DE LA MANETTE <table border="1"> <thead> <tr> <th>on Marché</th> <th>off Arrêt</th> <th>Switch Commutateur</th> <th>Program Unit - Unité programme</th> <th>Auto Feed - Alimentation auto.</th> <th>Auto Skip - Auto Dupl. - Om. auto-Dupl. auto</th> <th>Print - Impression</th> <th>Self Checking No. - N° d'auto-vérification</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>							on Marché	off Arrêt	Switch Commutateur	Program Unit - Unité programme	Auto Feed - Alimentation auto.	Auto Skip - Auto Dupl. - Om. auto-Dupl. auto	Print - Impression	Self Checking No. - N° d'auto-vérification								
on Marché	off Arrêt	Switch Commutateur	Program Unit - Unité programme	Auto Feed - Alimentation auto.	Auto Skip - Auto Dupl. - Om. auto-Dupl. auto	Print - Impression	Self Checking No. - N° d'auto-vérification															
CARD FIELD - CHAMP DE LA CARTE		Col. From-to De-à		Function* Fonction*	REMARKS - REMARQUES																	
Question #10 (Duck Calendar)		57	58	PV	Days September																	
		59	60	PV	Kill September																	
		61	62	PV	Days October																	
		63	64	PV	Kill October																	
		65	66	PV	Days November																	
		67	68	PV	Kill November																	
		69	70	PV	Days December																	
		71	72	PV	Kill December																	
Question #11 (metal leg-band)			73	PV	01, 2 or 9 only																	
			74	PV	01 to 9 only																	
			75	PV	01 to 9 only																	
			76	PV	01 to 9 only																	
TOTAL KEY STROKES PER CARD NOMBRE DE FRAPPES PAR CARTE																						
		Section		Page																		

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INSTRUCTIONS POUR LA PERFORATION ET LA VÉRIFICATION DES CARTES

Job Name - Désignation de la tâche Ontario Migratory Birds Response Survey 1971	Job No. N° de la tâche G851	Control Panel No. - N° du tableau des connexions	Operation Name Désignation de l'opération	Function Fonction	Machine type Type de machine
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☐ Daily Quotidienne	☐ Semi-Monthly Bi-mensuelle	☐ Annual Annuelle	Due in - Entrée prévue	Due out - Sortie prévue	Est. volume - Quantité est.	Est. time - Temps est.
☐ Weekly Hédomadaire	☐ Monthly Mensuelle	☐ Other Autre	Time - Heures	Time - Heures		Heures
☐ Term Périodique	☐ Quarterly Trimestrielle		Date	Date		Minutes

Program Card No. - N° de la carte-programme

Special Features Used - Fonctions accessoires utilisées

☐ Alternate Program Programme supplémentaire	☐ Card Reversing Inversion des cartes
☐ Auxiliary Duplicate Reproduction auxiliaire	☐ Self Checking No. N° d'auto-vérification
☐	☐

24-26-56

SWITCH SETTINGS - POSITION DE LA MANETTE

on Marche	off Arrêt	Switch - Commutateur			
		Program Unit - Unité programme			
		Auto Feed - Alimentation auto.			
		Auto Skip - Auto Dupl. - Om. auto-Dupl. auto			
		Print - Impression			
		Self Checking No. - N° d'auto-vérification			

B C D E

CARD FIELD - CHAMP DE LA CARTE

Col.
From - de To - àFunction*
Fonction*

REMARKS - REMARQUES

1. Card Code		1	PV	always '2'
2. 1970 Permit number	2	7	PV	duplicate
3. Age	8	9	PV	
4. Editing #1		10	PV	0, 1 or 2 only
5. Editing #2		11	PV	0, 1 or 2 "
6. Editing #3		12	PV	0, 1 or 2 "
7. Editing #4		13	PV	0, 1 or 2 "
8. Resident		14	PV	0, 1 or 2 only
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				

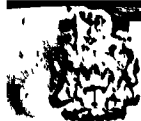
TOTAL KEY STROKES PER CARD
NOMBRE DE FRAPPES PAR CARTE

* Function - Fonction	Symb.
Duplicate - Reproduction	D
Punch - Perforation	P
Skip - Omission	S
X-Skip - Omission des X	X
Verify - Vérification	V
Self Ch No. - N° d'auto-vér.	CH

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Job Name - Désignation de la tâche Ontario Migratory Birds Response Survey 1971	Job No. N° de la tâche G851	Control Panel No. - N° du tableau des connexions	Operation Name Désignation de l'opération	Function Fonction	Machine type Type de machine
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☐ Daily Quotidienne	☐ Semi-Monthly Bi-mensuelle	☐ Annual Annuelle	Due in - Entrée prévue	Due out - Sortie prévue	Est. volume - Quantité est.	Est. time - Temps est.
☐ Weekly Hebdomadaire	☐ Monthly Mensuelle	☐ Other Autre	Time - Heure	Time - Heure		Heure
☐ Term Périodique	☐ Quarterly Trimestrielle		Date	Date		Minutes

Program Card No. - N° de la carte-programme	Special Features Used - Fonctions accessoires utilisées
	☐ Alternate Program Programme supplémentaire
	☐ Card Reversing Inversion des cartes
	☐ Auxiliary Duplicate Reproduction auxiliaire
	☐ Self Checking No. N° d'auto-vérification
	☐

24-26-56		SWITCH SETTINGS - POSITION DE LA MANETTE	
on Marché	off Arrêt	Switch - Commutateur	
		Program Unit - Unité programme	
		Auto Feed - Alimentation auto.	
		Auto Ship - Auto Dupl. - On, auto-Dupl. auto	
		Print - Impression	
		Self Checking No. - N° d'auto-vérification	

CARD FIELD - CHAMP DE LA CARTE	Col.		Function* Fonction*	REMARKS - REMARQUES
	From - de	To - à		
1. Card Code		1		Always '1'
2. 1970 Permit number	2	7	PV	
3. Sample Group		8	PV	A, B, C, E, only
4. Mailing		9	PV	4, 5, 7, only
5. Date received		10	PV	1 to 9 only
6. Question #1 (Buy)		11	PV	yes = 1 no = 2 or 9
7. 1971 Permit number	12	17	PV	
8. Question #2 (hunted) 1971		18	PV	yes = 1 no = 2 or 9
9. 1970		19	PV	yes = 1 no = 2 or 9
10. 1969		20	PV	yes = 1 no = 2 or 9
11.				
12. Question #3 (Province)	21	22	PV	
13. Question #4 (hunted waterfowl)	26	28	PV	
14. Question #5 (hunted migratory birds)	29	31	PV	
15.				
16.				
TOTAL KEY STROKES PER CARD NOMBRE DE FRAPPES PAR CARTE				

*Function - Fonction	Sym.
Duplicate - Reproduction	P
Punch - Perforation	P
Ship - Omission	S
X-Ship - Omission des X	X
Verify - Vérification	V
Self Ch No. - N° d'auto-vér.	CH



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CARD PUNCHING OR VERIFYING INSTRUCTIONS INSTRUCTIONS POUR LA PERFORATION ET LA VÉRIFICATION DES CARTES

Job Name - Désignation de la tâche

Ontario Migratory Birds
Response Survey 1971

Job No.
N° de la tâche

G851

Control Panel
N° du
tableau des
contrôles

Operation Name
Désignation de l'opération

Function
Fonction

Machine type
Type de machine

☐ Daily Quotidienne	☐ Semi-Monthly Bi-mensuelle	☐ Annual Annuelle	Due in - Entrée prévue	Due out - Sortie prévue	Est. volume - Quantité est.	Est. time - Temps est.
☐ Weekly Hédomadaire	☐ Monthly Mensuelle	☐ Other Autre	Time-Heure	Date		Heures Minutes
☐ Term Périodique	☐ Quarterly Trimestrielle					

Program Card No. - N° de la carte-programme

Special Features Used - Fonctions accessoires utilisées

☐ Alternate Program Programme supplémentaire	☐ Card Reversing Inversion des cartes
☐ Auxiliary Duplicate Reproduction auxiliaire	☐ Self Checking No. N° d'auto-vérification
☐	☐

24-26-56

SWITCH SETTINGS - POSITION DE LA MANETTE

on Marche	off Arrêt	Switch - Commutateur			
		Program Unit - Unité programme			
		Auto Feed - Alimentation auto.			
		Auto Skip - Auto Dupl. - Om. auto-Dupl. auto			
		Print - Impression			
		Self Checking No. - N° d'auto-vérification			

CARD FIELD - CHAMP DE LA CARTE

Col.
From-to

Function
Fonction

REMARKS - REMARQUES

1. Question #6 (kills)	32	34	PV	Number of ducks
2.	35	36	PV	Number of sea ducks
3.				
4.	39	40	PV	Number of Canada geese
5.	41	42	PV	Number of Other geese
6.	43	44	PV	Number of Snipes
7.	45	46	PV	Number of Woodcocks
8.				
9.	55	56	PV	Number of Unknowns
10. Question #7 (metal leg-band)		73	PV	0,1,2 or 9 only
11.		74	PV	0,1,2 or 9 only
12.		75	PV	0,1,2 or 9 only
13.		76	PV	0,1,2 or 9 only
14.				
15.				
16.				
TOTAL KEY STROKES PER CARD NOMBRE DE FRAPPES PAR CARTE				

Function - Fonction	Symb.
Duplicate - Reproduction	D
Punch - Perforation	P
Skip - Omission	S
X-Skip - Omission des X	X
Verify - Vérification	V
Self Ch No. - N° d'auto-vér.	Ch

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CARD PUNCHING OR VERIFYING INSTRUCTIONS INSTRUCTIONS POUR LA PERFORATION ET LA VÉRIFICATION DES CARTES

Job Name - Désignation de la tâche Ontario Migratory Birds Response Survey 1971	Job No. N° de la tâche G851	Control Panel No. - N° du tableau des connexions	Operation Name Désignation de l'opération	Function Fonction	Machine type Type de machine
☐ Daily Quotidienne ☐ Weekly Hédomadaire ☐ Term Périodique		☐ Semi-Monthly Bi-mensuelle ☐ Monthly Mensuelle ☐ Quarterly Trimestrielle		☐ Annual Annuelle ☐ Other Autre	
Due in - Entrée prévue Time-Heure Date		Due out - Sortie prévue Time-Heure Date		Est. volume - Quantité est. Est. time - Temps est. Heure Minutes	
Program Card No. - N° de la carte-programme		Special Features Used - Fonctions accessoires utilisées ☐ Alternate Program Programme supplémentaire ☐ Card Reversing Inversion des cartes ☐ Auxiliary Duplicate Reproduction auxiliaire ☐ Self Checking No. N° d'auto-vérification			

SWITCH SETTINGS - POSITION DE LA MANETTE

on Marche	off Arrêt	Switch Commutateur
		Program Unit - Unité programme
		Auto Feed - Alimentation auto.
		Auto Skip - Auto Dupl. - Om. auto-Dupl. auto
		Print - Impression
		Self Checking No. - N° d'auto-vérification

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CARD FIELD - CHAMP DE LA CARTE	Col.		Fudation* Fonction*	REMARKS - REMARQUES
	From-to	To-to		
1. Card Code		1	PV	always '2'
2. 1970 permit number	2	7	PV	duplicate
3. Age	8	9	PV	
4. Editing #1		10	PV	01 or 2 only
5. Editing #2		11	PV	01 or 2 only
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Appendix 15

Weighting Procedures for Calculation of Accumulated Response
Rate to Treatments used over Successive Waves.

Prepared by Dr. G.E.J. Smith
Canadian Wildlife Service
Department of the Environment

Because nonrespondents to waves 1 and 2 were subdivided and followed-up with different treatments, the following weighting procedure was developed to enable the computation of a cumulated response rate to treatments used in successive waves.

The cumulated response rate denoted by $\bar{x}$ is obtained by the formula:

$$\bar{x} = \frac{1}{n_1} (x_1 + ax_2 + abx_3)$$

and the standard error of $\bar{x}$ is denoted by $\text{var } \bar{x}$ and is computed by:

$$n_1 \text{var } \bar{x} = p_1(1-p_1) + p_2 \left\{ a - \frac{p_2(a-p_1)}{1-p_1} - 2p_1 \right\} + p_3 \left\{ ab - \frac{p_3}{(1-p_1-p_2)} \right. \\ \left. [ab - p_1 - \frac{p_2(a-p_1)}{1-p_1}] - 2p_1 - 2p_2 \frac{a-p_1}{1-p_1} \right\}$$

where n_i = sample selection for a given treatment
in i th mailing

x_i = response for a given treatment in i th
mailing

$$p_i = x_i/n_i$$

$$a = (n_1 - x_1)/n_2$$

$$b = (n_2 - x_2)/n_3$$

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ABSTRACT

EXPLORING METHODS TO MINIMIZE BIAS DUE TO NONRESPONSE IN SELF-ADMINISTERED MAIL SURVEYS.

By

F.L. FILION

Practical procedures for minimizing error due to nonresponse in self-administered mail surveys were tested among a stratified sample of Canadian Migratory Game Bird Permit purchasers. Two dimensions of the problem were examined: the extent to which respondents differ from nonrespondents and the effectiveness of twelve techniques to maximize the response rate. Assuming that follow-ups probe deeper into the core of nonrespondents a linear regression model for estimating parameter values of a population while correcting for nonresponse bias was devised using cumulated observations over three successive waves. It was estimated that nonrespondents tended to have a significantly lower level of participation and involvement in the topic investigated, were younger and resided within the province. With respect to resource management nonresponse bias was slight but resulted in overestimation of harvests and underestimation of recreation days. The effectiveness of several response induction techniques including changes in questionnaire format, anonymity, an incentive, special class postage and follow-ups were tested and compared to the method used in the continuing Harvest Survey. Significant increases in the rate of returns, as high as 69 percent, were observed and have been attributed mainly to questionnaire design and the method of following-up nonrespondents. These results confirm the effectiveness of the mail survey as a research instrument, the significant effect of procedural techniques on survey participation, and the usefulness of follow-ups as an inexpensive and convenient means of exploring and correcting for error due to nonresponse.

RÉSUMÉ

MÉTHODES POUR RÉDUIRE AU MINIMUM LES ERREURS DUES À LA NON-RÉPONSE AUX ENQUÊTES PAR CORRESPONDANCE

par

F.L. FILION

Certaines méthodes pratiques visant à réduire au minimum les erreurs dues à la non-réponse aux enquêtes par correspondance ont été mises à l'essai parmi un échantillon stratifié d'acheteurs de permis canadiens de chasse aux oiseaux migrateurs. Deux aspects du problème ont été étudiés: le degré de différence entre les répondants et les non-répondants et l'efficacité de douze techniques visant à augmenter le taux de réponse. En supposant que les lettres de rappel renseignent davantage sur les non-répondants, un modèle de régression linéaire pour estimer les valeurs paramétriques d'une population tout en corrigeant les erreurs dues à la non-réponse a été conçu en se fondant sur les observations accumulées à la suite de trois mises en poste successives. On en a déduit que les non-répondants avaient, d'habitude, un plus faible niveau de participation et d'engagement dans le domaine qui nous concerne, qu'ils étaient plus jeunes et habitaient surtout la province. Quant à la gestion des ressources, les erreurs attribuables à la non-réponse étaient légères, mais résultaient en une surestimation des prises et une sous-estimation du nombre de jours de loisirs. L'efficacité de plusieurs techniques d'induction des réponses, y compris des modifications dans la présentation du questionnaire, l'anonymat, un stimulant, le courrier de classe spéciale et les lettres de rappel, a été mise à l'essai et comparée à celle de la méthode utilisée dans le relevé national permanent sur les prises. On a noté des augmentations importantes, jusqu'à 69 pour cent, dans le taux de réponse, augmentations surtout attribuées à la présentation du questionnaire et à la méthode de relancer les non-répondants. Ces résultats confirment l'efficacité des enquêtes par correspondance comme moyen de recherche, l'effet réel des façons de procéder sur la participation aux enquêtes et l'utilité des rappels comme méthode peu coûteuse et pratique de recherche et de correction des erreurs attribuables à la non-réponse.