This is to certify that the

thesis entitled

EXTRA MARKET VALUES FOR NON-CONSUMPTIVE
USES OF FOUR GREAT LAKES REGION
WILDLIFE SPECIES

presented by

CATHLEEN HEIDI GRETHER

has been accepted towards fulfillment
of the requirements for

Master of Science degree in Resource Development

Milton H. Steinmueller

Major professor
Milton H. Steinmueller

Date September 19, 1984

EXTRA MARKET VALUES FOR NON-CONSUMPTIVE USES OF FOUR GREAT LAKES REGION WILDLIFE SPECIES

By

Cathleen Heidi Grether

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Resource Development

1984

ABSTRACT

EXTRA MARKET VALUES FOR NON-CONSUMPTIVE
USES OF FOUR GREAT LAKES REGION
WILDLIFE SPECIES

By

CATHLEEN HEIDI GRETHER

Extra market values for non-consumptive uses of fish and wildlife resources are important elements in resource allocation decisions. Presently, there are no estimates for these types of values for Great Lakes region species.

This study explores Ingham and Bay county respondents' use, option price and existence values for four species associated with the Great Lakes. The contingent valuation method was used to elicit respondents' values; and two types of interviews were used: telephone and personal interviews. Telephone interviews were conducted in Bay and Ingham counties, whereas personal interviews were conducted only in Ingham county.

Major finding of this study include that: individuals do hold extra market values for fish and wildlife resources; these values are, on average, positive; existence values are of the some order of magnitude as use values; and generally, bald eagles are valued the highest while the value of gulls is relatively low.

ACKNOWLEDGEMENTS

I would like to thank the members of my graduate committee for their guidance during this study: Drs. Daniel R. Talhelm, Milton H. Steinmueller and Lawrence Libby. In addition, I would like to express my gratitude to my fellow graduate students in Resource Development. Many provided frequent assistance through discussions of the merits of this study and the uses of their libraries. I would like to thank the Great Lakes Fishery Commision for providing financial support, and the MSU Fisheries and Wildlife Department, Jane Thompson in particular, for typing the questionnaire and this paper.

Lastly, I am thankful for the support of my husband, Stan Koster and our families. Without them, achievement of this goal would have been impossible.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Overview: Extra Market Values for Non-consumptive Uses of Wildlife Species

Most natural resources can have two broad types of use, consumptive use and non-consumptive use. The value of consumptive use of the resource is the value associated with the physical consumption of it; examples include the value of a timber stand for pulp wood and the price per pound of Atlantic salmon. The non-consumptive use value of the resource is value attributed to the uses of resource that do not physically affect the resource; examples include the value of saving an endangered species from extinction or the value of preserving wilderness areas (Randall 1981).

Economic values most often associated with the use of natural resources have been consumptive use values. The value of the consumptive use of the resource is the price the buyer or user is willing to pay for it in a market. This value, as with all values, depends upon the total supply and demand of the resource.

Many people value non-consumptive uses of natural resources. These values are somewhat intangible because they are difficult to define or identify and they are not transacted in a market. Therefore, they have been termed extra market values.

Historically, policy analysts have sometimes employed benefit-cost studies to determine the most economically efficient allocations of natural resources. Monetary values used in these analyses have generally been tangible values derived from some observable market interaction. The consideration of only market established use values omitted many other social values. Increased awareness of this deficiency has led to efforts to include intangible social values as part of benefit-cost analysis.

It is especially important that the extra market values for non-consumptive uses of wildlife be examined, as wildlife resources can be utilized in many ways in addition to consumption. If individuals hold these kinds of values, the values need to be identified and included in benefit-cost evaluations. Estimating these non-consumptive use values can provide policy makers with a more complete set of tools for resource allocation decisions.

It is also important to point out that non-consumptive values of wildlife may be based on a broad range of experiences, interests and feelings. The total value for a given item or experience may be separated into three mutually exclusive components (Talhelm 1983, Randall and Stoll 1983, Talhelm and Johnson 1984). Specifically, total value is comprised of use value, option value and existence value, where: use value is the value an individual places on his/her present and future use of the resource; option value is the value an individual places on the guarantee itself of the future availability of the resource for his/her possible use or enjoyment, in addition to his/her present and future use value; and existence value is the value an individual places on knowing the resource will exist now and in the future

even though he/she may never enjoy the resource directly. Option price is equal to the option value plus the expected consumer surplus of the future use of the resource.

This typology of values can be applied to many categories of natural resources, including wildlife. The method of obtaining these values, however, depends on the situation or resource being investigated. Freeman (1979) cites two approaches to determining individuals' values for environmental quality improvements which can be applied to other natural resource valuation situations. They are: 1) ask individuals for their values; and 2) derive values from related market transactions.

The literature is replete with studies that try to assess extra market values for natural resources. (See Brookshire and Crocker, 1981 for a summary.) In the area of wildlife resources, however, economic research has been limited primarily to values associated with consumptive (hunted) species (Bishop and Heberlein 1979, Brookshire et al. 1982). In the Great Lakes region no research on the extra market values for non-consumptive uses of wildlife has been undertaken. This study will address the issue of non-consumptive use values for specified Great Lakes wildlife species.

Scope of This Study

There were several major goals of this study. First, determine if individuals are able to conceptually divide their total value for a

specified wildlife species into its' component values and assess each component separately. Second, determine the magnitudes of the components as an approximation of their relative importance. Third, determine the approximate value of each species and use this as an indicator of individuals' preferences between species. Fourth, examine the possibility that the relative magnitudes of the values for species may be related to other factors, including geographical location. Fifth, evaluate whether respondents were able to understand the concepts presented, and if they felt their responses accurately reflected their values. Finally, offer recommendations for further research into the problem of assessing extra market values for non-consumptive uses of wildlife.

It is important to recognize that the scope of this study imposes limitations on the practical use and application of the findings. Due to the scarcity of previous studies on the value of non-consumptive uses of wildlife, and time and monetary constraints, this study was not able to unequivocally provide answers to many of the questions raised. It does however, indicate ranges and magnitudes of values, and directions for further research in the area of extra market values for non-consumptive uses of wildlife.

Several questions were identified for examination at the onset of this study. These questions, in hypothesis form, are:

1. People hold option prices and existence values for fish and wildlife resources, and these valuations differ from species to species.
2. Option prices for each species differ from existence values for each species.

3. Total use values will be higher for common species (species with low utilization costs) and will be lower for uncommon species (species with high utilization costs).

Two research tools were employed in this study, telephone interviews and personal interviews. Questionnaires were developed for each interview type. In both, the components of total value were explained to each respondent. He/she was asked about the relative importance of each component, and then asked to assign a dollar value to each component.

Four wildlife species associated with the Great Lakes were chosen for the study: bald eagle (Haliaeetus leucocephalus), Great Lakes sea gull (Larus spp.), lake trout (Salvelinus namaycush), and lake sturgeon (Acipenser fulvescens). For each of the two animal classes represented (birds and fish), one common and one uncommon species was chosen so the relative total values of each species in the same class could be compared to each other. Personal interview respondents were asked about all four species, but, due to interview-time considerations, telephone interviewees were only asked about one species.

Organization of the Paper

The remainder of this paper is divided into four chapters. Chapter II provides the theoretical basis for the project by reviewing the taxonomy of values used. Chapter III contains an explanation of the research methods employed and special methodology concerns specific to extra market valuations. The findings are discussed in Chapter IV, including a description of the general results, comparisons of results between survey types and examination of the results vis-a-vis the hypotheses. Chapter V presents a summary of the key findings,

conclusions based on these findings and recommendations for further study and research.

CHAPTER II

THEORETICAL FOUNDATION

The difficulty in determining extra market values for non-consumptive uses of wildlife species is a recognized problem. Due to the system of rights enjoyed in the United States, all citizens are joint owners, through the government, of many of the country's natural resources. Traditionally, many natural resources are also considered public goods. Public goods have been defined as goods that are non-rival and non-excludable (Boadway 1979), meaning that the good can be jointly used or enjoyed by more than one individual at a time, and that individuals cannot be excluded from this use or enjoyment. Allocation of public goods through market mechanisms is inefficient or impossible because of their nature.

Some public goods may also be common property resourced when sufficient demand for use of the resource exists. Common property resources are resources in which open access and the right of capture are allowed. These characteristics provide the foundation for resource use problems. First, open access to the resource can lead to congestion arising from its' use. This is because each individual has the right of access to the resource whenever he/she desires. Second, the resource may become depleted because of the right of capture. Consequently, overexploitation of the resource may result with common property resources.

The very nature of some natural resources, therefore, makes it inappropriate to use traditional market transactions to determine the resources' values to society. In these cases, other methods of resource valuation must be used.

In this study, it was helpful to establish an artificial typology to aid in the examination of extra market values for non-consumptive uses of wildlife, and consumptive and non-consumptive uses of fish. This typology was based on economic theory and certain observed economic exchanges. Three mutually exclusive classes of values were established: (1) the value associated with the consumptive and non-consumptive use of the species or "use" value, (2) the value associated with the guarantee of the future availability of the species or "option" value and (3) the value associated with the pure existence of the species or "existence" value.

Use Value

It is well known that individuals are willing to pay for wildlife related experiences. These wildlife experiences can be consumptive or non-consumptive in nature. Common user fees associated with consumptive uses of wildlife include hunting and fishing license fees. User fees associated with non-consumptive uses of wildlife include state and federal park permits.

There may be many reasons why an individual is willing to pay a user fee, such as a park permit. Consider the example of Pt. Pelee National Park in southern Ontario, Canada. The park is heavily used by vacationers and birdwatchers. Each vehicle entering the park is required to purchase a $2.00 daily or $10.00 annual entry permit. The entry fee paid by vacationers may be attributed to the ability to enjoy

the many miles of beaches and trails in the park, while the fee paid by birdwatchers would be attributed to the value of the non-consumptive uses of birds during migration. Additionally, some individuals may visit Pt. Pelee (and consequently pay the entry fee) for multiple reasons, many of which may have little or nothing to do with wildlife related experiences.

In these cases, such observable "market" interactions may give insight into individuals' willingness to pay for their present and future wildlife related experiences. This insight, however, is limited because user fees are artificially low and do not include a significant component of wildlife value. In reality, individuals may be willing to pay more than the required user fees. Therefore, the user fee system does not accurately reflect individuals' consumptive or non-consumptive use value, and measurement must be obtained using a consumer surplus approach.

The specific concern here is to assess the value of individuals' present and future uses for the four wildlife species under consideration by estimating the maximum amount they would be willing to pay for their present and future resource use. In essence then, this value is the expected consumer surplus from present and future uses of the species. Use value is defined as the amount an individual is willing to pay for his/her present and future use or enjoyment of a specified species.

Option Price and Option Value

The notion of option value has been discussed in economic literature for 20 years, originating with Weisbrod's 1964 article on option value. Weisbrod posed the idea that people would be willing to pay for the option to retain a right or commodity presently available for use at a future time. He further stated that "option value" should be included in any economic based decision to alter or eliminate that right or commodity (Weisbrod 1964).

Through the years, much debate ensued over the nature of option value and its place in economic theory. For example, Long (1967) contended option value was merely a rediscovery of consumer surplus. Lindsay (1969) pointed out the element of uncertainty in option value and reinforced Weisbrod's insurance policy analogy. Byerlee (1971) attempted an empirical analysis of the option value-consumer surplus debate proposed by Long. The existence of option value was further shown by Cicchetti and Freeman (1971). Additional empirical work was done by Schmalensee (1972) and Bohm (1975).

The most comprehensive review of relevant option value literature to date has been done by Bishop (1982). His work provided a clearer definition of option value and option price. Bishop pointed out that option price is the maximum amount an individual would be willing to pay to maintain the option of using or enjoying the good (or experience) in the future. Option value, then, equals the option price minus the expected consumer surplus from future use of the good. Option value is in addition to his/her use value and is similar to the value of insurance. This is the amount an individual is willing to pay to decrease the risk that the resource will be unavailable in the future

should he/she decide to use it. (See Talhelm and Johnson 1984 for further explanation.) In this study, the intent was to ask respondents their option price, but given the wording and interpretation of the questions, it is felt that a hybrid of option value and option price is asked. The option value is not calculated because the expected consumer surplus of the option could not be subtracted from the option price, as it was not clearly estimated.

Existence Value

The idea that many individuals desire to preserve certain things for future generations is not new. It is evidenced by the passing on of family heirlooms and other items of sentimental or economic value. Similarly, some individuals may feel it is important to preserve certain natural sites or resources for future generations to enjoy (Krutilla 1967).

This desire to preserve wildlife for the future is well recognized by many of the wildlife advocacy organizations. Often, the appeal for donations is on behalf of preserving an endangered species, which most people would never have the opportunity to see in its' natural habitat. The request is frequently along the lines of, "Help us save the white rhino from extinction - so your children can enjoy its' majestic beauty." This can be an effective tool for soliciting support because individuals can be motivated by the desire for their children and future generations to have the same opportunities that are now available. For some, these appeals may imply future use value and option value as well as existence value, but to others the appeals may imply purely existence value.

In an effort to quantify this desire, a working definition of existence value was formed. The definition of existence value used here is the maximum amount an individual would be willing to pay to ensure the existence of a specified species without regard to his/her own future use or enjoyment.

The goal in using this typology and making the transition from theory to practice, is to estimate individuals' specific use values for the four wildlife species examined. It is hoped that these approximations could be used as benchmark values for researchers and policy makers in the future.

CHAPTER III

METHODS

Chapter III reviews the methods used to conduct this research project. First, the contingent valuation (CV) method is defined and the problems associated with it are discussed. Second, application of CV in this study is addressed as are the efforts made to minimize bias. Third, the organization and purpose of the questionnaire are reviewed, including the differences between the telephone and personal interview forms. Fourth, the survey sample selection processes are explained for both interview types. Fifth, the administration of the questionnaires is explained. Last, the data analyses procedures are summarized.

Contingent Valuation

In addition to the problems associated with determining extra-market values for non-consumptive uses of wildlife, there are also methodological difficulties. Individuals' values were partitioned into mutually exclusive categories to provide a framework consistent with economic theory. The problem then became, whether individuals' values could be accurately elicited.

Many studies have used contingent valuation surveys for determining monetary values associated with extra-market goods. Brookshire and

Crocker (1981) provide a concise summary of the diverse studies undertaken. Studies using CV for examining wildlife values have been limited primarily to economic values associated with hunting (Bishop and Heberlein 1979, Brookshire et al. 1982).

Brookshire and Crocker (1981) point out that the key to CV is the establishment of a hypothetical market for the good or goods being examined. They go on to outline a three step procedure:

(a) The non-market commodity is described in quantity, quality, location, and time dimensions. Various types of supplementary information including maps and photographs are introduced when appropriate.

(b) The rules of operation of the hypothetical market are established. Then a representation of the available quantity of the environmental good is perturbed and the respondent is asked to state willingness-to-pay or required compensation, or the activity substitutions and expenditure adjustments he would make. Both a status quo quantity of the good and price are explicitly stated by the interviewer prior to any respondent statements. The first is a direct approach, while the second provides information for using the indirect techniques commonly employed with data on actual observed behavior.

(c) The market rules of operation, bidding vehicles, and status quo prices and quantities may differ across respondents. Each respondent is presented a status quo price and/or quantity of the non-marketed good: the price and/or quantity of the good is then altered by the interviewer until a combination is reached to which the respondent is indifferent.

Similarly, Randall et al. (1983) emphasize the structured, well-defined situation posed to respondents in CV surveys.

Despite the wide use of CV for valuing natural resources, doubts about the accuracy have been voiced, as well as concerns about biases encountered. Maler (1974) questioned the use of bids as a way to determine the amount individuals would be willing to pay for environmental services. More recently, Bishop et al. (1983) found by comparing various value methods that CV mechanisms may distort individuals' true willingness to pay and that willingness to pay may underestimate value, while willingness to accept payment may overestimate value.

Further, concerns about potential biases have also been examined. Several types of bias have been mentioned, primarily, strategic bias, hypothetical bias, instrument bias and information bias.

Strategic bias can be defined as the error caused by the respondent not revealing his/her true preferences, thereby influencing the valuation results. This failure to reveal his/her true preferences may be based on the respondents' assumption that it is in his/her best interest not to be truthful. An example of strategic bias would be where an individual underestimates his/her value for the good in question when payment of that value is implied or requested. Several researchers have examined strategic bias (Bohm 1972, Brookshire et al. 1976, and Rowe et al. 1980). Their results indicate that strategic bias can be countered by the design of the questionnaire.

Hypothetical bias can be defined as error caused by presenting the respondent with a hypothetical situation and asking him/her to place a value on the goods in question, knowing payment will not be required. The problem of hypothetical bias has been considered by several researchers (Brookshire et al. 1976, Rowe et al. 1980, Thayer 1981, and Schulze et al. 1981). Their work indicates that this form of bias may

be countered by validation of the results. In addition, the work by Bishop et al. (1983) suggest that the differences between individuals' willingness to pay and willingness to sell may be due to the problem of hypothetical bias.

Instrument bias can be defined as error caused by the structure of the survey instrument itself. Two primary types of instrument bias may be encountered, starting point bias and payment bias. Other biases caused by the structure of the instrument may exist as well.

It has been suggested that the starting point of the bidding process may influence the respondent's valuations, Rowe et al. (1980) and Schulze et al. (1981) state that there are primarily two types of starting point bias. First, the starting point itself may imply value or the lack of value to the respondent and may therefore influence his/her valuations. Second, depending upon the value increments chosen for the bidding game, the respondent may tire of the repetitive questioning and may give a value just to stop the process. In another study by Brookshire et al. (1977), however, the results indicate that no statistically significant starting point bias existed in their study.

Another type of instrument bias is payment bias. The respondent's perceived acceptability of the method of payment may effect his/her valuations. Brookshire et al. (1980) rejected the hypotheses that valuations were affected by the method of payment. They did, however, find that respondents were more likely to refuse to bid when one of the two payment forms specified was used. In addition, they received negative feedback about that payment form. The results of another study by Brookshire et al. (1977) were somewhat inconclusive on the issue of payment bias due to the small sample size of many of the cases tested.

Information bias can be defined as the potential influence of the information the interviewer gives the respondent which may affect his/her valuations. Rowe et al. (1980) suggest that information bias may have a significant influence on bids depending upon the measure of consumer surplus being examined. Additionally, the respondent's answer will be biased if he/she does not fully understand what is being asked.

Application of Contingent Valuation

In trying to determine extra-market values for non-consumptive uses of wildlife, a somewhat modified version of Brookshire and Crocker's contingent valuation method, as outlined earlier, was used. First, with regard to (a) (on page 14), the non-market commodity was given (either one or all four species considered, depending upon the survey type) as well as time dimensions (present and future). In general terms, the quantity was specified to the personal interview respondents by informing them that two of the species were common in Michigan and two were uncommon. Telephone respondents were not told anything about the relative abundance of the species they were asked about. The quantity and location were not specified because the respondents' values for the species at that point in time were the desired valuations. The purpose of the questionnaire process was not to educate or increase the respondents awareness either before or during the administration of the questionnaire. In addition, visual aids were used during the personal interviews to explain the value measures.

Second, with regard to (b) (on page 14), the iterative bidding technique was explained to respondents as were the potential forms of payment. The status quo quantity was implied to each respondent as the amount currently available for his/her enjoyment. Although a numerical

amount was not explicitly specified the respondent had the choice of zero levels of the resource or the amount currently available. Each respondent was randomly assigned a status quo price (bid starting point) prior to the administration of the questionnaire.

Finally, with regard to (c) (on page 14), each respondent was given the quantity (implied) and a price. Through iterative bidding he/she was asked for the highest amount he/she would be willing to pay for various situations related to the value measures specified.

Efforts were made through the design of the study to minimize the biases that have concerned other researchers. Careful attention was given to the design and wording of the questionnaires to reduce the affects of bias associated with the instrument itself and the administration of the instrument.

Strategic bias. The questionnaires were designed so that there was little or no incentive for the respondents not to reveal their true valuations. Respondents were not told that they would be asked to pay the average bid of all respondents, as this could provide incentive to underestimate bids. Respondents also knew that attempts would not be made to collect the bid amount. Therefore, overestimation was possible, but there would be no advantage in doing so.

Hypothetical bias. Time constraints prevented using an elaborate "realistic" hypothetical situation for the respondents to react to. Consequently, when feasible, respondents' real life experiences were relied on. First, respondents were asked about past experiences with the species to stimulate recall about the interactions they have had. These past experiences were then used to classify respondents into "users" and "nonusers" of the species, thereby providing a reference

point for the valuations. In situations where the respondent had no past experiences with the species, his/her knowledge about the species was used as a reference point.

Instrument bias. Both types of instrument bias were considered in the study design. In the original design, each respondent would be randomly assigned a bid starting point ranging from $50.00 to $300.00, at $50.00 increments. Preliminary analysis of median values indicated that the starting points were too high (Table 1). As a result, the bid starting point of $50.00 was used for the personal interviews.

In addition, some telephone interview respondents showed obvious irritation with the high bid starting points. Therefore, efforts were made to find the respondents' acceptable bid range quickly by using non-uniform intervals. (Example: If a $300.00 starting point was unacceptable to a respondent then $100.00 was tried, then perhaps $50.00) It was considered more important to find the respondents' acceptable range quickly than it was to use uniform bidding intervals in an effort to minimize time on the phone and the possibility of the respondent giving the answer to "get on with it".

In an effort to counter payment bias the form of payment was purposely made unclear. Examples of ways the respondents currently pay for things was presented, including voluntary contributions, increased taxes paid to the state, and user fees. It was expected that by giving respondents a list of possible payment forms that they would find at least one of them acceptable and therefore, would not let the form of payment influence their valuations.

Table 1. Median Values for Bay and Ingham Surveys

		Bay Co. Value	Ingham Co. Value
Eagle Median Bid:	Use	$5.00	$37.50
	Option	$10.00	$25.00
	Existence	$10.00	$22.50
Gull Median Bid:	Use	$0.00	$10.00
	Option	$0.00	$10.00
	Existence	$0.00	$10.00
Trout Median Bid:	Use	$25.00	$22.50
	Option	$7.50	$20.00
	Existence	$17.50	$17.50
Sturgeon Median Bid:	Use	$10.00	$30.00
	Option	$5.00	$20.00
	Existence	$10.00	$25.00

As mentioned earlier, little information about each species was given to the respondents. Respondents were not told about the species appearance, distribution or life history. It was felt that this type of information could create bias that would not exist in the general population unless everyone had the opportunity to receive the same information. Personal interview respondents were told that two common and two uncommon species were considered, and this may have influenced bids for the uncommon species, especially the lake sturgeon.

Questionnaire Design

The study design for this project involved two types of interviews: telephone and personal. It was intended that the same basic information would be collected by both interviews. One notable exception was that the personal interview questionnaire asked respondents' values for all four species, while the telephone interviews questionnaire asked values for only one species (randomly selected from the four species considered). Therefore, a modified version of the personal interview questionnaire was used for the telephone interview. The result was one personal interview questionnaire (See Appendix A1) and two telephone questionnaires - one for birds and one for fish (See Appendix B1 and B2). (These two telephone questionnaires will, however, be referred to as "the" telephone interview questionnaires.) This was done to aid the telephone interviewers in asking the appropriate questions for each species.

Both the personal and telephone questionnaires contained the same major sections. They were: A - Recreation Participation, B - Past Experiences, C - Value Measures, and D - Demographic Information. Sections A and D were exactly the same in both questionnaires. In the

telephone interview questionnaires, sections B and C contained questions about only birds or fish.

The goal in developing the questionnaires was to make it as easy as possible for the respondents to answer the questions posed. The questionnaires began with questions that required the least amount of thought (Section A), worked toward questions that required the most thought (Sections B and C), and ended with easier questions (Section D).

A broad-to-narrow questioning strategy was employed in Sections A through C. Broad natural resource questions were asked in Section A, while specific species value questions were asked in Section C. This was done so each section would build on the next and to help get the respondents in the frame of mind to answer the value questions.

The most personal and perhaps the most objectionable questions were asked last. This was done in an effort to minimize respondents' termination of the interview as they had already invested time in answering the earlier questions.

The purpose of Section A - Recreation Participation - was to get a general idea of respondents interest and participation in natural resource related activities. Kellert (1979) has shown that individuals' perceptions about and feelings toward wildlife are affected by their knowledge of the species and their interest in outdoor activities.

The intent of Section B - Past Experiences - was to determine the extent of interaction the respondent had with the species in question. The purpose of this was two-fold; first, to get the respondent thinking about the species and second, to determine if he/she was a user or non-user of the species. The questions he/she was asked in Section C depended on his/her response from Section B.

The first part of Section C - Value Measures - was used to learn the importance to the respondents of having the species available under the condition outlined. Personal interview respondents were given a card explaining three types of values - use value, option price and existence value. The three values were explained verbally to the telephone interview respondents, then they were asked if they understood the concepts.

This was the first time during the interview that respondents were asked to think about their values for the species. It is important to note that most respondents had never thought about the value of non-consumptive uses of wildlife. This section was not critical to the analysis, but was a tool to help the respondent organize his/her thinking prior to the value measures.

In the second part of Section C, the iterative bidding technique was used to determine the respondents' values on each measure. This was done to make the respondent think about each monetary possibility and judge whether or not he/she would be willing to pay that price. After the respondent's maximum bid point was reached, he/she was asked, "Is ___ the most you would be willing to pay..?", to verify the respondent's previous valuation in an attempt to ensure that they were satisfied with their response.

The last question in Section C asked respondents to assess the accuracy of their responses to the value questions. This was included to determine the respondent's feelings about their values in hopes of providing an indication of the accuracy (via respondent self evaluation) of the responses.

Standard demographic questions were asked of all respondents. Visual aids were used in the personal interviews for age, educational level and income level. Section D was included to understand the nature of the sample populations and to determine what relationships exist between demographic variables and certain questionnaire responses.

Sample Selection

Telephone Interviews

Two locations were chosen for telephone surveys, Ingham county and Bay county. Ingham County was chosen because of the lower cost associated with obtaining telephone interviews. Telephone survey interviews were conducted from October 1982 through March 1983. Most of the calls made were toll calls. Bay county was chosen as a comparison area for the results of the Ingham county interviews. The population characteristics of Bay county are similar to those of Ingham county which allowed the effect on values of proximity to a Great Lake to be examined. A total of at least 120 usable telephone interviews were needed from Ingham county and 30 from Bay county for sufficient comparisons to be made.

The population distributions for Ingham and Bay counties were obtained from 1980 Census data. Proportional random sampling was used in both counties (See Appendices C1 and C2). Phone numbers were taken from 1982 telephone directories for each area.

The actual selection of residential telephone numbers was a multi-step process. First, the number of phone numbers per page was estimated by randomly selecting a few pages, counting the phone numbers per page and averaging them. Second, the number of business phone numbers per page was estimated by randomly selecting a few pages, counting the

number of business phone numbers and averaging them. Third, the average number of business numbers per page was subtracted from the average number of phone numbers per page, giving the average number of residential phone numbers per page. Fourth, the total number of pages for any one location were counted and multiplied by the average number of residential phone numbers per page, giving the total number of residential phone numbers for that location. Fifth, the total number of residential phone numbers per location was divided by the estimated number needed (as determined from the census data) to get evenly spaced selections. Sixth, a ruler was used to measure the distance between selections. Last, if the selection fell on a business number, the number was not used and the first residential phone number below it was selected. Measurement then continued from that point.

It was estimated that 60 telephone numbers for Bay county and 240 telephone numbers for Ingham county would be needed for the pool of potential telephone respondents. Prior to the completion of the telephone interview phase all the numbers selected for Ingham county were used. A second round of phone numbers were chosen half way between the phone numbers chosen in the first round (they had been marked in the phone book).

Three attempts were made to contact potential respondents at each phone number. Both the day and the time of day were varied to allow for irregular work hours and other activities. It was soon discovered, however, that week nights between 6:30 p.m. and 9:00 p.m. were the most successful. Some calls were made on Saturday afternoons, but these were usually successful only when the weather was poor.

When a potential respondent was reached, he/she was read a prepared text explaining the purpose of the call. He/she was then asked a series of questions to determine his/her interest in participating and suitability as a respondent. If the respondent was interested, and lived in Ingham or Bay county, and was at least 18 years of age, the interview commenced.

Personal Interviews

Personal interviews were conducted in Ingham county only. This location was the most practical for the researcher and minimized the time and travel required for each interview. Personal survey interviews were conducted from June through August 1983. Approximately 30 usable personal interviews were needed, which would result in a comparable sample size per species to the Ingham telephone interview.

Potential personal interview respondents were selected from a randomly generated list of Ingham county drivers license holders purchased from the Michigan Secretary of State. Using 1982 telephone directories, each name on the list was checked and matched with a phone number when possible. In cases where phones were not listed in the name provided, addresses were used to match phone numbers. The names on the list, for which phone numbers could be found, were then numbered. Possible respondents were selected using a random numbers table.

Personal interviews were conducted in "waves." Fifteen potential respondents were selected at a time and letters explaining the project were sent to them (See Appendix A3). Follow-up phone calls were made a few days after the letters were sent. Again, three attempts were made to contact the individuals, as with the telephone interviews. Again, evenings were the most successful time to call.

When potential respondents were reached they were given the same information. First, the caller identified herself and reminded them that a letter briefly explaining the project had been sent. Second, the potential respondent was asked if they recalled receiving the letter and if they would like more information. (Almost all wanted to know more). Next, more detail about the project was provided, including (1) that their participation would entail a personal interview, (2) that the interview would take approximately 30 to 45 minutes, and (3) that the interview would be arranged at their convenience. Last, individuals were asked if they would be willing to participate. For those who were willing, an appointment for the interview was made and the respondent's address was verified.

Administration of the Questionnaire

Telephone Interviews

The species and bid starting point were selected prior to the administration of each telephone interview. The species selection process was as follows. The name of each species was written on two separate small cards. The eight cards were placed in a plastic bag and one species card was drawn at random. The selected card was then replaced before the next selection (random sampling with replacement). The bid starting point selection process was the same as the species except there were six possible bid starting points.

On average, the telephone interviews went quickly, taking less than 10 minutes each. To minimize time on the phone and reduce the respondents' potential irritation with the process, the background information given to the personal interview respondents was omitted. In addition,

some questionnaire instructions were reduced somewhat for the telephone interviews, while others were expanded to compensate for the lack of visual aids provided during the personal interviews. Any questions regarding background information on the species or the purpose of the project were answered after the completion of the interview.

Personal Interviews

Each personal interview respondent was given the same introductory information immediately prior to the interview. First, he/she was given background about the project, including the funding source and what broad problems were being examined. Second, he/she was told about the survey, and the questionnaire and its design. Third, he/she was told that the interview would take between 30 and 45 minutes and that he/she must answer the questions alone. Lastly, the respondent was asked if he/she had any questions before the interview began.

It was generally found that respondents were able to grasp the value measure and the bidding technique quickly. Therefore, during the course of the interview some of the instructions for repetitive questions were abbreviated. The extent to which this occurred depended upon the interviewer's perceptions of the respondent's understanding. It was felt that abbreviating the instructions would not bias the respondent's valuations as much as their impatience with listening to redundant instructions would.

Data Analyses

Survey data were analyzed using the Statistical Package for the Social Sciences (SPSS). Specific analyses included: frequency distributions for all questions by survey type, comparisons of median and mean values for use, option and existence questions by survey type and comparisons between various mean values using t-tests. In addition, observations and comments made during the interviews are also discussed.

CHAPTER IV

DATA ANALYSES

The questionnaire data were analyzed at two levels. First, the frequency distribution for each section of each survey was analyzed. This included computation of the mean and standard deviation for the value questions. Second, the means of various sets of value questions were compared using standard t-tests. Comparisons included the mean values of: Bay and Ingham surveys, Ingham telephone and Personal surveys, and Nonusers and Users.

Demographic Characteristics

Each respondent was asked eight background questions to obtain a demographic profile in each of the three surveys (Table 2). Questions included: sex, age, marital status, education, employment status, occupation, residency and income. (See Appendix D for 1980 Census data for Bay and Ingham counties.)

Bay Survey

SEX. Nearly 52% of the Bay respondents were female and 48.3% were male. This is almost the same percentage of adult females and males found in the 1980 Census for Bay county.

AGE. Twenty-four percent of the respondents were from 20-29 years of age. The second highest age groups were 30-39 years and 50 to 59 years,

Table 2. Demographic Characteristics of Respondents by Survey Type.

DEMOGRAPHIC VARIABLES		BAY (N=29)	INGHAM (N=130)	PERSONAL (N=30)
SEX	Male	48.3%	45.4%	46.7%
	Female	51.7%	54.6%	53.3%
AGE	18-19	6.9%	13.1%	0.0%
	20-29	24.1%	30.0%	13.3%
	30-39	20.7%	20.0%	26.7%
	40-49	13.8%	11.5%	23.3%
	50-59	20.7%	7.7%	26.7%
	60-69	10.3%	12.3%	6.7%
	70 and over	3.4%	5.4%	3.3%
MARITAL STATUS	Single	44.8%	43.8%	33.3%
	Married	55.2%	56.2%	66.6%
EDUCATION	Elementary school	0.0%	0.0%	0.0%
	Some high school	10.3%	6.2%	3.3%
	High school graduate	37.9%	26.9%	16.7%
	Some College	24.1%	36.9%	23.3%
	College graduate	13.8%	13.1%	16.7%
	Some graduate school	0.0%	5.4%	10.0%
	Graduate professional or graduate school	13.8%	11.5%	30.0%
EMPLOYMENT STATUS	Employed full-time	44.8%	48.5%	80.0%
	Employed part-time	3.4%	17.7%	16.7%
	Unemployed	6.9%	4.6%	0.0%
	Not employed	44.8%	29.2%	3.3%

with nearly 21% each. The age distribution of respondents followed the distribution of adult Bay county residents found in the 1980 Census.

MARITAL STATUS. Approximately 55% of the respondents were married and 45% were single.

EDUCATION. Most of the respondents had at least a high school education (89.6%), with the highest single group indicating they were high school graduates (37.9%). Bay county respondents tended to be more well educated than the general adult population of the county as defined by the 1980 Census.

EMPLOYMENT STATUS. Nearly 45% of the respondents indicated they were employed full-time while another 45% were not employed and not looking for full-time work.

OCCUPATION. Twenty one percent of the respondents were in each of the following occupational categories: homemaker; skilled worker, craftsman or foreman; manager or proprietor; professional or technical (See Appendix E).

RESIDENCY. Nearly 70% of the respondents said they were urban residents.

INCOME. Approximately 43% of the respondents earned between $30,000 and $39,999 annually. None of the Bay respondents earned less than $10,000 per year. Bay county respondents tended to have higher incomes than the general population of the county as defined by the 1980 Census.

Ingham Survey

SEX. Forty five percent of the Ingham respondents were male and 55% were female. This closely follows the percentages of adult males and females found in the 1980 Census for Ingham county.

AGE. The largest percent of respondents (30.0%) were from 20-29 years of age. The second largest group (20.0%) were 30-39 years of age. The age distribution of respondents was similar to the distribution of adult Ingham county residents found in the 1980 Census.

MARITAL STATUS. Nearly 44% of the respondents indicated they were single, while 56% were married.

EDUCATION. Almost 94% of the respondents had a high school education or more. The largest group (36.7%) had attended some college. Ingham county respondents tended to be more well educated than the general adult population of the county as defined by the 1980 Census.

EMPLOYMENT STATUS. Over 48% of the respondents were employed full-time, and 29.2% were not employed and not looking for full-time work.

OCCUPATION. Eighteen percent of the respondents classified themselves as professional or technical, with 17% indicating they were sales, clerical or office workers. Over 16% were students (See Appendix E).

RESIDENCY. Approximately 73% of the respondents said they were urban residents and 27% were rural residents.

INCOME. Nearly 24% of the respondent earned less than $10,000 annually. The second largest income groups, with 16.4% each, were $10,000 to

$19,999 and $20,000 to $29,999. Ingham county telephone respondents' income levels generally followed the income levels for the population of the county as defined by the 1980 Census.

Personal Survey

SEX. Over 53% of the personal interview respondents were female while 47% were male. This closely follows the percentages of adult females and males found in the 1980 Census for Ingham county.

AGE. The two highest age groups, with 26.7% each, were 30-39 years and 50-59 years. Second, with 23.3% was 40-49 years. Personal interview respondents tended to be slightly older than the general adult population of Ingham county as defined by the 1980 Census.

MARITAL STATUS. Most respondent were married (66.6%) and 33.3% were single.

EDUCATION. Nearly 97% of the respondents had at least graduated from high school. The largest group (30.0%) had professional or graduate degrees. The second largest group (23.3%) had attended some college. Respondents tended to be more well educated than the general adult population of Ingham county as defined by the 1980 Census.

EMPLOYMENT STATUS. Eighty percent of the respondents were employed full-time, while 16.7% were employed part-time.

OCCUPATION. Thirty percent of the respondents classified themselves as professional or technical, and 20.0% were managers or proprietors (See Appendix E).

RESIDENCY. Most respondents (90.0%) indicated they were urban residents, while 10.0% were rural residents.

INCOME. Thirty percent of the respondents earned $20,000 to $29,000 per year. Nearly 27% earned $10,000 to $19,000 annually. Personal interview respondents' income levels tended to be higher than those for the population of Ingham county as defined by the 1980 Census.

Recreation Characteristics

Respondents were asked a series of questions about their recreation activities during the 12 months prior to their survey participation. These questions were asked to get a general idea of their interest and participation in natural resource related activities. Recreation questions included: various outdoor activities, membership in environmental organizations, donations of money to environmental organizations and frequency of watching wildlife related programs on television. Results of this section for each survey are found in Table 3.

Bay Survey

OUTDOOR ACTIVITIES. Of the 9 activities listed, nearly 83% of the respondents drove for pleasure. Next, with 72.4% was hiking, backpacking or walking for pleasure. Between 52% and 58% of the respondents fished, camped or went boating in the previous 12 months.

ENVIRONMENTAL ORGANIZATION MEMBER. Nearly 14% of the respondents belonged to organizations whose main purpose was learning about and enjoying natural resources. Only 30% belonged to hunting or fishing organizations (See Appendix F1).

Table 3. Respondents' Recreation Levels by Survey Type.

RECREATION VARIABLES		BAY (N=29)	INGHAM (N=130)	PERSONAL (N=30)
OUTDOOR ACTIVITIES	Fishing	51.7%	50.0%	40.0%
	Hunting	31.0%	20.8%	10.0%
	Boating or canoeing	58.6%	66.9%	66.7%
	Camping	51.7%	43.1%	26.7%
	Hiking, backpaking or walking for pleasure	72.4%	79.2%	83.3%
	Driving for pleasure	82.8%	86.2%	86.7%
	Outdoor photography	44.8%	38.5%	40.0%
	Wildlife observation or birdwatching	48.3%	57.7%	70.0%
	Other (skiing, biking)	27.6%	40.8%	30.0%
ENVIRONMENTAL ORGANIZATION MEMBER	Learning and enjoying (Nat'l Geographic, Nat'l Wldlf. Fed., etc.)	13.8%	10.0%	6.0%
	Environmental advocacy (Sierra Club, Greenpeace, etc.)	0.0%	2.3%	0.0%
	Hunting and/or fishing (Trout Unlimited, Ducks Unlimited, etc.)	3.4%	2.3%	3.0%
	Professional (Wildlife Society, Am. Fish. Soc., etc.)	0.0%	1.5%	0.0%
DONATED MONEY		10.3%	12.3%	20.0%

WATCH WILDLIFE TV PROGRAMS	Never	10.3%	5.4%	0.0%
	Rarely (once or twice/yr.)	17.2%	12.3%	3.3%
	Occasionally (3 to 9/yr.)	34.5%	35.4%	46.7%
	Often (10 or more/yr.)	37.9%	46.9%	50.0%

DONATED MONEY TO ENVIRONMENTAL ORGANIZATIONS. Slightly more than 10% of the respondents had donated money to environmental organizations (See Appendix F2).

WATCH WILDLIFE PROGRAMS. Nearly 38% of the respondents indicated they often watched wildlife related programs on television, while 34% said they watched them occasionally.

Ingham Survey

OUTDOOR ACTIVITIES. Of the 9 activities listed 86% of the participants said they drove for pleasure within the previous 12 months. Second highest was hiking, backpacking or walking for pleasure, with 79.2%. Three other activities were participated in by 50% or more of the respondents: boating or canoeing; wildlife observation or birdwatching; and fishing.

ENVIRONMENTAL ORGANIZATION MEMBER. Ten percent of the respondents belonged to organizations whose main purpose was learning about and enjoying natural resources (See Appendix F1).

DONATED MONEY TO ENVIRONMENTAL ORGANIZATIONS. Over 12% of the respondents donated money to environmental organizations (See Appendix F2).

WATCH WILDLIFE PROGRAMS. Nearly 47% of the respondents often watched wildlife related programs on television, while 35% said they watched them occasionally.

Personal Survey

OUTDOOR ACTIVITIES. Of the 9 activities listed 87% of the respondents indicated they drove for pleasure within the previous 12 months. Over 83% hiked, backpacked or walked for pleasure. Two other activities were participated in by over half the respondents: wildlife observation or birdwatching (70.0%); and boating or canoeing (66.7%).

ENVIRONMENTAL ORGANIZATION MEMBER. Six percent of the respondents belonged to organizations whose main purpose was learning about and enjoying natural resources, while 3.0% belong to hunting or fishing organizations (See Appendix F1).

DONATED MONEY TO ENVIRONMENTAL ORGANIZATIONS. Twenty percent of the respondents donated money to environmental organizations (See Appendix F2).

WATCH WILDLIFE PROGRAMS. Fifty percent of the respondents often watched wildlife related programs on television, while nearly 47% watched them occasionally.

Comparisons with Hunters and Anglers State-wide

According to the 1980 Survey of Hunting and Fishing for Michigan, state-wide 14.5% of the population hunts and 25.6% of the population fishes. Both Bay county and Ingham county telephone surveys included more hunters than the state average, while the Personal survey included less. All three surveys (Bay, Ingham and Personal) included more anglers than the state average.

Past Experiences With Species

Respondents were asked a series of questions about their past experiences with the species being considered. The purpose of these questions was to learn the extent of interaction the respondent had with the species; thereby determining if he/she was a user or nonuser; and to get the respondent to think about the species.

Past experience questions for the bird species included: has he/she seen species, number of times seen, seen species in past 12 months, did he/she make a special effort to see species, number of trips in past 12 months to see species, cost of species trips, extra time taken for species trips, enhancement of trip to see species and has he/she a desire to see species in his/her lifetime. The results of the past experiences with bald eagles for each survey are found in Table 4. The results for the past experiences with gulls for each survey are found in Table 5.

Past experience questions for the fish species included: has he/she fished for the species, if so how many times in the past 12 months and the average cost of each trip; has he/she gone with anyone who was fishing for the species, if so the number and cost of each trip; has he/she eaten the species; or seen it in hatcheries, aquariums or in the wild; what special efforts to see the species were made; and how much did the special trips cost. The results of the past experiences with lake trout for each survey are found in Table 6. The results for past experiences with lake sturgeon are found in Table 7.

Table 4. Respondents' Past Experiences With Bald Eagles by Survey Type.

PAST EXPERIENCES WITH BALD EAGLES		BAY (N=7)	INGHAM (N=35)	PERSONAL (N=30)
SEEN EAGLES IN WILD	Yes	28.6% (2)*	28.6% (10)*	33.3% (10)*
	No	71.4% (5)	71.4% (25)	66.7% (20)
RESPONDENT USER STATUS	Non-user	71.4% (5)	71.4% (25)	66.7% (20)
	User	28.6% (2)	28.6% (10)	33.3% (10)
USER RESPONSES				
NO. TIMES SEEN EAGLES	Once or twice	50.0% (1)	40.0% (4)	50.0% (5)
	3 to 9 times	0.0% (0)	40.0% (4)	40.0% (4)
	10 or more	50.0% (1)	20.0% (2)	10.0% (1)
SEEN OR TRIED TO SEE IN PAST 12 MO.	Yes	0.0% (0)	30.0% (3)	20.0% (2)
	No	100.0% (2)	70.0% (7)	80.0% (8)
SPECIAL EFFORT MADE TO SEE EAGLES	Yes	---	33.3% (1)	0.0% (0)
	No	---	66.7% (2)	100.0% (2)
NO. TRIPS IN PAST 12 MO. FOR EAGLES	One	---	10.0% (1)	---
	None	---	90.0% (0)	---
COST OF EAGLE TRIPS	$800.00	---	10.0% (1)	---
EXTRA TIME FOR TRIPS	10 hours	---	10.0%	---
SEEING EAGLE ENHANCE TRIP	Yes	---	66.7% (2)	100.0% (2)
	No	---	33.3% (1)	0.0% (0)
NON-USER RESPONSE				
DESIRE TO SEE EAGLES IN LIFETIME	Yes	80.0% (4)	80.0% (20)	85.0% (17)
	No	20.0% (1)	20.0% (5)	15.0% (3)

*Number in ( ) is the number or responses in each category.

Table 5. Respondents' Past Experiences With Gulls by Survey Type.

PAST EXPERIENCES WITH GULLS		BAY (N=7)	INGHAM (N=30)	PERSONAL (N=30)
SEEN GULLS IN WILD	Yes	85.7% (6)*	83.3% (25)*	100.0% (30)*
	No	14.3% (1)	16.7% (5)	0.0% (0)
RESPONDENT USER STATUS	Non-user	14.3% (1)	16.7% (5)	0.0% (0)
	User	85.7% (6)	83.3% (25)	100.0% (30)
USER RESPONSES				
NO. TIMES SEEN GULLS	Once or twice	0.0% (0)	4.0% (1)	6.7% (2)
	3 to 9 times	0.0% (0)	16.0% (4)	10.0% (3)
	10 or more	100.0% (6)	80.0% (20)	83.3% (25)
SEEN OR TRIED TO SEE IN PAST 12 MO.	Yes	83.8% (5)	72.0% (18)	76.7% (23)
	No	16.7% (1)	28.0% (7)	23.3% (7)
SPECIAL EFFORT MADE TO SEE GULLS	Yes	0.0% (0)	11.1% (2)	0.0% (0)
	No	100.0% (5)	88.9% (16)	100.0% (23)
NO. TRIPS IN PAST 12 MO. FOR GULLS	None	---	50.0% (1)	---
	One	---	50.0% (1)	---
COST OF GULL TRIPS	$5.00	---	100.0% (1)	---
EXTRA TIME FOR TRIPS	1 hour	---	100.0% (1)	---
SEEING GULLS ENHANCE TRIP	Yes	60.0% (3)	77.8% (14)	87.0% (20)
	No	40.0% (2)	22.2% (4)	13.0% (3)

NON-USER RESPONSE				
DESIRE TO SEE GULLS IN LIFETIME	Yes	0.0% (0)	20.0% (1)	---
	No	100.0% (1)	80.0% (4)	---

*Number in ( ) is the number of responses in each category.

Table 6. Respondents' Past Experiences With Lake Trout by Survey Type.

PAST EXPERIENCES WITH LAKE TROUT		BAY (N=8)	INGHAM (N=34)	PERSONAL (N=30)
FISHED FOR LK TROUT	Yes	62.5% (5)*	38.2% (13)*	46.7% (14)*
	No	37.5% (3)	61.8% (21)	53.3% (16)
NO. TROUT TRIPS IN PAST 12 MO.	0	20.0% (1)	46.1% (6)	64.3% (9)
	1	40.0% (2)	23.1% (3)	14.3% (2)
	2	40.0% (2)	15.4% (2)	14.3% (2)
	4	---	---	7.1% (1)
	6	---	7.7% (1)	---
	10	---	---	---
	20	---	7.7% (1)	---
COST OF TROUT TRIPS IN PAST 12 MO.	$0	---	---	20.0% (1)
	$10	25.0% (1)	---	---
	$15	---	14.3% (1)	---
	$20	25.0% (1)	---	---
	$25	---	57.1% (4)	---
	$30	---	14.3% (1)	20.0% (1)
	$45	25.0% (1)	---	---
	$50	---	---	20.0% (1)
	$100	25.0% (1)	14.3% (1)	40.0% (2)
GONE WITH LK TROUT ANGLER	Yes	33.3% (1)	28.6% (6)	18.8% (3)
	No	66.7% (2)	71.4% (15)	81.2% (13)
NO. TRIPS WITH TROUT ANGLER IN PAST 12 MO.	0	---	66.6% (4)	---
	1	---	16.7% (1)	---
	2	---	16.7% (1)	---
	3	100.0% (1)	---	---

PAST EXPERIENCES WITH LAKE TROUT		BAY (N=8)	INGHAM (N=34)	PERSONAL (N=30)
COSTS OF TRIPS WITH TROUT ANGLER	$10	---	50.0% (1)	---
	$50	---	50.0% (1)	---
	$60	100.0% (1)	---	---
	$100	---	---	---
EATEN LK TROUT	Yes	85.6% (6)	77.4% (24)	72.4% (21)
	No	14.4% (1)	22.6% (7)	27.6% (8)
SEEN LAKE TROUT	Yes	0.0% (0)	30.0% (3)	28.6% (2)
	No	100.0% (1)	70.0% (7)	71.4% (5)
SPECIAL EFFORT MADE TO SEE LK TROUT	Yes	---	0.0% (0)	50.0% (1)
	No	---	100.0% (3)	50.0% (1)
NO. SPECIAL TRIPS TO SEE LK TROUT	0	---	---	100.0% (1)
COST OF SPECIAL LK TROUT TRIPS	$0	---	---	---
RESPONDENT USER STATUS	User	87.8% (7)	88.2% (30)	83.3% (25)
	Non-user	12.5% (1)	11.8% (4)	16.7% (5)

*Number in ( ) is the number of responses in each category.

Table 7. Respondents' Past Experiences With Lake Sturgeon by Survey Type.

PAST EXPERIENCES WITH LAKE STURGEON		BAY (N=7)	INGHAM (N=31)	PERSONAL (N=30)
FISHED FOR LK STURGEON	Yes	0.0% (0)*	12.9% (4)*	3.3% (1)*
	No	100.0% (7)	87.1% (27)	96.7% (29)
NO. STURGEON TRIPS IN IN PAST 12 MO.	0	---	50.0% (2)	100.0% (1)
	1	---	25.0% (1)	---
	6	---	25.0% (1)	---
COST OF STURGEON TRIPS IN PAST 12 MO.	$0	---	---	---
	$50	---	50.0% (1)	---
	$130	---	50.0% (1)	---
GONE WITH STURGEON ANGLER	Yes	14.3% (1)	7.4% (2)	0.0% (0)
	No	85.7% (6)	92.6% (25)	100.0% (30)
NO. TRIPS WITH STURGEON ANGLER IN PAST 12 MO.	0	100.0% (1)	---	---
	1	---	50.0% (1)	---
	2	---	50.0% (1)	---
COST OF TRIPS WITH STURGEON ANGLER	$0	---	---	---
	$25	---	50.0% (1)	---
	$300	---	50.0% (1)	---
EATEN STURGEON	Yes	0.0% (0)	10.0% (3)	10.0% (3)
	No	100.0% (6)	90.0% (27)	90.0% (27)

PAST EXPERIENCES WITH LAKE STURGEON		BAY (N=7)	INGHAM (N=31)	PERSONAL (N=30)
SEEN LAKE STURGEON	Yes	33.3% (1)	37.0% (10)	37.5% (9)
	No	66.6% (2)	63.0% (17)	62.5% (15)
SPECIAL EFFORT MADE TO SEE LK STURGEON	Yes	0.0% (0)	20.0% (2)	11.1% (1)
	No	100.0% (1)	80.0% (8)	88.9% (8)
NO SPECIAL TRIPS TO SEE LK STURGEON	0	---	100.0% (2)	100.0% (1)
COST OF SPECIAL LK STURGEON TRIPS	$0	---	---	---
RESPONDENT USER STATUS	User	28.6% (2)	41.9% (13)	40.0% (12)
	Non-user	71.4% (5)	58.1% (18)	60.0% (18)

*Number in ( ) is the number of responses in each category.

Bald Eagles

Bay Survey

SEEN BALD EAGLES. Over 71% of the Bay survey respondent's indicated they had never seen a bald eagle in the wild. Of the 29% that had seen bald eagles; 50% had seen them once or twice and 50% had seen them 10 or more times.

DESIRE TO SEE BALD EAGLES. Of the 71% who had not seen bald eagles, 80% of them indicated they wanted to see bald eagles in the wild during their lifetime.

NONUSER OR USER. Seventy one percent of the Bay survey respondents were classified as nonusers of eagles, based on their responses to this section, while 29% were classified as users of eagles.

Ingham Survey

SEEN BALD EAGLES. Over 71% of the Ingham survey respondents had never seen bald eagles in the wild. Twenty nine percent had seen bald eagles. Of those who had seen bald eagles, 40% had seen them once or twice and another 40% had seen them 3 to 9 times. In addition 30% had seen or tried to see them in the previous 12 months. One individual made one special trip to see bald eagles that cost him/her $800.00 extra and took 10 extra hours. Nearly 67% of those who had seen bald eagles in the past 12 months indicated the experience enhanced their trip.

DESIRE TO SEE BALD EAGLES. Of the 71% who had not seen bald eagles, 80% had a desire to see bald eagles during their lifetime.

NONUSER OR USER. Over 71% of the Ingham survey respondents were classified as nonusers and 29% were classified as users.

Personal Survey

SEEN BALD EAGLES. Nearly 67% of the Personal survey respondents indicated they had never seen bald eagles in the wild, while 33% had seen bald eagles. Of those who had seen bald eagles, 50% had seen them once or twice. Also, 20% had seen bald eagles in the past 12 months, although they did not make a special effort to see them. Of those who had seen bald eagles in the past 12 months, all indicated that the experience enhanced their trip.

DESIRE TO SEE BALD EAGLES. Eighty five percent of those who have not seen bald eagles in the wild indicated they desired to see them in their lifetime.

NONUSER OR USER. Nearly 67% of the Personal survey respondents were classified as nonusers of bald eagles and 33.3% were users.

Gulls

Bay Survey

SEEN GULLS. Slightly more than 14% of the Bay survey respondents indicated they had never seen gulls in the wild, while nearly 86% indicated they had seen gulls in the wild. Of those who had seen gulls all had seen them 10 or more times, and 83.8% had seen gulls in the past 12 months but had not made a special effort to see them. Sixty percent said that seeing gulls enhanced their trip.

DESIRE TO SEE GULLS. The individual who had never seen gulls in the wild indicated no desire to see them in the future.

NONUSER OR USER. Nearly 86% of the Bay survey respondents were classified as gull users, while 14% were nonusers.

Ingham Survey

SEEN GULLS. Almost 17% of the Ingham survey respondents had never seen gulls in the wild. Eighty three percent had seen gulls, and most (80%) had seen them 10 or more times. Seventy-two percent had seen gulls in the past 12 months and only 11% had made special efforts to see them. One individual indicated he/she took a special trip to see gulls and the trip cost him/her $5.00 extra and took 1 hour. Seeing gulls enhanced the trips of nearly 78% of those who had seen gulls in the past year.

DESIRE TO SEE GULLS. Eighty percent of those who had not seen gulls indicated a desire to see them during their lifetime.

NONUSER OR USER. Over 83% of the Ingham survey respondents were classified as gull users and 17% were classified as nonusers.

Personal Survey

SEEN GULLS. All Personal survey respondents indicated they had seen gulls in the wild. Of these, 83.3% had seen them 10 or more times. Nearly 77% had seen gulls in the past 12 months, but none of them made a

special effort to see them. Eighty seven percent indicated that seeing gulls enchanced their trip.

DESIRE TO SEE GULLS. This question was not asked to the personal survey respondents because they all had seen gulls.

NONUSER OR USER. One hundred percent of the Personal survey respondents were classified as gull users.

Lake Trout

Bay Survey

FISHED FOR LAKE TROUT. Over 62% of the Bay Survey respondents fished for lake trout, while 37.5% had not. Of those who have fished for trout, 80% took 1 or 2 fishing trips in the last 12 months with an average cost of between $10.00 and $100.00 each.

GONE WITH A LAKE TROUT ANGLER. One individual took 3 trips with a lake trout angler.

EATEN LAKE TROUT. Over 85% of the respondents had eaten lake trout, while 14.4% had not.

SEEN LAKE TROUT. One individual, who had never fished for, accompanied a trout angler or eaten trout, when asked if he/she had seen lake trout, responded "no".

NONUSER OR USER. Over 87% of the Bay survey respondents were classified as lake trout users, based on their responses to this section. Twelve percent were classified as nonusers.

Ingham Survey

FISHED FOR LAKE TROUT. Nearly 62% of the Ingham survey respondent indicated they had not fished for lake trout, while 38% had fished for them. Forty six percent of those who had fished for lake trout made zero trips to fish for them in the past 12 months. The number of trips made in the past 12 months ranged from 1 to 20, with an average cost of between $15 and $100 each.

GONE WITH LAKE TROUT ANGLER. Over 28% of those who had not fished for lake trout themselves had gone with a lake trout angler. Most, however, had not made any trips within the past 12 months.

EATEN LAKE TROUT. Seventy seven percent of the respondent had eaten lake trout, while 23% had not.

SEEN LAKE TROUT. Of those who had not fished for, gone with a lake trout angler or eaten lake trout, 70% had not seen lake trout either.

NONUSER OR USER. Over 88% of the Ingham survey respondents were classified as lake trout users, and 12% were classified as nonusers.

Personal Survey

FISHED FOR LAKE TROUT. Over 53% of the Personal survey respondents indicated they had not fished for lake trout, while 46.7% indicated they had fished for them. Almost 36% of those who had fished for lake trout made between 1 and 4 fishing trips in the past 12 months. The average cost of each trip ranged from $0.00 to $100.00.

GONE WITH LAKE TROUT ANGLER. Approximately 19% of those who had not fished for lake trout went with a lake trout angler, however none of them took any trips within the past 12 months.

EATEN LAKE TROUT. Over 72% of the respondents had eaten lake trout.

SEEN LAKE TROUT. Of those who had not fished for, gone with a lake trout angler or eaten lake trout, 71% had never seen lake trout either.

NONUSER OR USER. Over 83% of the Personal survey respondents were classified as lake trout users, while 17% were classified as nonusers.

Lake Sturgeon

Bay Survey

FISHED FOR LAKE STURGEON. None of the Bay survey respondent had fished for lake sturgeon.

GONE WITH LAKE STURGEON ANGLER. Over 86% of the respondents had not gone with a lake sturgeon angler. Of the 14% that did, they made zero trips with a lake sturgeon angler in the past 12 months.

EATEN LAKE STURGEON. None of the respondents had eaten lake sturgeon.

SEEN LAKE STURGEON. Sixty seven percent of the respondents indicated they had not seen lake sturgeon, while 33% had seen them.

NONUSER OR USER. Over 71% of the Bay survey respondents were classified as nonusers of lake sturgeon and 29% were classified as users.

Ingham Survey

FISHED FOR LAKE STURGEON. Over 87% of the Ingham survey respondents had not fished for lake sturgeon, while 13% had fished for them. Of those who fished for them, the number of trips in the past 12 months ranged from 1 to 6 with an average cost of between $50 and $130 each.

GONE WITH STURGEON ANGLER. Almost 93% of the respondents had not gone with a lake sturgeon angler. Of the 7% who did, they took 1 or 2 trips at an average cost of between $25 and $300 each.

EATEN LAKE STURGEON. Ten percent of the respondents had eaten lake sturgeon and 90% had not.

SEEN LAKE STURGEON. Thirty seven percent of the respondents had seen lake sturgeon, while 63% had not seen them. Twenty percent of those who had seen them made a special effort to see them, but not during the past 12 months.

NONUSER OR USER. Over 58% of the Ingham survey respondents were classified as lake sturgeon nonusers, and 42% were classified as users.

Personal Survey

FISHED FOR LAKE STURGEON. Nearly 97% of the Personal survey respondents indicated they had never fished for lake sturgeon, while only 3.3% indicated they had fished for them, but made no sturgeon fishing trips during the past 12 months.

GONE WITH LAKE STURGEON ANGLER. None of the respondents had gone with a lake sturgeon angler.

EATEN LAKE STURGEON. Ten percent of the respondents said they had eaten lake sturgeon, while 90% had not.

SEEN LAKE STURGEON. Over 37% of the respondents had see lake sturgeon in the wild, in fish hatcheries or in aquariums, 62.5% had not seen them. One individual made a special effort to see them, but not within the past 12 months.

NONUSER OR USER. Sixty percent of the Personal survey respondents were classified as lake sturgeon nonusers, and 40% classified as users.

Species Values

Each telephone survey respondent was asked either 4 or 6 questions about one species, depending on his/her user status. Personal survey respondents were asked either 4 or 6 questions about each of the 4 species, depending on their user status for each species. In addition, all respondents were asked to evaluate the accuracy of their responses to the value questions.

These questions were asked to learn how important it was to the respondent to have the species available under the conditions outlined. They were also asked to determine the respondents' values on each measure. Results for this section are found in Tables 8-12.

Bald Eagles

Bay Survey

USE. Fifty percent of the bald eagle users said continuing their current use was not important to them. While the other 50% said it was very important to them. The use bids ranged from $0.00 to $10.00 with an average bid of $5.00.

Table 8. Respondents' Bald Eagle Values by Survey Type.

EAGLE VALUE MEASURES		BAY	INGHAM	PERSONAL
USE IMPORTANCE	Not important	50.0% (1)*	0.0% (0)*	20.0% (2)*
	Moderately important	0.0% (0)	50.0% (5)	20.0% (2)
	Very important	50.0% (1)	50.0% (5)	60.0% (6)
		(N=2)	(N=10)	(N=10)
USE VALUE	$0	50.0% (1)	---	20.0% (2)
	$5	---	---	10.0% (1)
	$10	50.0% (1)	20.0% (2)	10.0% (1)
	$20	---	10.0% (1)	---
	$25	---	20.0% (2)	20.0% (2)
	$30	---	---	20.0% (2)
	$35	---	---	10.0% (1)
	$50	---	20.0% (2)	---
	$75	---	---	10.0% (1)
	$100	---	10.0% (1)	---
	$150	---	20.0% (2)	---
	Mean use value	$5.00	$59.00	$23.50
	Standard deviation	$7.07	$54.81	$22.37
OPTION	Not important	28.8% (2)	2.9% (1)	3.3% (1)
	Moderately important	14.3% (1)	48.6% (17)	23.3% (7)
	Very important	57.1% (4)	48.6% (17)	73.3% (22)

EAGLE VALUE MEASURES		BAY	INGHAM	PERSONAL
		(N=7)	(N=34)	(N=30)
OPTION PRICE	$0	42.9% (3)	29.4% (10)	6.7% (2)
	$5	---	5.9% (2)	16.7% (5)
	$10	14.2% (1)	2.9% (1)	10.0% (3)
	$15	---	---	3.3% (1)
	$20	---	5.9% (2)	3.3% (1)
	$25	42.9% (3)	14.7% (5)	23.3% (7)
	$30	---	---	3.3% (1)
	$40	---	---	3.3% (1)
	$50	---	20.6% (7)	10.0% (3)
	$60	---	---	6.7% (2)
	$75	---	---	3.3% (1)
	$100	---	5.9% (2)	3.3% (1)
	$150	---	5.9% (2)	3.3% (1)
	$160	---	2.9% (1)	---
	$200	---	---	3.3% (1)
	$250	---	2.9% (1)	---
	$300	---	2.9% (1)	---
	Mean option price	$12.14	$51.53	$37.67
	Standard deviation	$12.54	$72.85	$44.79
EXISTENCE IMPORTANCE	Not important	14.2% (1)	2.8% (1)	3.3% (1)
	Moderately important	42.9% (3)	22.9% (8)	20.0% (6)
	Very important	42.9% (3)	74.3% (26)	76.7% (23)

EAGLE VALUE MEASURES		BAY	INGHAM	PERSONAL
		(N=7)	(N=34)	(N=30)
EXISTENCE VALUES	$0	42.9% (3)	35.3% (12)	6.7% (2)
	$5	---	---	13.3% (4)
	$10	14.2% (1)	5.9% (2)	6.7% (2)
	$15	---	2.9% (1)	10.0% (3)
	$20	---	5.9% (2)	6.7% (2)
	$25	42.9% (3)	11.8% (4)	26.7% (8)
	$50	---	14.7% (5)	13.3% (4)
	$60	---	---	6.7% (2)
	$100	---	14.7% (5)	3.3% (1)
	$150	---	5.9% (2)	3.3% (1)
	$160	---	2.9% (1)	---
	$200	---	---	3.3% (1)
	Mean existence value	$12.14	$40.73	$36.50
	Standard deviation	$12.54	$49.36	$44.14

*Number in ( ) is the number of responses in each category.

Table 9. Respondents' Gull Values by Survey Type

GULL VALUE MEASURES		BAY	INGHAM	PERSONAL
USE IMPORTANCE	Not important	40.0% (2)*	20.0% (5)*	13.8% (4)*
	Moderately important	40.0% (2)	68.0% (17)	51.7% (15)
	Very important	20.0% (1)	12.0% (3)	34.5% (10)
		(N=6)	(N=25)	(N=30)
USE VALUE	$0	83.3% (5)	32.0% (8)	36.7% (11)
	$5	---	8.0% (2)	20.0% (6)
	$10	---	24.0% (6)	6.7% (2)
	$15	---	4.0% (1)	6.7% (2)
	$20	---	4.0% (1)	---
	$25	---	16.0% (4)	16.7% (5)
	$50	16.7% (1)	12.0% (3)	13.3% (4)
	Mean use value	$ 8.33	$14.20	$13.50
	Standard deviation	$20.41	$16.12	$17.08
OPTION IMPORTANCE	Not important	14.3% (1)	20.7% (6)	17.2% (5)
	Moderately important	57.1% (4)	58.6% (17)	44.8% (13)
	Very important	28.6% (2)	20.7% (6)	38.0% (11)
		(N=7)	(N=30)	(N=30)
OPTION PRICE	$0	71.4% (5)	46.6% (14)	36.7% (11)
	$5	41.3% (1)	6.6% (2)	16.7% (5)
	$10	---	20.0% (6)	13.3% (4)
	$15	---	---	6.7% (2)
	$20	---	3.3% (1)	---
	$25	---	13.3% (4)	16.7% (5)
	$50	14.3% (1)	6.6% (2)	10.0% (3)
	$200	---	3.3% (1)	---
	Mean option price	$ 7.86	$16.33	$12.33
	Standard deviation	$18.68	$37.39	$15.58

GULL VALUE MEASURES		BAY	INGHAM	PERSONAL
EXISTENCE IMPORTANCE	Not important	0.0% (0)	10.0% (3)	3.5% (1)
	Moderately important	66.7% (4)	40.0% (12)	51.7% (15)
	Very important	33.3% (2)	50.0% (15)	44.8% (13)
		(N=7)	(N=30)	(N=30)
EXISTENCE VALUE	$0	71.4% (5)	46.6% (14)	23.3% (7)
	$5	---	---	16.7% (5)
	$10	---	23.3% (7)	20.0% (6)
	$15	---	3.3% (1)	6.7% (2)
	$20	---	6.6% (2)	---
	$25	14.3% (1)	13.3% (4)	16.7% (5)
	$30	14.3% (1)	---	---
	$50	---	6.6% (2)	16.7% (5)
	Mean existence value	$ 7.86	$10.83	$16.33
	Standard deviation	$13.50	$14.02	$17.42

*Numbers in ( ) are number of responses in each category.

Table 10. Respondents' Lake Trout Values by Survey Type.

LAKE TROUT VALUE MEASURES		BAY	INGHAM	PERSONAL
USE IMPORTANCE	Not important	28.6% (2)*	40.0% (12)*	30.8% (8)*
	Moderately important	42.8% (3)	33.3% (10)	50.0% (13)
	Very important	28.6% (2)	26.7% (8)	19.2% (5)
		(N=7)	(N=30)	(N=26)
USE VALUE	$0	14.3% (1)	30.0% (9)	23.1% (6)
	$5	14.3% (1)	3.3% (1)	7.7% (2)
	$10	14.3% (1)	13.4% (4)	11.5% (3)
	$15	---	---	7.7% (2)
	$20	---	3.3% (1)	---
	$25	42.8% (3)	10.0% (3)	23.1% (6)
	$30	---	3.3% (1)	---
	$35	---	3.3% (1)	---
	$50	---	26.7% (8)	11.5% (3)
	$60	---	---	3.8% (1)
	$75	---	---	7.7% (2)
	$100	---	6.7% (2)	3.8% (1)
	$150	14.3% (1)	---	---
	Mean use value	$34.29	$26.83	$26.15
	Standard deviation	$52.08	$28.29	$27.65
OPTION IMPORTANCE	Not important	0.0% (0)	11.8% (4)	13.3% (4)
	Moderately important	75.0% (6)	35.3% (12)	40.0% (12)
	Very important	25.0% (2)	52.9% (18)	46.7% (14)

LAKE TROUT VALUE MEASURES		BAY	INGHAM	PERSONAL
		(N=8)	(N=34)	(N=30)
OPTION PRICE	$0	37.5% (3)	29.4% (10)	23.3% (7)
	$5	12.5% (1)	---	13.3% (4)
	$10	12.5% (1)	17.6% (6)	6.7% (2)
	$15	---	---	6.7% (2)
	$20	12.5% (1)	5.9% (2)	---
	$25	12.5% (1)	14.7% (5)	23.3% (7)
	$35	---	2.9% (1)	---
	$40	---	5.9% (2)	---
	$50	---	11.8% (4)	13.3% (4)
	$75	---	2.9% (1)	6.7% (2)
	$100	12.5% (1)	2.9% (1)	3.3% (1)
	$150	---	5.9% (2)	---
	$200	---	---	3.3% (1)
	Mean option price	$20.00	$29.85	$29.93
	Standard deviation	$33.70	$38.64	$41.32
EXISTENCE IMPORTANCE	Not important	0.0% (0)	2.9% (1)	3.3% (1)
	Moderately important	12.5% (1)	32.4% (11)	53.3% (16)
	Very important	87.5% (7)	64.7% (22)	43.3% (13)

LAKE TROUT VALUE MEASURES		BAY	INGHAM	PERSONAL
		(N=8)	(N=34)	(N=30)
EXISTENCE VALUES	$0	12.5% (1)	23.5% (8)	13.3% (4)
	$5	---	5.9% (2)	23.3% (7)
	$10	37.5% (3)	11.8% (4)	10.0% (3)
	$15	---	8.8% (3)	10.0% (3)
	$20	---	8.8% (3)	---
	$25	37.5% (3)	8.8% (3)	20.0% (6)
	$30	12.5% (1)	2.9% (1)	---
	$35	---	2.9% (1)	---
	$50	---	20.6% (7)	10.0% (3)
	$75	---	---	6.7% (2)
	$100	---	2.9% (1)	3.3% (1)
	$150	---	2.9% (1)	---
	$200	---	---	3.3% (1)
	Mean existence value	$16.87	$26.32	$28.67
	Standard deviation	$10.56	$31.51	$41.10

*Numbers in ( ) are number of responses in each category.

Table 11. Respondents' Lake Sturgeon Values by Survey Type.

STURGEON VALUE MEASURES		BAY	INGHAM	PERSONAL
USE IMPORTANCE	Not important	100.0% (2)*	30.8% (4)*	76.8% (10)*
	Moderately important	0.0% (0)	61.5% (8)	15.4% (2)
	Very important	0.0% (0)	7.7% (1)	0.0% (0)
		(N=2)	(N=13)	(N=12)
USE VALUE	$0	50.0% (1)	23.1% (3)	66.7% (8)
	$5	---	7.7% (1)	8.3% (1)
	$10	---	---	8.3% (1)
	$15	---	---	16.7% (2)
	$20	50.0% (1)	15.4% (2)	---
	$30	---	7.7% (1)	---
	$40	---	7.7% (1)	---
	$50	---	30.8% (4)	---
	$100	---	7.7% (1)	---
	Mean use value	$10.00	$31.92	$3.75
	Standard deviation	$14.14	$28.98	$6.08
OPTION IMPORTANCE	Not important	28.6% (2)	26.7% (8)	36.7% (11)
	Moderately important	57.1% (4)	33.3% (10)	50.0% (15)
	Very important	14.3% (1)	40.0% (12)	13.3% (4)

STURGEON VALUE MEASURES		BAY	INGHAM	PERSONAL
		(N=7)	(N=29)	(N=30)
OPTION PRICE	$0	42.9% (3)	34.5% (10)	50.0% (15)
	$5	14.3% (1)	3.5% (1)	6.7% (2)
	$10	42.9% (3)	10.3% (3)	6.7% (2)
	$15	---	---	6.7% (2)
	$20	---	3.5% (1)	3.3% (1)
	$25	---	24.1% (7)	6.7% (2)
	$30	---	6.9% (2)	---
	$50	---	17.2% (5)	16.7% (5)
	$100	---	---	3.3% (1)
	Mean option price	$5.00	$18.62	$16.00
	Standard deviation	$5.00	$18.27	$24.33
EXISTENCE IMPORTANCE	Not important	14.3% (1)	9.7% (3)	23.3% (7)
	Moderately important	71.4% (5)	25.8% (8)	46.7% (14)
	Very important	14.3% (1)	64.5% (20)	30.0% (9)
		(N=7)	(N=30)	(N=30)
EXISTENCE VALUE	$0	42.9% (3)	26.7% (8)	30.0% (9)
	$5	---	---	20.0% (6)
	$10	57.1% (4)	10.0% (3)	10.0% (3)
	$15	---	---	3.3% (1)
	$20	---	10.0% (3)	6.7% (2)
	$25	---	16.7% (5)	13.3% (4)
	$30	---	3.3% (1)	---
	$50	---	20.0% (6)	10.0% (3)
	$75	---	3.3% (1)	---
	$100	---	10.0% (3)	3.3% (1)
	$200	---	---	3.3% (1)
	Mean existence value	$5.71	$30.67	$22.17
	Standard deviation	$5.34	$31.04	$40.14

*Number in ( ) is the number of responses in each category.

Table 12. Respondents' Assessment of Accuracy of Their Bids by Survey Type.

RESPONDENTS' ASSESSMENT OF VALUE ACCURACY		BAY	INGHAM
EAGLE ANSWERS	Wild guesses	0.0% (0)	20.6% (7)
	Fairly accurate	100.0% (7)	79.4% (27)
GULL ANSWERS	Wild guesses	0.0% (0)	3.3% (1)
	Fairly accurate	100.0% (7)	96.7% (29)
LAKE TROUT ANSWERS	Wild guesses	0.0% (0)	8.8% (3)
	Fairly accurate	100.0% (8)	91.2% (31)
LAKE STURGEON ANSWERS	Wild guesses	0.0% (0)	0.0% (0)
	Fairly accurate	100.0% (7)	100.0% (29)
TOTAL ANSWERS	Wild guesses	0.0% (0)	8.7% (11)
	Fairly accurate	100.0% (29)	91.3% (116)

PERSONAL INTERVIEW RESPONDENTS' ASSESSMENT OF VALUE ACCURACY	PERSONAL
Wild guesses	0.0% (0)
Fairly accurate	100.0% (30)

OPTION. Over 57% of the bald eagle respondents said that maintaining the option to enjoy bald eagles in the future was very important to them. The option bids ranged from $0.00 to $25.00, with an average bid of $12.14.

EXISTENCE. Nearly 43% of the bald eagle respondents indicated that it was very important that the existence of bald eagles be insured for future generations, regardless of their own future use, while another 43% said bald eagles future existence was moderately important. The existence bids ranged from $0.00 to $25.00, with an average bid of $12.14.

Ingham Survey

USE. Fifty percent of the bald eagle users said continuing their current use of bald eagles was very important to them. The other 50% said it was moderately important to them. The use bids ranged from $10.00 to $150.00 with an average bid of $59.00.

OPTION. Over 48% of the bald eagle respondents said that maintaining the option to enjoy bald eagles in the future was very important to them. Another 48.6% said it was moderately important. Option bids ranged from $0.00 to $300.00, with an average bid of $51.33.

EXISTENCE. Approximately 75% of the bald eagle respondents indicated that the future existence of bald eagles, regardless of their own future use, was very important to them. Existence bids ranged from $0.00 to $160.00, with an average bid of $40.73.

Personal Survey

USE. Sixty percent of the bald eagle users indicated that continuing their current use of bald eagles was very important to them. The use bids ranged from $0.00 to $75.00, with an average bid of $23.00.

OPTION. Over 73% of the respondents said that maintaining the option to enjoy bald eagles in the future was very important to them. The option bids ranged from $0.00 to $200.00, with an average bid of $37.67.

EXISTENCE. Nearly 77% of the respondents indicated that the future existence of bald eagles, regardless of their own future use, was very important to them. Existence bids ranged from $0.00 to $200.00, with an average bid of $36.50.

Gulls

Bay Survey

USE. Forty percent of the gull users indicated that continuing their current use of gulls was moderately important to them. Another 40% said it was not important at all. Use bids ranged from $0.00 to $50.00, with an average bid of $8.33.

OPTION. Sixty eight percent of the gull respondents said it was moderately important that their option to enjoy gulls be guaranteed in the future. The option bids ranged from $0.00 to $50.00, with an average bid of $7.86.

EXISTENCE. Nearly 67% of the gull respondents indicated that the future existence of gulls, regardless of their own future use, was moderately

important to them. The existence bids ranged from $0.00 to $30.00, with an average bid of $7.86.

Ingham Survey

USE. Sixty eight percent of the gull users said their continuing current use of gulls was moderately important to them. The use bids ranged from $0.00 to $50.00 with an average bid of $14.20.

OPTION. Over 58% of the gull respondents indicated that it was moderately important that their option to enjoy gulls in the future be guaranteed. Option bids ranged from $0.00 to $16.33, with an average bid of $16.33.

EXISTENCE. Fifty percent of the gull respondents said that the future existence of gulls, regardless of their own future use, was very important to them. The existence bids ranged from $0.00 to $50.00, with an average bid of $10.83.

Personal Survey

USE. Over 51% of the gull users indicated their continued current use of gulls was moderately important to them. Use bids ranged from $0.00 to $50.00 with an average bid of $13.50.

OPTION. Nearly 45% of the gull respondents said it was moderately important that their option to enjoy gulls in the future be guaranteed. The option bids ranged from $0.00 to $50.00, with an average bid of $12.33.

EXISTENCE. Over 51% of the gull respondents indicated that the future existence of gulls, regardless of their own future use, was moderately

important to them. The existence bids ranged from $0.00 to $50.00, with an average bid of $16.33.

Lake Trout

Bay Survey

USE. Nearly 43% of the lake trout users indicated that their continued current use of lake trout was moderately important to them. The use bids ranged from $0.00 to $150.00, with an average bid of $34.29.

OPTION. Seventy five percent of the lake trout respondents said it was moderately important that their option to enjoy lake trout in the future be guaranteed. Option bids ranged from $0.00 to $100.00, with an average bid of $20.00.

EXISTENCE. Over 87% of the lake trout respondents said that the future existence of lake trout, regardless of their own future use, was very important to them. Existence bids ranged from $0.00 to $30.00, with an average bid of $16.87.

Ingham Survey

USE. Forty percent of the lake trout users said that their continued current use of lake trout was not important to them. Another 33.3% said it was moderately important to them. Use bids ranged from $0.00 to $100.00, with an average bid of $26.83.

OPTION. Nearly 53% of the lake trout respondents indicated it was very important that their option to enjoy lake trout in the future be guaranteed. Option bids ranged from $0.00 to $150.00, with an average bid of $29.85.

EXISTENCE. Almost 65% of the lake trout respondents said that the future existence of lake trout, regardless of their own future use, was very important to them. Existence bids ranged from $0.00 to $150.00, with an average bid of $26.32.

Personal Survey

USE. Fifty percent of the lake trout users indicated that their continued current use of lake trout was moderately important to them, while nearly 31% said it was not important at all. The use bids ranged from $0.00 to $100.00, with an average bid of $26.15.

OPTION. Nearly 47% of the respondents said that it was very important that their option to enjoy lake trout in the future be guaranteed. Forty percent indicated that it was moderately important. Option bids ranged from $0.00 to $200.00, with an average bid of $29.93.

EXISTENCE. Over 53% of the respondents said that the future existence of lake trout, regardless of their own future use, was moderately important to them, while 43.3% said it was very important. Existence bids ranged from $0.00 to $200.00, with an average bid of $28.67.

Lake Sturgeon

Bay Survey

USE. All of the lake sturgeon users indicated that their continued current use of lake sturgeon was not important to them. Despite this, use bids ranged from $0.00 to $20.00, with an average bid of $10.00.

OPTION. Over 57% of the lake sturgeon respondents said that is was moderately important that their option to enjoy lake sturgeon in the

future be guaranteed. The option bids ranged from $0.00 to $10.00 with an average bid of $5.00.

EXISTENCE. Approximately 71% of the lake sturgeon respondents indicated that it was moderately important to them that lake sturgeon exist in the future, regardless of their own future use. Existence bids ranged from $0.00 to $10.00, with an average bid of $5.71.

Ingham Survey

USE. Over 61% of the lake sturgeon users said that their continued current use of lake sturgeon was moderately important to them. Use bids ranged from $0.00 to $100.00, with an average bid of $31.92.

OPTION. Forty percent of the lake sturgeon respondents indicated that it was very important that their option to enjoy lake sturgeon in the future be guaranteed. The option bids ranged from $0.00 to $50.00 with an average bid of $18.62.

EXISTENCE. Over 46% of the lake sturgeon respondents said that the future existence of lake sturgeon, regardless of their own future use, was very important to them. Existence bids ranged from $0.00 to $100.00, with an average bid of $30.67.

Personal Survey

USE. Nearly 77% of the lake sturgeon users said that their continued current use of lake sturgeon was not important to them. Use bids ranged from $0.00 to $15.00, with an average bid of $3.75.

OPTION. Fifty percent of the respondents indicated that it was moderately important that their option to enjoy lake sturgeon in the future be guaranteed. Option bids ranged from $0.00 to $100.00 with an average bid of $16.00.

EXISTENCE. Over 64% of the respondents said that the future existence of lake sturgeon, regardless of their own future use, was moderately important to them. Thirty percent indicated that it was very important. The existence bids ranged from $0.00 to $200.00, with an average bid of $22.17.

Accuracy of Responses to Value Questions

Bay Survey

All the participants in the Bay survey felt their responses to the value questions were fairly accurate (Table 12).

Ingham Survey

Most of the Ingham survey participants felt their responses to the value questions were fairly accurate. In total, over 91% indicated their answers were fairly accurate (Table 12).

Personal Survey

All of the participants in the Personal survey felt their responses to the value questions were fairly accurate (Table 12).

Species Total Value

The average total value for each species was obtained by adding the average use, option and existence bids for that species (Table 13). Results show that the Bay survey total values were consistently lower

than either the Ingham survey or the Personal survey. The total values for the common species, gulls and lake sturgeon, differed by $.70 and $1.30, respectively. Total values for the uncommon species varied more widely.

Comparisons of Median and Mean Bids

Measures of central tendency are often used to give insight into the typicalness of a population distribution. Various measures can be used to describe what is typical including, mean, median and mode.

In this research, there was the problem of eliciting extreme dollar amounts during the iterative bidding process. In an effort to compensate for the effects of extreme values, the median and mean bids for the value measures were compared. The median value is less influenced by extreme values than is the mean value. Therefore, the median value is the preferred measure of central tendency when extreme values exist.

Bay Survey

Comparisons between the median and mean bids for the Bay survey indicate that extreme values were given for all the gull values and the lake trout and lake sturgeon use and option values (Table 14). This concurs with the frequency data for the Bay survey found in Tables 8-11.

Table 13. Average Total Value of Each Species by Survey Type.

SPECIES	AVERAGE TOTAL VALUE		
	Bay	Ingham	Personal
Eagles	$29.28	$148.43	$97.67
Gulls	$24.05	$41.46	$42.16
Lake Trout	$71.16	$86.00	$84.70
Lake Sturgeon	$17.87	$97.24	$41.95

Table 14. Comparisons of Median and Mean Bids for Bay Survey.

		MEDIAN	MEAN
Eagles:	Use	5.00	5.00
	Option	10.00	12.14
	Existence	10.00	12.14
Gulls:	Use	0.00	8.33
	Option	0.00	7.86
	Existence	0.00	7.86
Lk. Trout:	Use	25.00	34.29
	Option	7.50	20.00
	Existence	17.50	16.87
Lk. Sturgeon:	Use	10.00	10.00
	Option	5.00	5.00
	Existence	10.00	5.71

Ingham Survey

Comparisons between the median and mean bids for the Ingham Survey show a divergence between them for most values (Table 15). In some cases, this is due to extreme values alone, while in other cases the influence of extreme values is increased by the overall frequency distribution of the bids (Tables 8-11).

Personal Survey

Comparison between the median and mean bids for the Personal survey again indicate a difference between most of the values (Table 16). Again, this is due in part to extreme values alone and the compounding factor of the frequency distribution of the bids (Tables 8-11).

Table 15. Comparison of Median and Mean Bids for Ingham Survey

		MEDIAN	MEAN
Eagles:	Use	37.50	59.00
	Option	25.00	51.33
	Existence	22.50	40.73
Gulls:	Use	10.00	14.20
	Option	5.00	16.33
	Existence	10.00	10.83
Lk. Trout:	Use	22.50	26.83
	Option	20.00	29.85
	Existence	17.50	26.32
Lk. Sturgeon:	Use	30.00	31.92
	Option	20.00	18.62
	Existence	25.00	30.67

Table 16. Comparison of Median and Mean Bids for Personal Survey

		MEDIAN	MEAN
Eagles:	Use	25.00	23.50
	Option	25.00	37.67
	Existence	25.00	36.50
Gulls:	Use	5.00	13.50
	Option	5.00	12.33
	Existence	10.00	16.33
Lk. Trout:	Use	20.00	26.15
	Option	20.00	29.93
	Existence	15.00	28.67
Lk. Sturgeon:	Use	0.00	3.75
	Option	2.50	16.00
	Existence	7.50	22.17

Comparisons of Mean Bids

As mentioned earlier, the question of whether or not various sets of mean bids were different, was of interest. Standard two tailed t tests were used to test if there were statistically significant differences between these means. All calculated t values were compared to t-table values at $\alpha = .05$ levels. In cases where there were no table values listed, the values were extrapolated.

Telephone Survey

The average bids for all value measures for the telephone surveys (Bay and Ingham) were compared (Tables 17 and 18). For all the bird species value measures, there were no statistically significant differences between the mean bids. For the fish species value measures, all but one showed no statistically significant difference between the mean bids. A statistically significant difference existed between the lake sturgeon existence bids for the Bay and Ingham surveys.

Table 17. Comparison of Bald Eagle and Gull Means and Standard Errors for Bay and Ingham Surveys

		BAY	INGHAM
EAGLES			
Use	$\bar{x}$	5.00	59.00
	se	5.00	17.33
Option	$\bar{x}$	12.14	51.33
	se	4.34	12.49
Existence	$\bar{x}$	12.14	40.73
	se	4.74	8.46
GULLS			
Use	$\bar{x}$	8.33	14.20
	se	8.33	3.22
Option	$\bar{x}$	7.86	16.33
	se	7.06	6.83
Existence	$\bar{x}$	7.86	10.83
	se	5.10	2.56

Table 18. Comparison of Lake Trout and Lake Sturgeon Means and Standard Errors for Bay and Ingham Surveys

		BAY	INGHAM
LAKE TROUT			
Use	$\bar{x}$	34.29	26.83
	se	19.68	5.17
Option	$\bar{x}$	20.00	29.85
	se	11.91	6.63
Existence	$\bar{x}$	16.87	26.32
	se	3.77	5.40
LAKE STURGEON			
Use	$\bar{x}$	10.00	31.92
	se	10.00	8.04
Option	$\bar{x}$	5.00	18.62
	se	1.89	3.32
Existence	$\bar{x}$	5.71[1]	30.67
	se	2.02	5.67

[1]Accept H_1 that Bay ($\bar{x}$) is significantly different from Ingham ($\bar{x}$) at $\alpha = .05$.

Ingham and Personal Surveys

It was felt that if the telephone and personal interview surveys were well constructed they may be considered comparable research instruments. To achieve this, the mean bids for the two survey types would need to show no statistically significant difference between the two sets of means. Therefore, the average bids for all value measures for the two surveys conducted in Ingham county were compared (Tables 19 and 20). For all the bird species value measures, there were no statistically significant differences between the mean bids. For the fish species, all but one showed no statistically significant difference between the mean bids. A statistically significant differences was found between the lake sturgeon use bids for the Ingham and Personal surveys. This difference may be more a result of the small sample of Ingham county sturgeon users (N=2) surveyed, rather than true mean population differences.

Table 19. Comparison of Bald Eagle and Gull Means and Standard Errors for Ingham and Personal Surveys.

		INGHAM	PERSONAL
EAGLES			
Use	$\bar{x}$	59.00	23.50
	se	17.33	7.07
Option	$\bar{x}$	51.33	37.67
	se	12.49	8.18
Existence	$\bar{x}$	40.73	36.50
	se	8.46	8.06
GULLS			
Use	$\bar{x}$	14.20	13.50
	se	3.22	3.12
Option	$\bar{x}$	16.33	12.33
	se	6.83	2.84
Existence	$\bar{x}$	10.83	16.33
	se	2.56	3.18

Table 20. Comparison of Lake Trout and Lake Sturgeon Means and Standard Errors for Ingham and Personal Surveys

		INGHAM	PERSONAL
LAKE TROUT			
Use	$\bar{x}$	26.83	26.15
	se	5.17	5.42
Option	$\bar{x}$	29.85	29.93
	se	6.63	7.54
Existence	$\bar{x}$	26.32	28.67
	se	5.40	7.50
LAKE STURGEON			
Use	$\bar{x}$	31.92[1]	3.75
	se	8.04	1.75
Option	$\bar{x}$	18.62	16.00
	se	3.39	4.44
Existence	$\bar{x}$	30.67	22.17
	se	5.67	7.33

[1]Accept H_1 that Ingham ($\bar{x}$) is significantly different from Personal ($\bar{x}$) at $\alpha = .05$.

Nonusers or Users

The average values for users and nonusers of each species were compared for the Ingham survey and the Personal survey (Tables 21-24). For all species, there were no statistically significant differences between nonuser and user means at the $\alpha = .05$ level.

Table 21. Comparison of Bald Eagle and Gull Nonuser and User Means and Standard Errors for Ingham Survey.

		NONUSER	USER
EAGLES			
Option	$\bar{x}$	56.04	40.00
	se	16.59	15.38
Existence	$\bar{x}$	35.62	53.00
	se	9.24	15.38
GULLS			
Option	$\bar{x}$	9.00	17.80
	se	4.58	8.14
Existence	$\bar{x}$	9.00	8.80
	se	4.58	3.77

Table 22. Comparison of Lake Trout and Lake Sturgeon Nonuser and User Means and Standard Errors for Ingham Survey.

		NONUSER	USER
LAKE TROUT			
Option	$\bar{x}$	$17.50	$31.50
	se	11.81	7.34
Existence	$\bar{x}$	8.75	28.67
	se	4.27	5.98
LAKE STURGEON			
Option	$\bar{x}$	16.11	22.73
	se	4.49	5.11
Existence	$\bar{x}$	30.56	30.83
	se	7.86	8.28

Table 23. Comparison of Bald Eagle and Gull Nonuser and User Means and Standard Errors for Personal Survey.

		NONUSER	USER
EAGLES			
Option	$\bar{x}$	39.00	35.00
	se	8.07	19.23
Existence	$\bar{x}$	37.00	35.50
	se	7.90	19.08
GULLS			
Option	$\bar{x}$	-	12.33
	se	-	2.84
Existence	$\bar{x}$	-	16.33
	se	-	3.18

Table 24. Comparison of Lake Trout and Lake Sturgeon Nonuser and User Means and Standard Errors for Personal Survey.

		NONUSER	USER
LAKE TROUT			
Option	$\bar{x}$	26.00	29.96
	se	10.65	8.95
Existence	$\bar{x}$	20.00	30.00
	se	11.47	8.76
LAKE STURGEON			
Option	$\bar{x}$	20.00	10.00
	se	6.75	4.35
Existence	$\bar{x}$	19.17	26.67
	se	6.44	15.96

Comparison of Use Value with Other Estimates

Lake trout and salmon sport fishing values have been estimated using the travel cost method. Talhelm (personal communication) has estimated this sport fishing value to be $40 to $45 per day, in 1983 dollars. This value can be compared with an estimated per day use value obtained from survey respondent lake trout anglers. For the purpose of this comparison, the use values for respondents who had fished for lake trout in the previous year were summed and divided by the anglers' total number of lake trout angling days in the previous year. The resulting value was a rough estimate of the value of lake trout fishing per day to

respondents. It is important to note that this value may be somewhat inflated because the anglers' use value may have included value for uses other than fishing, such as eating.

The estimated lake trout sport fishing value per day, for each survey was: Bay - $37.50, Ingham - $6.21 and Personal - $23.50. Comparing these values with $40 - 45/day, CV appears to have underestimated willingness to pay. This underestimation is consistent with the results of a similar comparison of travel cost and CV methods by Bishop and Heberlein (1979).

Observations of and Comments by Respondents

Respondents' actions and comments during the interview process add insight into their reactions and responses to various questions. Therefore, observations of and comments by the respondents are briefly discussed.

Telephone Interview Respondents

Most of the telephone interview respondents were relatively patient with the interviewer while the questions were being asked. This was probably because the respondents were told that the interview would take 10 to 15 minutes and all were completed in less than 10 minutes. This overestimate of the time the questionnaire would take may have reduced the likelihood that the respondent would answer inaccurately to hurry the interview along.

Many of the telephone respondents were noticeably irritated with high bid starting points. Frequently the respondent would laugh or ask the interviewer if she was serious. For this reason the interviewers

tried to find the respondent's acceptable bid range quickly, so as not to irritate them further.

Some of the respondents bid zero on the value questions. A few offered explanation including:

- the Michigan DNR should be taking care of this anyway;
- the money should come from license fees only;
- the money should come from trout fishermen and businesses that profit from lake trout rather than the general public; and
- there should be enough money in the DNR already - don't give DNR money to other programs.

A few respondents refused to bid at all. Reasons given included:

- the questions were not applicable for a single species;
- sea gulls were not a worthy cause and he/she didn't like the questions.
- he/she didn't have adequate time to think abut the money questions; and
- the money questions were irrelevant and he/she didn't care to respond.

Personal Interview Respondents

The personal interview respondents were generally friendly to and patient with the interviewer, during the interview. The respondents were told the interview would take about 45 minutes, and most were completed in 30 minutes. There was little indication that the respondents tried to hurry the process along, thereby jeopardizing the accuracy of

their responses. Two notable exceptions to this were when one respondent had unexpected company and the other was watching a TV game show while trying to respond to the questions.

The $50.00 starting point appeared to pose no problem for most of the personal interview respondents. There were, however, indications that $50.00 was still perceived as too high by a few.

Some of the respondents bid zero on the value questions. Most who did so indicated that they did not value a specific aspect of the species, such as the use of lake trout. Others felt there were enough of the species already (gulls and trout) and they didn't need to be financially supported. One respondent bid zero on all value measures for all species stating that preserving any specific species was a waste of money.

After the personal interview was formally completed, respondents were asked an additional question informally. They were asked if they bid on each species separately or if their bids were influenced by their previous species bids. All personal interview respondents said they bid on each species separately and did not allow their previous bids to influence their subsequent bids.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Chapter V includes a summary of the key findings of this study, conclusions based on these findings and recommendations for further study and research.

Summary

Bay Survey

The typical Bay telephone respondent was, 20-29 years old, married, with a high school education and a household income of $30,000 to $39,999 annually. The sample of Bay county respondents was similar to the general population of the county with a regard to their age and sex. Respondents did have somewhat higher levels of education and income than the general population.

Most Bay county respondents were classified as nonusers of bald eagles and lake sturgeon, and as users of gulls and lake trout. The average option and existence bids were higher for bald eagles than for gulls, and higher for lake trout than for lake sturgeon. The average total bids for each species ranged from $17.87 for lake sturgeon to $71.16 for lake trout. All Bay respondents felt their answers to the money questions were fairly accurate.

Ingham Survey

The typical Ingham telephone respondent was male or female, 20-29 years old, married, with some college education and an annual household income of less than $10,000. The sample of Ingham county telephone respondents was similar to the general adult population of the county with regard to sex, age and income levels. Respondents did have somewhat higher levels of education than the general population.

Most Ingham respondents were classified as nonusers of bald eagles and lake sturgeon, and as users of gulls and lake trout. The average use and option bid was higher for lake trout than for lake sturgeon, while the average existence bid was higher for lake sturgeon than for lake trout. The average total bids for each species ranged from $41.46 for gulls to $148.43 for bald eagles. Most Ingham respondents felt their answers to the money questions were fairly accurate.

Personal Survey

The typical Personal interview respondent was male or female, 40-49 years old, married, with some college education and an annual household income of $20,000 - $29,999. The sample of Personal interview respondents from Ingham county was similar to the general population of the county with regard to sex. Respondents tended to be slightly older than the general population, and had higher levels of education and income.

Most Personal interview respondents were classified as nonusers of bald eagles and lake sturgeon, and as users of gulls and lake trout. The average use, option and existence bids were higher for bald eagles than for gulls, and higher for lake trout than for lake sturgeon. The average total bids for each species ranged from $41.95 for sturgeon to

$95.67 for bald eagles. All Personal interview respondents felt their answers to the money questions were fairly accurate.

Comparison of Mean Bids

Three sets of mean bids were compared to test for statistical differences between means. They were comparisons between: Bay and Ingham surveys, Ingham and Personal surveys, and Nonusers and Users. A statistically significant difference was found (at $\alpha = .05$) in only two of the 38 comparisons made: the lake sturgeon existence bids for Bay and Ingham surveys, and the lake sturgeon use bids for Ingham and Personal surveys. Differences between the mean bids in both cases can probably be attributed to the small sample sizes used for comparisons rather than true population differences.

Review of Goals and Hypotheses

At the onset of the research several goals were identified and hypotheses were formed.

Goals

The first goal was to determine if individuals are able to conceptually divide their total value for a specified wildlife species into its' component values and assess each component separately. Respondents were able to conceptually divide their total value for a species into component values and assess each component separately. There is some question, however, if they perceived each component as was intended. The use value was intended to measure the value of the respondents' present and future use of the species. The option price question was intended to measure option value - the value respondents' placed on the guarantee of the future option of use, not the value of future use

itself. In reviewing the value measure questions it was felt that the difference between the use value and option price was not clearly made. It appears that the use value question may have elicited present use values only and that future use values were included in the option price question. Therefore, the option price values may not accurately measure the amount respondents are willing to pay for the option alone of future use of the species.

The second goal was to determine the magnitudes of the components as an approximation of their relative importance. It was felt that some consistent order of values, based on the mean bids for each value, might be found. If so, this could provide insight into the importance of the various components of total value to individuals. In comparing the mean bids for each value by species and survey type, no consistent order of values appeared. It is, however, important to point out that the magnitudes of the mean bids for the values were generally similar. This finding is especially relevant to the magnitude of existence values compared with that of use value. Conclusions regarding the relationship between the magnitudes of use and existence value to option price value are unclear because of the uncertainty about the reliability of the option price bids, as discussed in the preceding paragraph. Speculativley, the magnitude of option price may be a small percentage of the magnitudes of the other two values.

Goal three was to determine the approximate total value of each species and use this as an indicator of individuals' preferences between species. The approximate value for each species was identified as the average total value of the species, computed by adding the average use, option and existence bids (See Table 13). Comparing the average total

values for each species by survey type shows no clear pattern of preference between species. Bald eagles were the most highly valued species by both Ingham and Personal survey respondents, while lake trout were the most highly valued species by Bay survey respondents. The responses from Bay county participants may be different than those of Ingham county participants because of the smaller sample size, or because there are more lake trout anglers near the Great Lakes. Gulls ranked last with Ingham respondents while lake sturgeon ranked last with Personal respondents (gulls were ranked a close third to sturgeon, however).

The fourth goal was to examine the possibility that the relative magnitudes of the values may be related to other factors including geographical location. Comparisons between Bay and Ingham telephone survey means bids showed no statistically significant difference between mean values. We can not conclusively accept the hypothesis that geographical location influenced respondents' average bids.

Goal five was to evaluate whether respondents were able to understand the concepts presented, and if they felt their responses accurately reflected their values. For the most part, respondents were able to understand the concepts as they were presented. Some respondents, however, did require additional clarification of the values. As mentioned in the discussion of the first goal the concepts respondents were presented with and understood were perhaps not exactly the concepts intended to be presented. Almost all respondents indicated that they felt their bid responses did, in fact, accurately reflect their values.

The last goal was to offer recommendations for further research into the problem of assessing extra market values for non-consumptive

uses of wildlife. Recommendations are addressed in the last section of this chapter.

Hypotheses

The first hypothesis was that people do hold option prices and existence values for fish and wildlife resources, and these valuations differ from species to species. Respondents do hold existence values for fish and wildlife resources, and most probably have option prices for them as well. The problem encountered in evaluating the option price bids was the uncertainty regarding what the bids elicited measured. It is felt that the option price bids may have included the value of future use of the species, in addition to the amount the individual would be willing to pay to maintain the option of future use. Therefore, there is not a good sense of respondents' option price or their ability to conceptualize it. Further, given the uncertainty about what was actually measured, it is difficult to assess if option prices differ significantly from species to species.

The existence value component of total value does differ somewhat from species to species. The order of magnitude of the existence value bids are similar, however, for bald eagles, lake trout and lake sturgeon. Gull existence value bids are approximately one-half the magnitude of the existence value bids for the other species. This is perhaps a reflection of both the abundance of gulls, as well as respondents perceived inability to use gulls consumptively in the future. This ability to consume the fish species may have played an important role in the formulation of respondents' existence values.

The second hypothesis was that option prices for each species differ from existence values for each species. This hypothesis could

not be adequately examined because of the probable inaccuracy of the option price results due to the wording of the option question in the questionnaire. The hypothesis my be testable if the option price question could be worded clearly and time for complete explanation provided.

The last hypothesis was that total use values will be higher for common species (species with low utilization costs) and will be lower for uncommon species (species with high utilization costs). For the bird species, the total value for bald eagles (uncommon species) was higher than for gulls (common species) for each survey. This indicates that this hypothesis did not hold true for the bird species. The results for the fish species are somewhat inconclusive. The total value of lake sturgeon (uncommon species) was higher than the total value of lake trout (common species) for Ingham survey respondents only. Bay and Personal survey respondents, however, valued lake trout over lake sturgeon.

Conclusions

There were advantages to both the telephone and personal interview survey methods. The telephone interviews allowed more information to be gathered in a short amount of time. Telephone respondents were, however, less likely to ask for clarification of questions and concepts. Therefore, the data collected using the telephone interview method may be less precise than that collected by the personal interview method due to the possible increased opportunity for misunderstanding.

The personal interviews were much more time intensive than the telephone interviews with regard to the amount of information gathered. This extra time taken with respondents proved to be advantageous because they appeared to ask for explanation of unclear points more readily.

The precision of the personal interview data may therefore be higher than that of the telephone interview data.

The bid starting point did not influence the respondents' bids for the survey done in Ingham county. The static $50.00 bid for the Personal survey resulted in mean bids statistically equal to the bids received from the Ingham telephone survey with the randomly selected bid starting point ranging from $50.00 to $300.00. It is, possible that $50.00 may have been considered a high bid by respondents. They may have perceived a starting point of $50.00 and $300.00 as equally unacceptable and therefore, their bids did not reflect any differences. A lower range of bid starting points may have had a different effect on the mean bids.

Generally, there existed no statistically significant difference between mean bids by survey location for the telephone surveys. There was also, generally, no statistically significant difference between mean bids by survey type for Ingham county. In addition, there was no statistically significant difference between the mean bids of species users and nonusers. Therefore, there appears to be a high degree of reliability with the data collected.

The specific values elicited through the surveys were not necessarily the values intended to be examined. The use values obtained probably measured respondents' annual present use values of the species. It is unlikely that respondents' annual future use values were included in this use value measurement, as was intended. This was due to the unclear wording of the use value questions.

The option price values obtained may have been a hybrid of option values and option price, as defined by Bishop (1982). These values most

probably represent respondents' annual future use value of the species, plus the maximum amount they would be willing to pay to maintain the option of enjoying the species in the future or the option price.

The existence values represent the maximum amount respondents would be willing to pay annually to ensure the existence of the species without regard to their own future use or enjoyment, as they were more clearly defined than the use or option price values.

Despite questions about what the values elicited actually measured, important conclusions about these types of values can be made. It has been known that the values of consumptive or non-consumptive uses of fish and wildlife resources are greater than $0. This study has shown that the values of future use and the option of future use, as well as the existence of species was found to be in the same order of magnitude as the species use value.

In conclusion, survey respondents were able to affix monetary values to non-consumptive uses of bald eagles and gulls, and to consumptive and non-consumptive uses of lake trout and lake sturgeon. By assigning values to wildlife species respondents indicated that they would be willing to pay some amount for the use and preservation of these resources, even if they did know of the species previously. This willingness to pay for wildlife resources supports the idea that wildlife are important to most individuals in society.

Recommendations

Resource Management Decisions

As pointed out in the introduction of this paper, there are limitations on the practical use and application of the findings. These limitations, however, do not diminish the significance of the results to Great Lakes resource managment decisions. It is shown that the average use, option price and existence values for the four species are positive, and that existence value is of similar magnitude to use value. These magnitudes of values, then can be used in resource management decisions. They especially need to be included in benefit cost analyses, as this study has shown that individuals do hold extra market values for fish and wildlife resources.

It is also important to note how the information gathered in this study should not be used. The monetary values should not be taken as exact, but rather as "ballpark" values. Also, the average total values calculated for each species are not additive. Each respondent was asked to consider the value for one species at a time, with all other elements of consideration being held constant. Adding the average total values therefore, would result in a gross overestimation of resource value. Lastly, the values obtained are estimates of the average value of all individuals of the species for each adult in Ingham or Bay county. The values are not the value of each individual animal to society.

For these values to be genuinely useful to Great Lakes management, it is necessary to recognize the need for institutional legitimacy of extra market values and for further research. To ensure that this information is included in resource allocation decisions, researchers need more formal interaction with the decision making process. This

could be achieved through legislative mandate or agency policy. In addition, further research is necessary to substantiate and expand the findings of this study, so as to provide policy makers with more clear and valid estimates of extra market values of Great Lakes fish and wildlife resources. These estimates could play a key role in future resource allocation decisions.

Furthermore, studies on extra market values for consumptive and non-consumptive uses of resources for other species not related to the Great Lakes or for other regions of the country might be a consideration. This information could lead to a more complete understanding of the array of resource values that exist for other parts of the county, as well as for the nation. These values could then be included formally in federal resource allocation policies.

Further Research

The need for further research is evident if extra market values are to be consistently included in resource allocation decisions. General recommendations for further research include:

- complete replication of this study to verify the mean bids and if they were truly statistically the same;
- broadening the sampling areas to include other areas within the Great Lakes region;
- using larger sample sizes for increased reliability of data;
- insuring more equal sample sizes between sample populations if comparisons are to be made;

- carefully choosing the survey instrument to be used based on the needs and constraints of the study. Telephone interviews allow more information to be gathered in a shorter amount of time, while personal interviews allow for more interaction between the interviewer and the respondent;

- limiting telephone interviews to the valuation of one species,

- limiting personal interviews to the valuation of no more than four species; and

- explicity framing the value questions so that there is more certainty of the values being measured. This is especially critical to the use and option price values.

Specific recommendations for variations on this study could include:

- using species other than the ones considered in this study.

- using more similar species, such as all birds, to see if individuals are able to differentiate between them, and then,

- using groups of species, such as endangered birds or small mammals to see if individuals value species of similar circumstance and morphology similarly;

- a more complete exploration of the effects of respondents' past experiences and interests in wildlife to help determine possible predictors of individuals' resource values;

- a more complete exploration of the effects of geographic location on respondents' bids, and

- asking individuals' total value for a species first and then asking them to partition the total value into use, option price and existence values.

APPENDICES

APPENDIX A1

Personal Interview Questionnaire

A. RECREATION PARTICIPATION

The first group of questions I'm going to ask deal with your participation in natural resource activities. We would like to get a general idea of your present wildlife interests.

A1. I'm going to list a number of outdoor recreation activities. I would like you to tell me, yes or no, if you have participated in any of these activities during the last 12 months.

yes = 1
no = 0

1. **Fishing** ___ (1)
2. **Hunting** ___ (2)
3. **Boating or Canoeing** ___ (3)
4. **Camping** ___ (4)
5. **Hiking, Backpacking or Walking for pleasure** ___ (5)
6. **Driving for pleasure** ___ (6)
7. **Outdoor photography** ___ (7)
8. **Wildlife observation or Bird watching** ___ (8)
9. **Other unorganized outdoor activities** ___ (9) ___ (10)

   (list) _____ ___ (11) ___ (12)

A2. Do you presently belong to any environmental, natural resources or sportsmen's organizations?

yes {go to A3.}

no {go to A4.} ___ (13)

A3. What are the names of the organizations?

list _____ ___ (14)

_____ ___ (15)

_____ ___ (16)

_____ ___ (17)

_____ ___ (18)

A4. Have you, in the past 12 months, donated money (other than membership dues) or volunteered time to any environmental or natural resource organization or cause?

yes Explain _____

no

19

A5. How often do you watch wildlife-related programs on TV?

1. Never
2. Rarely (once or twice a year)
3. Occasionally (3 to 9 times a year)
4. Often (10 or more times a year)

20

B. PAST EXPERIENCES

The following group of questions are about your past experiences with wildlife. I am purposely asking about two common and two uncommon animals so we can compare your values of these animals to each other.

1. Birds

First, I'd like to ask you about your experiences with two kinds of birds, the bald eagle, and the Great Lakes sea gull.

	Gulls	Eagles
B1. Have you ever seen a bald eagle/sea gull in the wild, that is, not in a zoo or in captivity?		
yes {go to B2.}		
no {go to B7.}	21	22
B2. How many times have you seen a bald eagle/sea gull in your lifetime?		
1. Once or twice		
2. 3 to 9 times	23	24
3. 10 or more times		

	Gull	Eagle
B3.1. Have you seen or tried to see a bald eagle/sea gull in the past 12 months?		
yes {go to B3.2.}		
no {go to next species}	25	26
2. Did you make a special effort, or go out of you way to see them?		
yes {go to B4.}		
no {go to B6.}	27	28
B4. Can you tell me approximately:		
1. How many trips you took in the past 12 months when you went out of your way to see bald eagles/sea gulls? _____ (number)	29 30	31 32
2. How much extra, on average, did that cost you? _____ (amount) (Include gas mileage, equipment and other.)	33 34 35	36 37 38
B5. How much extra time did that take?		
_____ (Hours)	39 40	41 42
B6. Did the experience of seeing a bald eagle/sea gull enhance your trip or your enjoyment of that day?		
yes		
{go to next species}		
no	43	44
B7. Do you have a desire to see a bald eagle/sea gull in your lifetime?		
yes		
no	45	46

{Repeat section with other species}

- 4 -

2. Fish

	L. Trout	L. Sturgeon
Now I'm going to ask you about your experiences with two fish species, the lake trout and the lake sturgeon.		
B8. Have you ever fished for lake trout/lake sturgeon?		
yes {go to B9.}		
no {go to B10.}	47	48
B9. Can you tell me approximately:		
1. how many trips you took in the last 12 months to fish for lake trout/lake sturgeon? _____(number)	49 50	51 52
2. how much, on the average, each of these trips cost you? _____ (amount)	53 54 55	56 57 58
{go to B12.}		
B10. Have you ever gone with anyone who fished for lake trout/lake sturgeon?		
yes {go to B11.}		
no {go to B12.}	59	60
B11. Can you tell me approximately:		
1. how many of these trips you took in the last 12 months when someone fished for lake trout/lake sturgeon? _____ (number)	61 62	63 64
2. how much, on the average, each trip cost you? _____ (amount) (Include gas mileage, equipment and other.)	65 66 67	68 69 70
{go to next part}		
B12. Have you ever eaten lake trout/lake sturgeon?		
yes {go to next species}		
no {go to B13.}	71	72
B13. Have you ever seen lake trout/lake sturgeon in fish hatcheries, or in the wild, or in aquariums?	Card # 1	Interview #
yes {go to B14.}	76	78 79 80
no {go to next species}	1	2

	L. Trout	L. Sturgeon
B14. Did you go out of your way or make a special effort to see them?		
yes {go to B15.}		
no {go to next species}	3	4
B15. Can you tell me approximately:		
1. how many of these trips you took in the past 12 months? _____ (number)	5 6	7 8
2. how much, on average, each trip cost you? _____ (amount) (Include gas mileage, equipment and other.)	9 10 11	12 13 14

{Repeat section with other species}

C. VALUE MEASURES

In this next section of the survey, we want to find out how important these birds and fish are to you. There are three ways we would like you to think about your values related to wildlife. These ways are described on this card. {Give card 1}

1. Birds

	Gulls	Eagles
First, I'm going to ask about your values for the two birds, the bald eagle and the Great Lakes sea gull.		
		User = 1
{If answered yes to B1. (presently a user) continue with C1.}		Non-User = 0
{If answered no to B1. (not presently a user) skip to C3. explanation}	15	16
Let's consider part I of this card. I'd like you to think about how important enjoying bald eagles/sea gulls is to you.		
C1. How important is it to you to see and enjoy bald eagles/sea gulls?		
1. very important		
2. moderately important	17	18
3. not important at all		

{C2. Explanation}
Now, I'd like you to think about part II of the card. This is like an insurance policy: assuring you that bald eagles/sea gulls will be available in the future.

	Gull	Eagles

In addition to how important enjoying bald eagles/sea gulls is to you, I'd like you to consider how important a guarantee of future enjoyment of them is worth to you.

C2. In addition to the value you just gave me,

how important is it to you that your future enjoyment of bald eagles/sea gulls will be guaranteed? In other words, how important is the guarantee by itself?

1. very important
2. moderately important
3. not important at all

{go to C4. explanation}

{C3. Explanation}
Since you are not presently enjoying bald eagles/sea gulls, part I of this card does not apply to you.

One way of valuing bald eagles/sea gulls is illustrated in part II of Card 1. This is like an insurance policy: assuring you that they will be available in the future. You are not presently enjoying bald eagles/sea gulls, but you could decide to in the future.

Now, I'd like you to think about how important it is to you to know bald eagles/sea gulls will be guaranteed to exist for your possible use and enjoyment in the future.

C3. How important is it to you that bald eagles/sea gulls will be guaranteed available for your possible enjoyment in the future?

1. very important
2. moderately important
3. not important at all

	19	20

{C4. Explanation}
The last way of valuing birds is shown in part III of Card 1. In addition to the other values on Card 1, you may gain satisfaction from knowing that bald eagles/sea gulls exist, even though you may never see them yourself.

	Gull	Eagles
C4. In addition to your other value(s), how important is it to you just to know that bald eagles/sea gulls will exist in the future, even though you may never see them?		
1. very important		
2. moderately important	21	22
3. not important at all		

As you probably know, we all pay for government sponsored programs and facilities through taxes and/or user fees. And, obviously, we pay for private programs and services through prices, memberships and donations.

Now, I'd like you to think about what amount of money you would be willing to pay each year, to ensure that the types of situations I just asked about would exist. The form of payment would be either 1) voluntary contributions, 2) increased taxes paid to the state, or 3) user fees, such as licenses or entry permits. In each case, the money would go directly to projects supporting each species only; not to any other kinds of projects or other species. This would be the same as thinking in terms of a voluntary organization set up just for this purpose, since we know exactly what the money would be used for. Remember, though, if people aren't willing to adequately support a program, it won't be done.

{Continue on if answered yes to B3. (presently a user)}

{If answered no to B3., (not presently a user) go to C9. explanation}

First, I'd like you to think about part I of Card 1, and what your enjoyment of bald eagles/sea gulls is worth to you right now.

I'm going to use a bidding process to find out your maximum willingness to pay.

	Gull	Eagles
C5. (Remember, you said earlier you paid $ _____ (from B4.) to enjoy bald eagles/sea gulls.) Would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to be able to continue to enjoy bald eagles/sea gulls as you can now? yes {continue bidding up by _____ amount until get negative response} no {bid downward by _____ amount until get positive response} $ _____ {final amount}	23 24 25 26	27 28 29 30
C6. Is $ _____ {final amount} the most you would be willing to pay, to continue to enjoy bald eagles/sea gulls, under present conditions? yes {move on to C7. explanation} no {repeat bidding process C5. and C6.}		

{C7. Explanation}
Now, I'd like you to think about part II of this card, and what guaranteed future enjoyment of bald eagles/sea gulls is worth to you, in addition to the value you just gave me. Remember, this is like an insurance policy or a guarantee.

C7. In addition to the amount you gave before would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to ensure the guaranteed future availability of bald eagles/sea gulls for your enjoyment?

yes {continue bidding up by _____ amount until get negative response}

no {bid downward by _____ amount until get positive response}

$ _____ {final amount}

C8. Is $ _____ {final amount} the most you would be willing to pay, to guarantee the future availability of bald eagles/sea gulls for your enjoyment?

yes {move to C11. explanation}

no {repeat bidding process C7. & C8.}

	Gull				Eagles			
{C9. Explanation} Since you are not presently enjoying bald eagles/sea gulls, part I of this card does not apply to you. I'd like you to think about part II of Card 1, and what your guaranteed future enjoyment is worth to you. Remember, this is similar to an insurance policy. I'm going to use a bidding process to find out what your maximum willingness to pay is.								
C9. Would you be willing to contribute $ ____ extra each year in voluntary contributions, higher taxes or user fees, to ensure your possible future enjoyment of bald eagles/sea gulls? yes {continue bidding up by _____ amount until get negative response} no {bid downward by ____ amount until get positive response} $ _____ {final amount}	___	___	___	___	___	___	___	___
	31	32	33	34	35	36	37	38
C10. Is $ ____ {final amount} the most you would be willing to pay, to guarantee the future availability of bald eagles/sea gulls for your enjoyment? yes {go to C11. explanation} no {repeat bidding process C9. and C10.}								
{C11. Explanation} Lastly, I'd like you to think about part III of Card 1 and what bald eagles/sea gulls are worth to you even though you may never see them in the future.								
C11. In addition to the amounts you gave me before, would you be willing to contribute $ ____ extra each year in voluntary contributions, higher taxes or user fees, to know that bald eagles/sea gulls will exist in the future even if you were never to see them? yes {continue bidding up by _____ amount until get negative response} no {bid downward by _____ amount until get positive response} $ _____ {final amount}	___	___	___	___	___	___	___	___
	39	40	41	42	43	44	45	46

C12. Is $ _____ {final amount} the most you would be willing to pay, to assure their existence under present conditions?

yes

no {repeat bidding process C11. and C12.}

{Repeat section C for other bird species}

2. Fish

Now, I'd like to ask you the same kinds of questions about your values for the two fish. Again, I'd like you to think about your values in terms of the three ways listed on the card.

L. Trout	L. Sturgeon
User = 1 Non-User = 0	
47	48

{If answered yes (presently a user) to any B8. - B15. continue}

{If answered no (not presently a user) to all B8., B10., B12., B13., go to C15. explanation}

Since you are presently enjoying lake trout/lake sturgeon, I'd like you to consider part I of Card 1.

C13. How important is it to you to be able to fish for and/or eat lake trout/lake sturgeon?

1. very important
2. moderately important
3. not important at all

49	50

{C14. Explanation}
Now, I'd like you to think about part II of the card. This is like an insurance policy: assuring you that lake trout/lake sturgeon will be available in the future.

In addition to how important enjoying lake trout/lake sturgeon is to you, I'd like you to consider how important a guarantee of future enjoyment of them is worth to you.

	L. Trout	L. Sturgeon
C14. In addition to the value you just gave me, how important is it to you that your future enjoyment of lake trout/lake sturgeon will be guaranteed? In other words how important is the guarantee, by itself?		
1. very important		
2. moderately important		
3. not important at all		
{go to C16. explanation}		
{C15. Explanation} Since you are not presently enjoying lake trout/lake sturgeon part I of Card 1 does not apply to you.		
One way of valuing lake trout/lake sturgeon is illustrated in part II of Card 1. This is similar to an insurance policy: assuring you that they will be available in the future. You are not fishing for or eating lake trout/lake sturgeon now, but you may want to do so in the future.		
Now, I'd like you to think about how important it is to you to know lake trout/lake sturgeon will be guaranteed to exist for your possible enjoyment in the future.		
C15. How important is it to you that lake trout/lake sturgeon will be guaranteed available in the future for you to possible fish for or for eating?		
1. very important		
2. moderately important	___ 51	___ 52
3. not important at all		
{C16. Explanation} The last way of valuing fish is shown in part II of Card 1. In addition to the other values on Card 1, you may gain satisfaction from knowing that lake trout/lake sturgeon exist, even though you may never see, eat or fish for them yourself.		

	L. Trout	L. Sturgeon
C16. In addition to your other value(s), how important is it to you just to know that lake trout/lake sturgeon will exist in the future, even though you may never enjoy them directly?		
1. very important		
2. moderately important	___ 53	___ 54
3. not important at all		

As I said before, we all pay for government sponsored programs and facilities through taxes and/or user fees.

I'd like you again to think about what amount of money you would be willing to pay each year, to ensure that the types of situations I just asked about would exist. The form of payment would be either 1) voluntary contributions, 2) increased taxes paid to the state, or 3) user fees, such as license or entry permits. In each case, the money would go directly to the projects supporting each species only; not to any other kinds of projects or other species. Remember, though, if people aren't willing to adequately support a program, it won't be done.

{If answered yes (presently a user) to any B8. - B15. continue}

{If answered no (not presently a user) to all B8. - B15. go to C21.}

{C17. Explanation}
First, I'd like you to think about part I of Card 1, and what your enjoyment (or fishing and eating) of lake trout/lake sturgeon is worth to you right now.

I'm going to use a bidding process to find out what your maximum willingness to pay is.

- 13 -

	L. Trout	L. Sturgeon
C17. (Remember, you said earlier you paid $ _____ (from either B9.2., or B11.2., or B15.) to enjoy lake trout/lake sturgeon.) Would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to be able to eat and/or fish for lake trout/lake sturgeon whenever you wanted to? yes {continue bidding up by _____ amount until get negative response} no {bid downward by _____ amount until get positive response} $ _____ {final amount}	55 56 57 58	59 60 61 62

C18. Is $ _____ {final amount} the most you would be willing to pay, to continue to enjoy lake trout/lake sturgeon under present conditions?

yes {move on to C19. explanation}

no {repeat bidding process C17. and C18.}

{C19. Explanation}
Now, I'd like you to think about part II of this card, and what guaranteed future enjoyment of lake trout/lake sturgeon is worth to you, in addition to the value you just gave me. Remember, this is like an insurance policy or a guarantee.

C19. In addition to the amount you gave me before, would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to ensure the guaranteed future availability of lake trout/lake sturgeon for your enjoyment?

yes {continue bidding upward by _____ amount until get negative response}

no {bid downward by _____ amount until get positive response}

$ _____ {final amount}

	L. Trout	L. Sturgeon
C20. Is $ _____ {final amount} the most you would be willing to pay, to guarantee the future availability of lake trout/lake sturgeon for your enjoyment? yes {move on to C23. explanation} no {repeat bidding process C19. & C20.}		
{C21. Explanation} Since you are not presently enjoying lake trout/lake sturgeon, part I of Card 1 does not apply to you. I'd like you to think about part II of Card 1, and what your guaranteed future enjoyment is worth to you. Remember, this is similar to an insurance policy. I'm going to use a bidding process to find out what your maximum willingness to pay is.		
C21. Would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to ensure your possible future enjoyment of lake trout/lake sturgeon? yes {continue bidding up by _____ amount until get negative response} no {bid downward by _____ amount until get positive response} $ _____ {final amount}	___ ___ ___ ___ 63 64 65 66	___ ___ ___ ___ 67 68 69 70
C22. Is $ _____ {final amount} the most you would be willing to pay to guarantee the future availability of lake trout/lake sturgeon for your enjoyment? yes {move on to C23. explanation} no {repeat bidding process C21. and C22.}		
{C23. Explanation} Lastly, I'd like you to think about part III of Card 1, and what lake trout/lake sturgeon are worth to you even though you may never enjoy them in the future.	Card # 2 76	Interview # ___ ___ ___ 78 79 80

	L. Trout	L. Sturgeon
C23. In addition to the amounts you gave me before, would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to know that lake trout/lake sturgeon will exist in the future even if you were never to enjoy them directly?		
yes {continue bidding up by _____ amount until get negative response}		
no {continue downward by _____ amount until get positive response}		
$ _____ {final amount}	___ ___ ___ ___ (1 2 3 4)	___ ___ ___ ___ (5 6 7 8)
C24. Is $ _____ {final amount} the most you would be willing to pay to assure their existence under present conditions?		
yes		
no {repeat bidding process C23. and C24.}		
{Repeat Section C2. for other fish species}		

C25. How accurate do you feel your responses were to the money questions?

1. fairly accurate
2. wild guesses

___ (9)

D. DEMOGRAPHIC INFORMATION

I have just a few more questions that will help me analyze the results of this study properly. These questions are somewhat personal and will be completely confidential, as will all of your earlier answers.

D1. Sex {should be obvious}

1. male
2. female

___ (10)

D2. {Give Card 2} Would you tell me which category includes your age?

1. 18-19
2. 20-29
3. 30-39
4. 40-49 11
5. 50-59
6. 60-69
7. 70 or older

D3. Are you presently:

1. single
2. married 12

D4. {Give Card 3} Would you tell me which category corresponds to the last grade of school you have completed?

1. elementary school
2. some high school
3. high school graduate
4. some college 13
5. college graduate
6. some graduate school
7. graduated professional or graduate school

D5. Are you presently:

1. employed full-time (36 hrs or more)
2. employed part time (less than 36 hours)
3. unemployed - looking for full-time work 14
4. not employed - not looking for full-time work

D6. Briefly, what is your present occupation?

_____

_____ 15 16

D7. Do you consider yourself an urban or rural resident?

1. urban
2. rural 17

D8. {Give Card 4} Here is a list of income categories. Would you please tell me which category corresponds to your total annual household income before taxes?

1. below $10,000
2. $10,000 - 19,999
3. $20,000 - 29,999
4. $30,000 - 39,999 18
5. $40,000 - 49,999
6. $50,000 - 59,999
7. Above $60,000

Card # Interview

3
76 78 79 80

APPENDIX A2

Personal Interview Visual Aids

CARD 1

Why We Might Value Wildlife and Fish

I. **VALUE OF USE**

***Use/Interaction With in the Present and Future**

***To enjoy viewing or interacting with**

***To hunt for game species**

***To fish for**

***To eat**

II. **VALUE OF GUARANTEED AVAILABILITY**

***Guaranteed Future Availability for Use**

***To guarantee that the animal or fish will be around in the future for your possible use and/or enjoyment**

***Like an insurance policy or guarantee.**

III. **VALUE OF EXISTENCE**

***Knowledge of Existence**

***Satisfaction from knowing the species exists.**

***Satisfaction from knowing others might be able to enjoy the species now or in the future.**

***To preserve for future generations.**

Note: These three values are separate and additive.
That is, TOTAL VALUE = VALUE I + VALUE II + VALUE III

CARD 2

Age Categories

Categories	Age Range
1.	18-19
2.	20-29
3.	30-39
4.	40-49
5.	50-59
6.	60-69
7.	70 or older

CARD 3

Education Completed

Category	Education
1.	Elementary school
2.	Some high school
3.	High school graduate
4.	Some college
5.	College graduate
6.	Some graduate school
7.	Graduate professional or graduate school

CARD 4

Income Categories

Category	Income Range
1.	below $10,000
2.	$10,000 - 19,999
3.	$20,000 - 29,999
4.	$30,000 - 39,999
5.	$40,000 - 49,999
6.	$50,000 - 59,999
7.	Above $60,000

APPENDIX A3

Personal Interview Letter

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF FISHERIES AND WILDLIFE
NATURAL RESOURCES BUILDING
(517) 355-4477

EAST LANSING • MICHIGAN • 48824

Dear Ingham County Resident:

Your name has been selected at random from a list of county residents to possibly participate in a survey sponsored by Michigan State University.

We are doing a study to determine individuals' values for certain wildlife species. This project is unique and has never been attempted before in this manner. The purpose of this research is to provide public and private policy makers with useful economic information on wildlife species that traditionally have not had market values.

To get this information, your help is critical. You have been chosen as one of the individuals to represent Ingham County. We are asking that you participate in a personal interview survey. Your identity and answers would be completely confidential.

A researcher will phone within the next few days to arrange an appointment with you at your convenience. Your participation in this study is totally voluntary, but your help would be greatly appreciated!

Sincerely,

Daniel R. Talhelm
Assistant Professor
Fisheries and Wildlife
Economics

Heidi Grether
Research Assistant

APPENDIX B1

Bird Telephone Interview
Questionnaire

Telephone Survey

Hello, my name is _____ from Michigan State University. We are conducting a survey to determine Ingham/Bay County residents' values for certain wildlife species.

Your phone number was randomly generated for the purposes of this study, only. The questions I would ask take approximately _____ minutes, and your responses are completely confidential.

Would you be willing to help us by practicipating in this survey?

yes {continue on}

yes, but not now {arrange for time to call back & note at top}

no: Thank you for your time.

Are you 18 years old or older?

yes {continue}

no: May I speak with someone 18 years old or older?

yes {start at beginning}

no: Thank you for your time.

Are you a resident of Ingham/Bay County?

yes {continue}

no: Thank you for your time.

A. RECREATION PARTICIPATION

The first group of questions I'm going to ask deal with your participation in natural resource activities. We would like to get a general idea of your present wildlife interests.

A1. I'm going to list a number of outdoor recreation activities. I would like you to tell me, yes or no, if you have participated in any of these activities during the last 12 months.

yes = 1
no = 0

1. Fishing ___ 1
2. Hunting ___ 2
3. Boating or Canoeing ___ 3
4. Camping ___ 4
5. Hiking, Backpacking or Walking for pleasure ___ 5
6. Driving for pleasure ___ 6
7. Outdoor photography ___ 7
8. Wildlife observation or Bird watching ___ 8
9. Other unorganized outdoor activities ___ 9 ___ 10

(list) _____ ___ 11 ___ 12

A2. Do you presently belong to any environmental, natural resources or sportsmen's organizations?

yes {go to A3.}

no {go to A4.} ___ 13

A3. What are the names of the organizations?

list _____ ___ 14

_____ ___ 15

_____ ___ 16

_____ ___ 17

_____ ___ 18

A4. Have you, in the past 12 months, donated money (other than membership dues) or volunteered time to any environmental or nature resource organization or cause?

yes Explain _____

no

A5. How often do you watch wildlife-related programs on TV?

1. Never
2. Rarely (once or twice a year)
3. Occasionally (3 to 9 times a year)
4. Often (10 or more times a year)

B. PAST EXPERIENCES: BIRDS

The following group of questions are about your past experiences with wildlife.

B1. Have you ever seen a bald eagle/sea gull in the wild, that is, not in a zoo or in captivity?

yes {go to B2.}

no {go to B7.}

B2. How many times have you seen a bald eagle/sea gull in your lifetime?

1. Once or twice
2. 3 to 9 times
3. 10 or more times

B3.1. Have you seen or tried to see a bald eagle/sea gull in the past 12 months?

yes {go to B3.2}

no {go to next section}

2. Did you make a special effort, or go out of your way to see them?

yes {go to B4.}

no {go to B6.}

B4. Can you tell me approximately:

1. how many trips you took in the past 12 months when you went out of your way to see bald eagles/sea gulls? _____ (number)

2. How much extra, on average, did that cost you? (Include gas, mileage, equipment and other) _____ (amount)

B5. How much extra time did that take?

_____ (Hours)

B6. Did the experience of seeing a bald eagle/sea gull enhance your trip or your enjoyment of that day?

yes

no

B7. Do you have a desire to see a bald eagle/sea gull in your lifetime?

yes

no

C. VALUE MEASURES: USERS (BIRD)

There are three (3) ways I would like you to think about your values related to bald eagles/sea gulls.

{C1. Explanation}
The first way is concerned with your present and future use of bald eagles/ sea gulls. I'd like you to think about how important enjoying bald eagles/ sea gulls is to you.

C1. How important is it to you to see and enjoy bald eagles/sea gulls?

1. **very important**
2. **moderately important**
3. **not important at all**

{C2. Explanation}
The second way of thinking about your value of bald eagles/sea gulls is like an insurance policy: guaranteeing you that bald eagles/sea gulls will be available in the future.

In addition to how important enjoying bald eagles/sea gulls is to you, I'd like you to consider how important a guarantee of future enjoyment of them is worth to you.

C2. In addition to the value you just gave me, how important is it to you that your future enjoyment of bald eagles/sea gulls will be guaranteed? In other words, how important is the guarantee, by itself?

1. **very important**
2. **moderatley important**
3. **not important at all**

{C3. Explanation}
Lastly, you may value bald eagles/sea gulls by just knowing they exist, even though you may never see or enjoy them yourself. You may also gain satisfaction from knowing others may enjoy bald eagles/sea gulls, or you may value them so they can be preserved for future generations.

C3. In addition to your other values, how important is it to you to know that bald eagles/sea gulls will exist in the future, even though you may never see or enjoy them?

1. very important
2. moderately important
3. not important at all

As you know, we all pay for government sponsored programs and facilities through taxes and/or user fees. And, obviously, we pay for private programs and services through prices, memberships and donations.

Now, I'd like you to think about what amount of money you would be willing to pay each year, to ensure that the types of situations I just asked about would exist. The form of payment would be either 1) voluntary contributions, 2) increased taxes paid to the state, or 3) user fees, such as licenses or entry permits. In each case, the money would go directly to projects supporting each species only; not to any other kinds of projects or other species. This would be the same as thinking in terms of a voluntary organization set up just for this purpose, since we know exactly what the money would be used for. Remember, though, if people aren't willing to adequately support a program, it won't be done.

{C4. Explanation}
First, I'd like you to think about what your enjoyment of bald eagles/sea gulls is worth to you right now.

I'm going to use a bidding process to find out your maximum willingness to pay.

C4. Would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to be able to continue to enjoy bald eagles/sea gulls as you can now?

yes {continue bidding up by _____ amount until get negative response}

no {bid downward by _____ amount until get positive response}

$ _____ {final amount}

C5. Is $ _____ {final amount} the most you would be willing to pay, to continue to enjoy bald eagles/sea gulls, under present conditions?

yes {move on to C6. explanation}

no {repeat bidding process C4. and C5.}

{C6. Explanation}
Now, I'd like you to think about what the guarantee future enjoyment of bald eagles/sea gulls is worth to you, in addition to the value you just gave me. Remember, this is like an insurance policy or a guarantee.

C6. In addition to the amount you gave before, would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to ensure the guaranteed future availability of bald eagles/sea gulls for your enjoyment?

yes {continue bidding up by _____ amount until get negative response}

no {bid downward by ____ amount until get postive response}

$ _____ {final amount}

C7. Is $ _____ {final amount} the most you would be willing to pay, to guarantee the future availability of bald eagles/sea gulls for your enjoyment?

yes {move to C8. explanation}

no {repeat bidding process C6. and C7.}

{C8. Explanation}
Lastly, I'd like you to think about what bald eagles/sea gulls are worth to you even though you may never see them in the future, or what they are worth to you to preserve for others or future generations to enjoy.

C8. In addition to the amounts you gave me before, would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to know that bald eagles/sea gulls will exist in the future even if you were never to see them?

yes {continue bidding up by _____ amount until get negative response}

no {bid downward by _____ amount until get positive response}

$ _____ {final amount}

C9. Is $ _____ {final amount} the most you would be willing to pay, to assure their existence under present conditions?

yes

no {repeat bidding process C8. and C9.}

C10. How accurate do you feel your responses were to the money questions?

1. fairly accurate

2. wild guesses

- 8 -

C. VALUE MEASURES: NON-USERS (BIRD)

There are two (2) ways I would like you to think about your values related to bald eagles/sea gulls.

{C1. Explanation}
One way of valuing bald eagles/sea gulls is like an insurance policy: assuring you that they will be available in the future. You are not presently enjoying bald eagles/sea gulls, but you could decide to in the future.

Now, I'd like you to think about how important it is to you to know bald eagles/sea gulls will be guaranteed to exist for your possible use and enjoyment in the future.

C1. How important is it to you that bald eagles/sea gulls will be guaranteed available for your possible enjoyment in the future?

1. very important
2. moderately important
3. not important at all

{C2. Explanation}
Another way you may value bald eagles/sea gulls is by just knowing they exist, even though you may never see or enjoy them yourself. You may also gain satisfaction from knowing others may enjoy bald eagles/sea gulls, or you may value them so they can be perserved for future generations.

C2. In addition to your other value, how important is it to you just to know that bald eagles/sea gulls will exist in the future, even though you may never see or enjoy them?

1. very important
2. moderately important
3. not important at all

As you probably know, we all pay for government sponsored programs and facilities through taxes and/or user fees. And, obviously, we pay for private programs and services through prices, memberships and donations.

Now, I'd like you to think about what amount of money you would be willing to pay each year, to ensure that the types of situations I just asked about would exist. The form of payment would be either 1) voluntary contributions, 2) increased taxes paid to the state, or 3) user fees, such as licenses or entry permits. In each

case, the money would go directly to projects supporting each species only; not to any other kinds of projects or other species. This would be the same as thinking in terms of a voluntary organization set up just for this purpose, since we know exactly what the money would be use for. Remember, though, if people aren't willing to adequately support a program, it won't be done.

{C3. Explanation}
I'd like you to think about what your guaranteed future enjoyment of bald eagles/sea gulls is worth to you. Remember, this is similar to an insurance policy. I'm going to use a bidding process to find out what your maximum willingness to pay is.

C3. Would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to ensure the guaranteed future availability of bald eagles/sea gulls for your enjoyment?

yes {continue bidding yp by _____ amount until get negative response}

no {bid downward by _____ amount until get positive response}

$ _____ {final amount}

C4. Is $ _____ {final amount} the most you would be willing to pay, to guarantee the future availability of bald eagles/sea gulls for your enjoyment?

yes {go to C5. explanation}

no {repeat bidding process C3. and C4.}

{C5. Explanation}
Lastly, I'd like you to think about what bald eagles/sea gulls are worth to you even though you may never see or enjoy them in the future, or what they are worth to you to preserve for others or future generations to enjoy.

C5. In addition to the amount you gave me before, would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to know that bald eagles/sea gulls will exist in the future even if you were never to see them?

yes {continue bidding up by _____ amount until get negative response}

no {bid downward by _____ amount until get positive response}

$ _____ {final amount}

C6. If $ _____ {final amount} the most you would be willing to pay, to assure their existence under present conditions?

yes

no {repeat bidding process C5. and C6.}

C7. How accurate do you feel your responses were to the money questions?

1. farily accurate

2. wild guesses

D. DEMOGRAPHIC INFORMATION

I have just a few more questions that will help me analyze the results of this study properly. These questions are somewhat personal and will be completely confidential, as will all of your earlier answers.

D1. Are you: (ask only is unsure)

1. male
2. female

D2. Are you over:

1. 18 (18 - 19)
2. 20 (20 - 29)
3. 30 (30 - 39)
4. 40 (40 - 49)
5. 50 (50 - 59)
6. 60 (60 - 69)
7. 70 (70 or older)

D3. Are you:

1. single
2. married

D4. What is the last grade of school you have completed?

1. elementary school
2. some high school
3. high school graduate
4. some college
5. college graduate
6. some graduate school
7. graduated professional or graduate school

D5. Are you presently:
(Read categories)

1. employed full-time (36 hrs or more)
2. employed part time (less than 36 hours)
3. unemployed - looking for full-time work
4. none employed - not looking for full-time work

D6. Briefly, what is your present occupation?

_____

_____

D7. Do you consider yourself an urban or rural resident?

1. urban
2. rural

D8. Is your total annual household income before taxes above:

1. $60,000 (Above $60,000)
2. $ 50,000 ($50,000 - $59,999)
3. $40,000 ($40,000 - $49,999)
4. $30,000 ($30,000 - $39,999)
5. $20,000 ($20,000 - $29,999)
6. $10,000 ($10,000 - $19,999)
7. don't know
8. refused

That completes the survey. I want to thank you for participating in this study, we really appreciate your help.

If you're interested in the outcome of this research I can take your address and send you the results. (Pause) Again, thanks for your time.

Good-bye.

APPENDIX B2

Fish Telephone Interview
Questionnaire

Telephone Survey

Hello, my name is _____ from Michigan State University. We are conducting a survey to determine Ingham/Bay County residents' values for certain wildlife species.

Your phone number was randomly generated for the purposes of this study, only. The questions I would ask take approximately _____ minutes, and your responses are completely confidential.

Would you be willing to help us by practicipating in this survey?

yes {continue on}

yes, but not now {arrange for time to call back & note at top}

no: Thank you for your time.

Are you 18 years old or older?

yes {continue}

no: May I speak with someone 18 years old or older?

yes {start at beginning}

no: Thank you for your time.

Are you a resident of Ingham/Bay County?

yes {continue}

no: Thank you for your time.

A. RECREATION PARTICIPATION

The first group of questions I'm going to ask deal with your participation in natural resource activities. We would like to get a general idea of your present wildlife interests.

A1. **I'm going to list a number of outdoor recreation activities. I would like you to tell me, yes or no, if you have participated in any of these activities during the last 12 months.** yes = 1, no = 0

1. **Fishing** ___ 1
2. **Hunting** ___ 2
3. **Boating or Canoeing** ___ 3
4. **Camping** ___ 4
5. **Hiking, Backpacking or Walking for pleasure** ___ 5
6. **Driving for pleasure** ___ 6
7. **Outdoor photography** ___ 7
8. **Wildlife observation or Bird watching** ___ 8
9. **Other unorganized outdoor activities** ___ 9 ___ 10

   (list) _____ ___ 11 ___ 12

A2. **Do you presently belong to any environmental, natural resources or sportsmen's organizations?**

yes {go to A3.}

no {go to A4.} ___ 13

A3. **What are the names of the organizations?**

list _____ ___ 14

_____ ___ 15

_____ ___ 16

_____ ___ 17

_____ ___ 18

A4. Have you, in the past 12 months, donated money (other than membership dues) or volunteered time to any environmental or natural resource organization or cause?

yes Explain _____

no

A5. How often do you watch wildlife-related programs on TV?

1. Never
2. Rarely (once or twice a year)
3. Occasionally (3 to 9 times a year)
4. Often (10 or more times a year)

B. PAST EXPERIENCES: FISH

The following group of questions are about your past experiences with fish.

B1. Have you ever fished for lake trout/lake sturgeon?

yes {go to B2.}

no {go to B3.}

B2. Can you tell me approximately:

1. how many trips you took in the last 12 months to fish for lake trout/lake sturgeon? _____ (number)
2. how much, on the average, each of these trips cost you? _____ (amount) (Include gas, mileage, equipment and other.)

{go to B5.}

B3. Have you ever gone with anyone who fished for lake trout/lake sturgeon?

yes {go to B4.}

no {go to B5.}

B4. Can you tell me approximately:

1. how many of these trips you took in the last 12 months when someone fished for lake trout/lake sturgeon? _____ (number)

2. how much, on the average, each trip cost you? _____ (amount) (Include gas, mileage, equipment and other.)

{go to next part}

B5. Have you ever eaten lake trout/lake sturgeon?

yes {go to next part}

no {go to B6.}

B6. Have you ever seen lake trout/lake sturgeon in fish hatcheries, or in the wild, or in aquariums?

yes {go to B7.}

no {go to next part}

B7. Did you go out of your way to make a special effort to see them?

yes {go to B8.}

no {go to next part}

B8. Can you tell me approximately:

1. how many of these trips you took in the last 12 months? _____ (number)

2. how much, on average, did that cost you? _____ (amount) (Include gas, mileage, equipment and other.)

C. VALUE MEASURES: USERS (FISH)

There are three (3) ways I would like you to think about your values related to lake trout/lake sturgeon.

{C1. Explanation}
The first way is concerned with your present and future use of lake trout/lake sturgeon. I'd like you to think about how important enjoying lake trout/lake sturgeon is to you.

C1. How important is it to you to be able to fish for and/or eat lake trout/lake sturgeon?

1. very important
2. moderately important
3. not important at all

{C2. Explanation}
The second way of thinking about your value of lake trout/lake sturgeon is like an insurance policy: guaranteeing you that lake trout/lake sturgeon will be availabe in the future.

In addition to how important enjoying lake trout/lake sturgeon is to you, I'd like you to consider how important a guarantee of future enjoyment of them is worth to you.

C2. In addition to the value you just gave me, how important is it to you that your future enjoyment of lake trout/lake sturgeon will be guaranteed? In other words, how important is the guarantee, by itself?

1. very important
2. moderately important
3. not important at all

{C3. Explanation}
Lastly, you may value lake trout/lake sturgeon by just knowing they exist, even though you may never see or enjoy them yourself. You may also gain satisfaction from knowing others may enjoy lake trout/lake sturgeon, or you may value them so they can be preserved for future generations.

C3. In addition to your other values, how important is it to you just to know that lake trout/lake sturgeon will exist in the future, even though you may never enjoy them directly?

1. very important
2. moderately important
3. not important at all

As you probably know, we all pay for government sponsored programs and facilities through taxes and/or user fees. And, obviously, we pay for private programs and services through prices, memberships and donations.

Now, I'd like you to think about what amount of money you would be willing to pay each year, to ensure that the types of situations I just asked about would exist. The form of payment would be either 1) voluntary contributions, 2) increased taxes paid to the state, or 3) user fees, such as licenses or entry permits. In each case, the money would go directly to projects supporting each species only; not to any other kinds of projects or other species. This would be the same as thinking in terms of a voluntary organization set up just for this purpose, since we know exactly what the money would be used for. Remember, though, if people aren't willing to adequately support a program, it won't be done.

{C4. Explanation}
First, I'd like you to think about what your enjoyment (or fishing and eating) of lake trout/lake sturgeon is worth to you. I'm going to use a bidding process to find out what your maximum willingness to pay is.

C4. Would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to be able to eat and/or fish for lake trout/lake sturgeon whenever you wanted to?

yes {continue bidding up by _____ amount until get negative response}

no {bid downward by _____ amount until get positive response}

$ _____ {final amount}

C5. Is $ _____ {final amount} the most you would be willing to pay, to continue to enjoy lake trout/lake sturgeon, under present conditions?

yes {move on to C6. explanation}

no {repeat bidding process C4. and C5.}

{C6. Explanation}
Now, I'd like you to think about what guaranteed future enjoyment of lake trout/ lake sturgeon is worth to you, in addition to the value you just gave me. Remember, this is like an insurance policy or a guarantee.

C6. In addition to the amount you gave me before, would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to ensure the guaranteed future availability of lake trout/lake sturgeon for your enjoyment?

yes {continue bidding upward by _____ amount until get negative response}

no {bid downward by _____ amount until get positive response}

$ _____ {final amount}

C7. Is $ _____ {final amount} the most you would be willing to pay, to guarantee the future availability of lake trout/lake sturgeon for your enjoyment?

yes {move on to C8. explanation}

no {repeat bidding process C6. and C7.}

{C8. Explanation}
Lastly, I'd like you to think about what lake trout/lake sturgeon are worth to you even though you may never enjoy them in the future, or what they are worth to you to preserve for others or future generations to enjoy.

C8. In addition to the amount you gave me before, would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to know that lake trout/lake sturgeon will exist in the future even if you were never to enjoy them directly?

yes {continue bidding up by _____ amount until get negative response}

no {continue downward by _____ amount until get positive response}

$ _____ {final amount}

C9. Is $ _____ {final amount} the most you would be willing to pay to assure their existence under present conditions?

yes

no {repeat bidding process C8. and C9.}

C10. How accurate do you feel your responses were to the money questions?

1. fairly accurate

2. wild guesses

C. VALUE MEASURES: NON-USERS (FISH)

There are two (2) ways I would like you to think about your values related to lake trout/lake sturgeon.

{C1. Explanation}
One way of valuing lake trout/lake sturgeon is similar to an insurance policy: assuring you that they will be available in the future. You are not presently fishing for or eating lake trout/lake sturgeon, but you may want to do so in the future.

Now, I'd like you to think about how important it is to you to know lake trout/lake sturgeon will be guaranteed to exist for your possible use and enjoyment in the future.

C1. How important is it to you that lake trout/lake sturgeon will be guaranteed available in the future for you to possibly fish for or for eating?

1. very important
2. moderately important
3. not important at all

{C2. Explanation}
Another way you may value lake trout/lake sturgeon by just knowing they exist, even though you may never see or enjoy them yourself. You may also gain satisfaction from knowing others may enjoy lake trout/lake sturgeon, or you may value them so they can be preserved for future generations.

C2. In addition to the value you just gave me, how important is it to you just to know that lake trout/lake sturgeon will exist in the future, even though you may never enjoy them directly?

1. very important
2. moderately important
3. not important at all

As you probably know, we all pay for government sponsored programs and facilities through taxes and/or user fees. And, obviously, we pay for private programs and services through prices, memberships and donations.

Now, I'd like you to think about what amount of money you would be willing to pay each year, to ensure that the types of situations I just asked about would exist. The form of payment would be either 1) voluntary contributions, 2) increased

taxes paid to the state, or 3) user fees, such as license or entry permits. In each case, the money would go directly to projects supporting each species only; not to any other kinds of proejcts or other species. This would be the same as thinking in terms of a voluntary organization set up just for this purpose, since we know exactly what the money would be used for. Remember, though, if people aren't willing to adequately support a program, it won't be done.

{C3. Explanation}
I'd like you to think about what your guaranteed future enjoyment of lake trout/lake sturgeon is worth to you. Remember, this is similar to an insurance policy. I'm going to use a bidding process to find out what your maximum willingness to pay is.

C3. Would you be willing to contribute $ _____ extra each year in voluntary cotributions, higher taxes or user fees, to ensure the guaranteed future availability of lake trout/lake sturgeon for your enjoyment?

yes {continue bidding up by _____ amount until get negative response}

no {bid downward by _____ amount until get positive response}

$ _____ {final amount}

C4. Is $ _____ {final amount} the most you would be willing to pay to guarantee the future availability of lake trout/lake sturgeon for your future enjoyment?

yes {move on to C5. explanation}

no {repeat bidding process C3. and C4.}

{C5. Explanation}
Lastly, I'd like you to think about what lake trout/lake sturgeon are worth to you even though you may never enjoy them in the future, or what they are worth to you to preserve for others or future generations to enjoy.

C5. In addition to the amounts you gave me before, would you be willing to contribute $ _____ extra each year in voluntary contributions, higher taxes or user fees, to know that lake trout/lake sturgeon will exist in the future even if you were never to enjoy them directly?

yes {continue bidding up by _____ amount until get negative response}

no {continue downward by _____ amount until get postive response}

$ _____ {final amount}

C6. Is $ _____ {final amount} the most you would be willing to pay to assure their existence under present conditions?

yes

no {repeat bidding process C5. and C6.}

C7. How accurate do you feel your responses were to the money questions?

1. fairly accurate

2. wild guesses

D. DEMOGRAPHIC INFORMATION

I have just a few more questions that will help me analyze the results of this study properly. These questions are somewhat personal and will be completely confidential, as will all of your earlier answers.

D1. Are you: (ask only is unsure)

1. **male**
2. **female**

D2. Are you over:

1. **18 (18 - 19)**
2. **20 (20 - 29)**
3. **30 (30 - 39)**
4. **40 (40 - 49)**
5. **50 (50 - 59)**
6. **60 (60 - 69)**
7. **70 (70 or older)**

D3. Are you:

1. **single**
2. **married**

D4. What is the last grade of school you have completed?

1. **elementary school**
2. **some high school**
3. **high school graduate**
4. **some college**
5. **college graduate**
6. **some graduate school**
7. **graduated professional or graduate school**

D5. Are you presently:
(Read categories)

1. employed full-time (36 hrs or more)
2. employed part time (less than 36 hours)
3. unemployed - looking for full-time work
4. none employed - not looking for full-time work

D6. Briefly, what is your present occupation?

_____

_____

D7. Do you consider yourself an urban or rural resident?

1. urban
2. rural

D8. Is your total annual household income before taxes above:

1. $60,000 (Above $60,000)
2. $ 50,000 ($50,000 - $59,999)
3. $40,000 ($40,000 - $49,999)
4. $30,000 ($30,000 - $39,999)
5. $20,000 ($20,000 - $29,999)
6. $10,000 ($10,000 - $19,999)
7. don't know
8. refused

That completes the survey. I want to thank you for participating in this study, we really appreciate your help.

If you're interested in the outcome of this research I can take your address and send you the results. (Pause) Again, thanks for your time.

Good-bye.

APPENDIX C1

Bay County Population and Telephone Survey

Distribution

LOCATIONS	% POPULATION OF BAY CO.	APPROPRIATE NO. RESPONSES NEEDED
Metro Bay City (includes: Bay City, Monitor twp., Bangor twp., Essexville, Hampton twp., Portsmouth twp., Frankenlust twp., Merritt twp.)	78	24
Auburn	5	2
Linwood	4	2
Pinconning Area (includes: Beaver twp., Garfield twp., Fraser twp., Mt. Forest twp., Gibson twp., Pinconning, Pinconning twp.)	13	4
TOTAL	100%	30

APPENDIX C2

Ingham County Population and Telephone Survey

Distribution

LOCATIONS	% POPULATION OF INGHAM CO.	APPROXIMATE NO. RESPONSES NEEDED
Metro Lansing (includes Lansing, E. Lansing, Okemos, Haslett)	77	93
Dansville	2	3
Holt	6	7
Mason	4	5
Onondaga/Aurelius	2	3
Williamston	3	4
Webberville	2	3
Stockbridge	2	3
Leslie	2	3
TOTAL	100%	124

APPENDIX D

Selected 1980 Census Data for

Bay and Ingham counties

VARIABLES		BAY CO.	INGHAM CO.
SEX	Male	47.6%	47.6%
	Females	52.4%	52.4%
AGE	20-29	27.1%	40.0%
	30-39	20.1%	40.0%
	40-49	15.1%	12.0%
	50-59	15.7%	11.4%
	60-69	12.0%	8.2%
	70 and over	10.0%	7.5%
EDUCATION	Elementary school	19.4%	9.7%
	Some high school	16.2%	12.3%
	High School graduate	40.9%	33.0%
	Some college	14.6%	19.1%
	College graduate	5.0%	11.1%
	Beyond college grad.	3.9%	14.9%

INCOME	Below $10,000	27.3%	26.0%
	10,000 to 19,999	12.1%	29.1%
	20,000 to 49,999	43.8%	40.5%
	50,000 and over	3.6%	4.4%

APPENDIX E

Participants' Occuptation by Category

RETIRED

BAY SURVEY (0)

INGHAM SURVEY (11)

PERSONAL SURVEY (12)

STUDENT

BAY SURVEY (1)

INGHAM SURVEY (18)

PERSONAL SURVEY (2)

HOMEMAKER

BAY SURVEY (4)

INGHAM SURVEY (4)

PERSONAL SURVEY (0)

SEMI-SKILLED OR APPRENTICE CRAFTSMAN

BAY SURVEY
railroad worker (1)

INGHAM SURVEY
server (2)
warehouse worker (1)
heavy equipment operator (1)
assembly line worker (1)
lunch supervisor (1)
nursing attendant (1)

UPS driver (1)
hospital worker (1)
baby sitter (1)
janitor (1)
grocery clerk (1)
TV repair/newspaper circulator (1)
maintenace supervisor (1)
city worker (1)
oil factory worker (1)

PERSONAL SURVEY
lunch supervisor (1)
cable TV technician (1)
janitor (1)

SALES, CLERICAL OR OFFICE WORKER

BAY SURVEY
medical transcriber (1)

INGHAM SURVEY
sales clerk (2)
secretary (5)
bookkeeper (3)
clerk (3)
loan officer (1)
receptionist (2)
fast food employee (1)
bank teller (1)
cashier (1)

PERSONAL SURVEY
accounts payable clerk (1)
administrative assistant (1)
bookkeeper (1)
clerk (1)
sales clerk (1)

SKILLED WORKER, CRAFTSMAN OR FOREMAN

BAY SURVEY
carpenter (1)
farmer (1)
skilled tradesman (1)
mechanic (1)

INGHAM SURVEY
engraver (1)
carpenter (1)
marketing representative (1)
school food service representative (1)
Olds supervisor
customer service representative (1)
dental assistant (1)
insurance coordinator (1)
billing coordinator (1)
GM employee (1)
pre-school teacher (1)
job coordinator (1)
mechanic (1)
sound engineer (1)
computer programmer/operator (1)
dairy farmer (1)

PERSONAL SURVEY
journeyman painter (1)
plumber (1)
interior designer (1)
tax service representative (1)

MANAGER OR PROPRIETOR

BAY SURVEY
assistant manager (1)
manager (1)
self employed (2)

INGHAM SURVEY
restaurant manager (1)
church executive (1)
personnel administration (1)
owns business (2)
banker (1)

PERSONAL SURVEY
lobbyist & association director (1)
association director (1)
insurance executive/owner (1)
librarian (1)
personal director (1)

APPENDIX F1

Organizations That Participants
Belonged To

BAY SURVEY

LEARNING AND ENJOYING
- Explorer group
- National Wildlife Federation
- Houghton Lake Association
- Yacht Club

HUNTING AND/OR FISHING
- Trout Unlimited/Ducks Unlimited

INGHAM SURVEY

LEARNING AND ENJOYING
- Woldumar Nature Center
- 4-H
- Michigan Out-of-Doors
- National Wildlife Federation
- Fenner Arboretum
- International Wildlife
- Michigan Garden Club
- Michigan Natural Resources
- National Geographic
- Save the Whales
- Greenpeace
- E. Lansing Bike Club

ENVIRONMENTAL ADVOCACY
- Cycle Conservation Club
- Audubon
- Michigan United Conservation Clubs

HUNTING AND/OR FISHING
- Okemos Sportsmen's Organization
- National Rifle Association

PROFESSIONAL
- Natural Botanical Society
- New York Zoological Society

PROFESSIONAL OR TECHNICAL

BAY SURVEY
teacher (1)
engineer (1)
director, special ed. programs (1)
professional fundraiser (1)

INGHAM SURVEY
HS athletic director (1)
nurse (3)
chiropractor (1)
special ed. teacher (1)
police officer (1)
librarian (1)
professor (4)
teacher (4)
engineer (1)
case worker (1)
company president (1)
labor relations director (1)

PERSONAL SURVEY
attorney (1)
professor (1)
education researcher (1)
teacher (5)
architect (1)

APPENDIX F2

Organizations That Participants Donated Money or Volunteered Time To

BAY SURVEY

Explorer Groups
National Wildlife Federation
Ducks Unlimited/Trout Unlimited

INGHAM SURVEY

Michigan Outdoors
Woldumar Nature Center
Federation for Wildlife
Audubon
4-H
Wildlife Society
Time for Salmon
Fenner Aurboretum
National Wildlife Federation
Okemos park

PERSONAL SURVEY

Red Cedar Fly Fisherman's Club
Woldemar Nature Center
Boy Scout
Audubon

LEARNING AND ENJOYING
Boy Scouts
Michigan Out-of-Doors

HUNTING AND/OR FISHING
National Rifle Association

LITERATURE CITED

LITERATURE CITED

Bishop, R. C. 1982. "Option Value: An Exposition and Extension". Land Econ. 58:1-15.

_____ and Heberlein, T. A. 1979. "Measuring Values of Extramarket Goods: Are Indirect Measures Biased"? Am. J. Ag. Econ. 61:926-930.

_____, _____ and Kealy, M. J. 1983. "Contingent Valuation of Environmental Assets: Comparisons with a Simulated Market". Nat. Res. J. 23:619-633.

Boadway, R. W. 1979. Public Sector Economics. Winthrop Publishers, Cambridge, MA. pp. 31-32.

Bohm, P. 1972. "Estimating Demand for Public Goods: An Experiment". Europ. Econ. Rev. 3:111-130.

_____. 1975. "Option Demand and Consumer's Surplus: Comment". Am. Econ. Rev. 65:733-736.

Brookshire, D. S., Ives, B. C. and Schulze, W. D. 1976. "The Valuation of Aesthetic Preferences". J. of Envir. Econ. and Mgmt. 3:325-346.

_____, Randall, A., d'Arge, R. C., Eubanks, L. S., Stoll, J. R., Crocker, T. D. and Johnson, S. 1977. Methodological Experiments in Valuing Wildlife Resources: Phase I". Interim Report to U.S. Fish and Wildlife Service. pp. 140.

_____, _____, and Stoll, J. R. 1980. "Valuing Increments and Decrements in Natural Resource Service Flows". Am. J. Ag. Econ. 62:478-488.

_____ and Crocker, T. D. 1981. "The Advantages of Contingent Valuation Methods for Benefit-Cost Analysis". Public Choice 36:235-252.

_____, Eubanks, L. S. and Randall, A. 1982. "Estimating Option Prices and Existence Values for Wildlife Resources". Land Econ.

Bureau of Census. 1980. Census, General Social and Economic Characteristics: Michigan. Washington, D.D., U.S. Department of Commerce.

Byerlee, D. R. 1971. "Option Demand and Consumer's Surplus: Comment". Quart. J. of Econ. 85:523-527.

Cicchetti, C. J. and Freeman, A. M., III. 1971. "Option Demand and Consumer's Surplus: Further Comment". Quart. J. Econ. 85:528-539.

Freeman, A. M., III. 1979. The Benefits of Environmental Improvement. Baltimore, Resources for the Future by Johns Hopkins Univ. Press. pp. 272.

Lindsay, C. M. 1969. "Option Demand and Consumer's Surplus". Quart. J. Econ. 83:344-346.

Long, M. F. 1967. "Collective-consumptive Services of Individual-Consumptive Goods: Comment". Quart. J. Econ. 81:351-352.

Kellert, S. R. 1979. "Public Attitudes Towards Critical Wildlife and Natural Habitat Issues". Phase I Report to U.S. Fish and Wildlife Service. pp. 138.

Krutilla, J. V. 1967. "Conservation Reconsidered". Am. Econ. Rev. 57:777-786.

Maler, K.-G. 1974. Environmental Economics: A Theoretical Inquiry. Baltimore, Johns Hopkins University Press for Resources For The Future.

Randall, A. 1981. Resource Economics. Columbus, Grid Publishing, Inc. pp. 415.

_____, Hoehn, J. P. and Brookshire, D. S. 1983. "Contingent Valuation Surveys for Evaluating Environmental Assets". Nat. Res. J. 23:635-648.

_____ and Stoll, J. R. 1983. "Existence Value in a Total Valuation Framework". In Managing Air Quality and Scenic Resources at Natural Parks and Wilderness Areas, Rowe, R. D. and Chestnut, L. G., eds. Boulder, Westwood Press. pp. 274.

Rowe, R. D., d'Arge, R. C. and Brookshire, D. S. 1980. "An Experiment on the Economic Value of Visability". J. of Envir. Econ. and Mgmt. 7:1-19.

Schmalensee, R. 1972. "Option Demand and Consumer's Surplus: Valuing Price Changes Under Uncertainty". Am. Econ. Rev. 62:813-824.

Schulze, W. D., d'Arge, R. C. and Brookshire, D. S. 1981. "Valuing Environmental Commodities: Some Recent Experiments". Land Econ. 57:151-172.

Talhelm, D. R. 1983. "Unrevealed Extramarket Values: Values Outside the Normal Range of Consumer Choices". In Managing Air Quality and Scenic Resources at National Parks and Wilderness Areas, Rowe, R. D. and Chestnut, L. G., eds. Boulder, Westwood Press. pp. 274.

_____. 1984. Personal Communication.

_____ and Johnson, R. L. 1984. "Unrevealed Economic Values of Ecosystem Management". Unpublished draft Technical Report. Great Lakes Fisheries Commission, Ann Arbor. pp. 32.

Thayer, M. A. 1981. "Contingent Valuation Techniques for Assessing Environmental Impacts: Further Evidence". J. of Envir. Econ. and Mgmt. 8:27-44.

U.S. Fish and Wildlife Service. 1980. National Survey of Fishing Hunting and Wildlife-Associated Recreation. Washington, D.C., U.S. Department of Interior. pp. 73.

Weisbrod, B. A. 1964. "Collective-Consumption Services of Individual-Consumption Goods". Quart. J. of Econ. 78:471-477.