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BIOECONOMICS STUDY

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A
Contingent
Valuation
Assessment
of Mountain
Lion Hunting:
Hunter
Attitudes
and
Economic
Benefits
■

Montana Fish,
Wildlife & Parks

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MONTANA BIOECONOMICS STUDY

A CONTINGENT VALUATION ASSESSMENT
OF MOUNTAIN LION HUNTING:
HUNTER ATTITUDES AND ECONOMIC BENEFITS

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December, 1995

EXECUTIVE SUMMARY

The objective of the mountain lion hunter study was to estimate the economic value of mountain lion hunting as well as develop a profile of lion hunters/chasers. This information will help in setting management direction for mountain lion hunting/chasing in Montana.

One thousand eight hundred license holders were mailed a questionnaire using the Dillman Total Design Method. A large sample was needed due to the fact that about 50% of license holders do not hunt in any given year. Seven hundred and seventeen people returned the survey. The overall response rate was 40%. Chapter II provides details on the response rates and survey methods.

Mountain lion hunters are mainly men with an average age of 41 years. To better understand mountain lion hunters, resident and nonresident responses were separated. While incomes for resident hunters were lower than nonresidents, as expected, it was surprising that almost 70% of residents had incomes between twenty and seventy-five thousand dollars. The majority of nonresidents, 65%, made over forty thousand dollars a year and 39% of these hunters made more than seventy-five thousand dollars a year. Residents hunted lions twice as often as nonresidents but spent only about half as much as nonresident hunters during the mountain lion hunt/chase season. Residents spent an average of \$29.00 per day on their lion hunting/chasing while nonresidents spent an average of \$250.00 per day pursuing lions.

Lion hunters were also asked to respond to a contingent valuation question in order to estimate what they felt mountain lion hunting was worth over and above their actual expenditures. An analysis of their responses provided estimates of value. Net economic value for resident hunters is \$25.00 per day and \$50.00 per day for nonresidents hunters. Chapter IV provides a detailed look at the estimation of the net economic value analysis.

MONTANA BIOECONOMICS STUDY

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CHAPTER I

INTRODUCTION

Scope and Objectives

The objective of this study was twofold: 1) to statistically estimate the net economic value of mountain lion hunting in the state of Montana and 2) to provide a profile of lion hunters/chasers. To accomplish this, a survey was administered to a random sample of mountain lion license holders for 1993. The survey asked hunters a variety of questions regarding their lion hunting, their attitudes about mountain lion management, their actual expenditures for the 1993 hunting/chasing season and the value they place on the hunting experience as well as some socio-demographic questions. Descriptive statistics were used to analyze hunter and trip characteristics. The economic valuation questions were analyzed using logistic regression techniques.

As stated above, the intent of this study is to estimate the economic value of mountain lion hunting. Other values associated with this resource have not been examined in this report. While these values (existence, option, bequest) may make up a large part of the total value associated with mountain lions, the estimation of these values is beyond the scope of this study. While nonuse values are important when discussing the loss or large scale impact to a resource, current use values (net economic value of hunting) are an adequate measure when showing the economic effects of marginal changes in mountain lion management.

Definition of Economic Benefits

Value is the benefit gained from the use of a good or service and can accrue to either an individual or society as a whole. In the case of a wildlife resource such as mountain lions these benefits are non-monetary. To compare the uses of various resources and make efficient allocation of them, these resources need to be placed on common ground. Generally the standard used for this type of comparison is the monetary system.

The estimates of economic value of wildlife provide answers to the question, "What is the net social benefit from the use of wildlife?" (Fay and Thomas, 1986a). This valuation can be used to derive demand curves or price-quantity relationships that are used to show the value of wildlife related activities. The area under the demand curve and above actual expenditures is called consumer surplus, net economic value or net willingness to pay.

The concept of net economic value is often hard to grasp. One way to view this value is to consider it a personal income equivalent in that it is equal to real income but not actually cash in hand. It can also be considered the "added" benefit a person gains from the use of the good or service.

The U.S. Water Resources Council Principles and Guidelines (1983) requires that many federal agencies employ net willingness to pay in measuring the value of resources. The U.S. Department of the Interior also requires that net willingness to pay be used in measuring society's gains and losses when assessing natural resource damage (U.S. Department of the Interior, 1986). The Bureau of Land Management also uses this concept when estimating the value of wildlife in their cost benefit analyses.

CHAPTER II

METHODS

Survey Design

The Montana Mountain Lion Hunting Survey (See example in Appendix A) was used to collect a wide range of information from respondents who hunted and/or chased mountain lions. The survey was divided into four sections (See Appendix A for a copy of the survey).

Section I covered the respondent's mt.lion hunting/chasing activities, reasons for hunting mt. lions, and reasons they chose an area.

Section II dealt with different mountain lion management options.

Section III provided information on the hunters' trip expenditures, travel time, distance traveled, as well as contingent valuation questions.

Section IV furnished information on socio-demographic characteristics including age, income, sex, employment, etc.

The data collected from Sections I, II, and IV of the survey are presented in Chapter III. The information from the contingent valuation questions in Section III is detailed in Chapter IV.

Sample and Survey Administration

The population from which the sample was drawn was resident and nonresident hunters who purchased a mountain lion license during 1993. The Dillman Total Design Method (1978) was used to conduct the mail survey. Mountain lion hunters first received a cover letter and survey along with a postage paid return envelope. One week later everyone was sent a reminder postcard. Those hunters who had not returned their surveys after the third week were mailed a second survey, cover letter, and return envelope.

Survey Response Rates

A large sample size was decided upon due to the fact that about

half (49.3% in 1993-1994) of all license buyers do not hunt/chase lions in any given year (Annual Game Harvest Report, 1993-1994). This effectively reduces our return rate by half since we could only expect half of the hunters we sampled to have actually hunted/chased lions. One thousand eight hundred (1800) questionnaires were mailed to mountain lion license holders.

From the initial mailing of 1800, seventy eight surveys were undeliverable and 717 were returned. There were 702 surveys included in the analysis, the remaining 15 surveys did not contain information or were returned too late to be included. The overall response rate of 40% was lower than other mail surveys conducted by the Department of Fish, Wildlife and Parks (Duffield and Neher, 1991; Brooks, 1993).

The Contingent Valuation Method

The contingent valuation method (CVM) is one of two widely accepted methodologies for estimating net willingness to pay (net economic value), the other is the travel cost method (TCM). Both are recommended by the U.S. Water Resource Council (1983) for valuing nonmarket resources. The U.S. Forest Service also recognizes these methods and incorporates net willingness to pay values into their RPA analyses.

The contingent valuation method differs from the travel cost method in that TCM relies upon observed behavior to estimate the value of a recreational activity. CVM on the other hand takes a more direct approach by simply asking people what they are willing to pay for something - in this case a season of mountain lion hunting/chasing.

A number of question formats have been developed for contingent valuation use. They are 1) the open-ended question where respondents are asked the maximum amount they would pay for the recreational activity, 2) iterative bidding game format where a person is asked to respond yes or no to a specific bid, if they respond yes then the bid amount is raised till they respond no - in this manner their maximum willingness to pay is revealed, and 3) the dichotomous choice format where the respondent is asked to respond yes or no to a specific dollar bid which simulates actual market transactions. While each of these question formats have their strengths and weaknesses, the dichotomous choice format has shown it can provide fair approximations to actual market transactions (Welsh, 1986; Bishop and Heberlein, 1980).

Contingent valuation has been used to value a wide variety of resources (water and air quality, hunting, fishing, and scenic beauty) and is limited only by the ability of the person developing the survey to draft understandable questions and the person answering them to be willing to provide accurate estimates

of value. To this end, researchers have identified six areas that are critical in developing sound CVM questions: 1) target population, 2) product definition, in this case mountain lion hunting, 3) payment vehicle, 4) question format, 5) method of analysis and 6) supplemental data. While most of these areas are straightforward, it is important that the payment vehicle chosen is realistic and emotionally neutral.

Estimation of Net Economic Value using Dichotomous Choice CVM

The Montana Mountain Lion Hunting Survey utilized a dichotomous choice format to value lion hunting. Although the analysis of the data is more complex than the other question formats discussed, the advantages of this method - high response rate, realistic market-like situation and lends itself to a mail survey format - as well as the fact that advancements in discrete choice modelling have made this format acceptable.

The estimation of a demand curve using dichotomous choice requires discovering the relationship between the bid amount asked and probability of a respondent saying "yes" to that bid amount. This relationship can be shown graphically as a two dimensional curve. The area under the curve represents the maximum willingness to pay for a season of mountain lion hunting. Generally the integration occurs between zero and some maximum value, usually the highest bid amount.

CHAPTER III

DESCRIPTIVE STATISTICS

The Montana Mountain Lion Hunting Survey asked lion hunters about their lion hunting behavior, their attitudes and preferences regarding specific lion management options, social and economic values concerning lion hunting, and socio-demographic data.

The information provided by the seven hundred and two (702) people who sent back a completed questionnaire is presented for the sample as a whole and by resident/nonresident subgroups. Information is also presented by other groupings where appropriate; by whether the person owned hounds for treeing lions as an example.

Hunter Characteristics

Figure 1.

Figure 2.

As Figures 1 and 2 show, a large majority of lion hunters are men (97%) and almost half of the sample had finished college. The incomes of residents and nonresidents were quite different. Thirty eight percent (38%) of residents had incomes in the \$20-40 thousand dollar range while thirty nine percent (39%) of nonresidents reported income greater than \$75,000 (See Table 1). A majority of both groups were members of a sports or conservation organization.

Table 1. Percentage of respondents in each income level.				
	<\$20	\$20-\$40 (\$\$ in thousands)	\$41-\$75	>\$75
Full Sample	19%	36%	30%	15%
Resident	20%	38%	31%	11%
Nonresident	11%	25%	25%	39%

Section I of the survey asked respondents questions about their mountain lion hunting/chasing as well as a number of questions regarding their reasons for hunting. Table 2. provides details about the hunter's 1993-1994 season. The major differences

between resident and nonresident hunter's trips lies in the miles driven, number of years hunting mountain lions and the number of trips to the hunting area. While the average (mean) number of trips by residents and nonresidents is 13 and 3 trips respectively, the median number of trips is only 6 and 1. It is obvious that some of the sample took multiple trips to the hunting area.

TABLE 2: Trip characteristics for resident and nonresident mountain lion hunters.

	RESIDENTS			NONRESIDENTS			FULL SAMPLE		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
Yrs Hunted Lion	5.8	3	449	3	1	72	5.5	3	543
Yrs Hunted Lion in Montana	5.6	3	444	2	1	72	5.1	3	537
Days/yr hunted lion in Montana	14	8	431	7.5	7	70	13	7	521
Days/yr chased lions in MT.	13	10	206	6.4	4	19	12	8	234
# of Trips	13	6	342	3	1	55	12	5	408
Lions treed.	14	4	301	3	2	59	12	3	373
Lions killed	2	1	198	1	1	45	2	1	256

Mountain Lion Hunter Motivation and Management Preferences:

It is important to wildlife managers to understand the reasons a person chooses to mountain lion hunt and the reasons they chose the area they did to hunt. Understanding how hunters feel about mountain lion management is also of interest to managers. A number of questions were asked in the Montana Mountain Lion Hunter Survey to provide insight into these areas.

Table 3. presents the information on why respondents hunted mountain lions. The top three reasons were: to be outdoors, to be in a natural setting, and to learn about lions. The least important reason was for hunting mountain lions was to take a lion.

Some of the reasons hunters chose an area to hunt and their importance are given in Table 4. The most important reasons given for choosing an area was high lion numbers and good access followed by being able to hunt with family/friends and familiarity with the area.

Table 3. General reasons for mountain lion hunting.				
	Very Important	Important	Not Very Important	Not at All Important
For the solitude	29%	50%	17%	4%
Test hunt skills	19%	47%	26%	8%
Kill trophy lion	15%	37%	36%	13%
To be outdoors	65%	33%	1%	1%
Take a lion	13%	31%	41%	16%
Natural setting	43%	46%	9%	2%
Learn about lions	34%	52%	11%	4%
To run my dogs	32%	21%	13%	33%

Table 4. Reasons for choosing a mountain lion hunting area.

	Very Important	Important	Not Very Important	Not at all Important
Good Access	44%	39%	14%	3%
High Lion numbers	32%	54%	12%	2%
Close to home	23%	40%	27%	10%
Chance for trophy	21%	36%	33%	10%
Hunt with family/friends	36%	41%	16%	7%
Familiar w/ area	31%	42%	21%	6%

Mountain Lion Hunter Opinions on Management Options

The questions regarding the management of mountain lion hunting provide insight into how hunters feel about lion populations, hunter numbers, access, etc.. Only twenty four percent of respondents felt there were too many hunters where they hunt mountain lions. These individuals were asked to rank a number of options to reduce hunter numbers. Forty percent (40%) of respondents felt that reducing the number of nonresident hunters was the solution while twenty percent (20%) felt that restricting vehicular traffic would help solve the problem.

Table 5. Options to Reduce Hunter Numbers

	%	N
Choose time period	7	11
Restrict veh. traffic	20	31
Restrict NR hunters	40	63
Permit Only	7	11
Choose hunting area	17	27
Other	9	14

Access is a concern for most hunters in Montana. Respondents were asked if "The opportunity to hunt/chase lions where you want" was restricted in the areas they hunted. A majority of lion hunters (56%) didn't feel access was a problem. Those who did were then asked what they felt was the major reason. As Table 6. points out, not being able to hunt private land and road closures were the biggest problems.

Table 6. Why access is restricted?		
	%	N
Limited public hunting on private lands	39	107
Too many road closures	36	97
Not enough public land	3	9
Limited access to public land	10	26
Subdivisions	3	7
Other	9	25

Respondent's were also asked about the quality of mountain lion hunting in Montana. Ninety two percent (92%) of them felt that lion hunting was good or excellent. Only two percent (2%) responded that lion hunting was poor. The majority of hunters (74%) thought that lion numbers in the areas they hunted had increased and twenty one percent believed lion numbers had stabilized. The remaining five percent felt mountain lion numbers had decreased.

Respondents were also asked if lion hunting without dogs should be allowed during the general big game hunting season. Fifty eight (58%) percent of those responding said yes while forty two (42%) said no.

Those individuals who chase lions were asked if there are too many houndsmen where they chase lions? A large majority, 82% said no. Those that did feel there are too many houndsmen where they chase lions were asked which option listed they thought might reduce the problem. More individuals felt reducing the number of nonresident houndsmen would solve the problem. Restricting vehicular traffic and choosing your area to chase lions were also possible options to reduce the numbers of lion chasers.

Table 7. Options to reduce the number of chase participants.

	%	N
Choose time period to chase	5	5
Restrict vehicular traffic	19	18
Restrict number of nonresident houndsmen	39	37
Permit only	8	8
Choose your chase area	20	19
Other	9	9

Mountain Lion Hunter Expenditures

Lion hunters were asked to provide information about the costs of their 1993-1994 lion hunt/chase season. The categories were transportation, food, lodging, outfitter/guide fees, and access fees. Resident hunters spent an average of \$789.00 per season. Nonresidents spent considerably more than resident hunters, \$3493.00 per season due to the long distances they traveled and the outfitter/guide fees they paid. This information is presented in detail in Table 8. Overall, mountain lion hunters spent approximately 1.7 million dollars during the 1993/1994 hunt/chase seasons pursuing lions in Montana.

Respondents were also asked to estimate the current market value of their hunting/chasing equipment. This included kennels, dog trailers, radio collars, dogs, etc.. Residents reported they had about \$6300 invested in these items, while nonresidents valued their equipment at \$5800. Asked how much they spent on just their hounds during the year, residents and nonresidents reported spending \$850 and \$1050 respectively.

Table 8. Mountain Lion Hunter Expenditures, by Residency, 1994

Expenditure Category	Residents		Nonresidents	
	Mean (\$)	Median (\$)	Mean (\$)	Median (\$)
Transportation	334	150	589	500
Lodging	193	150	260	200
Food/Beverages	133	50	189	200
Access Fees	129	15	214	250
Season Subtotal	789	365	1257	1150
Guide Fees	737	225	2241	2500
SEASON TOTAL	1526	590	3493	3650
Total / Per Trip	61	61	1164	3650
Total / Per Day	29	20	250	332

The per day and per trip estimates for residents are based on the season subtotal since only 20 hunters used the services of a guide or outfitter. A significant number of nonresident lion hunters used the services of a guide/outfitter so their per trip and per day values are based on the season total estimate.

Expenditures were also broken out for resident and nonresident hunters who owned dogs. Resident hunters owning dogs spent considerably more than the average resident hunter - \$1281 per season compared to \$789. There was very little difference in the expenditures of the two nonresident groups - \$3800 for those who owned dogs compared to \$3650 for those who did not.

CHAPTER IV

CONTINGENT VALUATION ESTIMATES

Valuation Questions Asked

Mountain lion hunters were asked how much they spent on lion hunting/chasing during the 1993/1994 season as well as what this activity was worth to them over and above what they actually spent. A dichotomous choice contingent valuation question format was used. The actual question read:

Suppose that everything about this last season was the same except your trip expenses increased by \$xxxx , would you still have hunted/chased Mtn.lions?

This economic valuation question presented the respondent with a specific dollar amount which he/she could response "yes or no" to, similar to an actual market situation. The dollar amounts (\$xxxx) were one of ten predetermined bid levels and were randomly selected ranging from \$25 to \$500.

Outlier and Protest Responses

The analysis of the responses to the CVM questions requires that responses to these questions be excluded if they are willing but unable to pay the stated bid amount or they are protesting in some way the hypothetical market.

In the first case, if a respondent answers yes to the bid amount but is obviously unable to pay this amount based on their income they are removed from the analysis. Economic theory requires both a willingness and ability to pay. Ability to pay was calculated by determining what percent of their income hunters were spending on mountain lion hunting/chasing. The following equation shows how this was calculated:

$$\text{Percent} = (\text{Total} + \text{Bid}) / \text{Income}$$

where:

Total = total amount spent for the season

Bid = bid amount asked

Income= reported annual income

Initially, all respondents with a Percent equal to or greater than one were excluded since this group obviously lacks the

ability to pay since the amount they said they would pay exceeds their income.

The other group of respondents excluded from the analysis were those hunters who were protesting the simulated market. The U.S. Water Resource Council recommends that a followup question be asked to determine the reasons for a negative response. Mountain lion hunters who indicated they would not pay the bid amount but had a valid reason were left in the sample. Hunters were excluded from the sample as protest bids if they indicated they did not understand the question or were opposed to any increases in fees or taxes, etc.

Model Specification

Lion hunters' net willingness to pay (net economic value) was estimated by analyzing their responses to the CVM question using logistic regression. A comprehensive discussion of this theory and methods is provided in Duffield and Patterson (1991).

Economic theory suggests that particular variables will influence an individual's response to a CVM question. This study used a bivariate model that regressed "yes and no" responses upon the bid amounts asked. It is assumed that as the bid amount increases, the probability of a "yes" response will decrease.

The specification of the logit equation is shown in Equation 1.

$$\ln(P/1-P) = B_0 + B_1 \ln(\text{Bid})$$

where: P = probability of a "yes" response
Bid = dollar amount of increased trip costs respondent was asked to pay.

The estimated equations are shown in Appendix B. The coefficients for the independent variable $\ln(\text{Bid})$ had the expected sign (negative) and were significant at the 95% level. Based on the results of the models, the responses are logical and consistent with economic theory.

Benefit Estimates

The measure of economic benefits (net economic value) used in this study is the truncated mean. The bivariate form of the model can be graphed with the probability of a "yes" response on the vertical axis and the bid amount on the horizontal axis. Graphing this relationship shows a high probability of acceptance at low bid amounts with the probability decreasing and approaching zero at high bid levels. Integrating the logit function from zero to an upper limit, generally the highest bid

amount, provides an estimate of the mean or maximum willingness to pay. The upper level of integration for the mountain lion study was \$500.00, the highest bid level.

While there is no analytical method for deriving standard errors of the truncated means, a bootstrapping procedure by Duffield and Patterson (1991) provides reliable estimates.

Table 9. presents the estimates of net economic value associated with mountain lion hunting. These estimates are for resident and nonresidents lion hunters and represent the value these individuals place on hunting/chasing mountain lions over their actual costs. Resident hunters valued their hunting/chasing at \$25.00 per trip while nonresidents valued their trips at \$125.00. This is not surprising given their higher income levels and the length of time they have to hunt lions.

Table 9. Montana mountain lion hunting net economic values: Per season and per day - 1994			
Model Sample Size		Net Economic Value (Truncated Mean) *	
		Per Trip (\$)	Per Day (\$)
Entire Sample	563	27.50	25.00
Residents	476	25.00	25.00
Nonresidents	77	125.00	50.00
*The truncation point for the mean value estimate was \$500.00, the maximum bid level.			

The total net economic value of mountain lion hunting is estimated to be \$450,525 for the 1993/1994 hunt/chase season. This includes both resident and nonresident value calculated at \$369,525 and \$81,000 respectively.

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APPENDIX A

Montana Mountain Lion
Hunting Survey 1993/1994

**MONTANA
MOUNTAIN LION
HUNTING
SURVEY
1993/1994**

1. FIRST, WE HAVE SOME GENERAL QUESTIONS ABOUT YOUR LION HUNTING IN MONTANA:

1. Have you hunted/chased lions in Montana? ____ yes ____ no
2. Where do you hunt/chase lions? (Please list all hunting districts you hunt.)
Hunting District # ____ # ____ # ____ # ____ # ____
3. Which hunting districts do you hunt the most? (List the top two.)
Hunting District # ____ # ____
4. How many years have you hunted lions? ____ years
5. How many years have you hunted lions in Montana? ____ years
6. On average, about how many days per year do you spend lion hunting in Montana? ____ days
7. About how many days per year do you hunt lions outside Montana? ____ days
8. Do you participate in the CHASE ONLY season?
____ yes ____ no
9. If you do participate in the CHASE ONLY season, how many days per year?
____ # of days
10. How many separate trips do you take each year to hunt/chase lions?
____ # of trips
11. Do you own hounds? ____ yes ____ no
If yes, how many hounds do you own? ____ # of hounds
12. How many times have you used a(n)other):
a) Montanan's hounds to hunt or chase lions? ____ # of times
b) nonresidents hounds to hunt or chased lions? ____ # of times
13. How many lions have you treed while participating in the hunt portion of the lion season?
____ # treed

~1~

14. How many lions have you killed in Montana? ____ # lions killed
15. Do you hunt any other big game in Montana? ____ yes ____ no
16. If yes, what species do you hunt? ____ elk ____ deer ____ bear ____ antelope
17. About how many other hunters (not in your party) did you see while you were lion hunting this year? ____ Other hunters
18. Was this number of lion hunters: (please check one)
____ more than I expected to see
____ about as many as I expected to see
____ I didn't have any expectations
19. Did the other lion hunters present affect your enjoyment of the hunting in this area?
____ yes ____ no
20. If yes, please explain how: _____

21. What are the most important factors you consider when deciding to go lion hunting/ chasing? (Please check the box that best reflects the importance of each item.)

	Very Important	Important	Not Important	Not at all Important
a. Good access	☐	☐	☐	☐
b. High lion numbers	☐	☐	☐	☐
c. Close to home	☐	☐	☐	☐
d. Chances of bagging a trophy	☐	☐	☐	☐
e. To hunt with family or friends	☐	☐	☐	☐
f. Familiarity with the area	☐	☐	☐	☐

~2~

22. Following is a list of possible reasons for hunting. Please check the box that says whether that reason was very important, important, not important, or not at all important a reason you lion hunted in this particular area.

	Very Important	Important	Not Important	Not at all Important
a. For the solitude	☐	☐	☐	☐
b. To test my hunting skills	☐	☐	☐	☐
c. To bag a trophy lion	☐	☐	☐	☐
d. To be outdoors	☐	☐	☐	☐
e. To take a lion	☐	☐	☐	☐
f. To be in a natural setting	☐	☐	☐	☐
g. To learn more about lions	☐	☐	☐	☐
h. To run my dogs	☐	☐	☐	☐

II. THE NEXT FEW QUESTIONS ASK YOUR OPINION ON DIFFERENT HUNTING MANAGEMENT OPTIONS.

1. Do you feel there are too many hunters where you hunt?

yes no

2. If yes, would you please rank the following options to reduce the number of hunters. (Rank 1, 2, 3)

choose time period to hunt permit only

restrict vehicular traffic choose your hunting area

restrict the number of nonresident hunters?

other

3. For the following question, access is defined as: "The opportunity to hunt/chase lions where you want." Is access restricted in the areas you hunt?

yes no

If yes, why? (Please rank 1, 2, 3)

not enough public hunting allowed on private land

too many road closures

not enough public land available

not enough access to public land

subdivisions

other

4. Do you think lion populations in your favorite hunting/chase areas have

increased stabilized decreased

If you feel the number of lions has decreased, please rank the following strategies to improve the situation: (Please rank 1, 2, 3)

restrict lion hunting

manage for increased prey base

improve or maintain total habitat

road closures

season to protect female segment of populations

shorten season

increase trophy fee on female lions

5. Do you currently feel lion hunting in Montana is:

excellent good fair poor

6. Should the Department of Fish, Wildlife and Parks allow lion hunting without dogs during the general rifle season?

yes no

5. Suppose that everything about this last season was the same except your trip expenses increased by \$_____, would you still have hunted/chased Mt Lions?

_____ Yes, I would still have made the trip.

_____ No (if no, could you briefly explain why not)

6. About how much do you spend on your hounds each year?

\$_____ Amount spent annually

7. How many miles do you travel outside the hunting/chase season training your hounds or participating in field trials in Montana?

_____ Miles

III. THE NEXT FEW QUESTIONS WILL HELP US TO UNDERSTAND THE VALUE YOU PLACE ON LION HUNTING/CHASING.

WE REALIZE YOU AREN'T USED TO CONSIDERING HUNTING/CHASING THIS WAY, BUT PLEASE THINK ABOUT IT AND GIVE US YOUR BEST ESTIMATE!

1. About how far is it from your home to where you generally hunt/chase lions?
_____ miles (one-way)

2. How many miles do you travel annually hunting/chasing lions? _____ miles

3. Would you estimate the current market value of your lion hunting/chasing equipment (dogs, radio collars, kennels, trailers, etc.)? _____

\$_____ current market value.

4. About how much did you personally spend on lion hunting/chasing during 1993/1994 season? If you can't recall the exact amount, please give your best estimate for each of the following types of expenses.

_____ Amount spent for transportation (gas, vehicle rental, airfare)

_____ Amount spent on lodging

_____ Amount spent on food, beverages

_____ Amount spent on access fees for the 1993/1994 season

_____ Amount spent on outfitter/guide fees for the 1993/1994 season

_____ TOTAL AMOUNT I SPENT THIS HUNTING/CHASE SEASON

~5~

IV. THESE LAST FEW QUESTIONS WILL HELP US UNDERSTAND YOUR RESPONSES BY KNOWING SOME BASIC INFORMATION ABOUT YOU.

1. Where are you from? City: _____ State: _____

2. What is your age? _____ Years

3. Are you: _____ Male _____ Female

4. Are you a member of any hunting, conservation, or sport organizations?

_____ yes _____ no

5. If so, which ones? _____

6. What is the highest year of formal education you completed?

_____ Some grade school _____ Some college

_____ Finished grade school _____ Finished college

_____ Finished junior high school _____ Some postgraduate work

_____ Finished high school _____ Finished postgraduate

~6~

7. During the hunting season this year, were you...? (Check one)

☐ Employed full time ☐ Retired
☐ Employed part time ☐ Homemaker
☐ Unemployed ☐ Other: _____

8. Please check your household's income before taxes last year:

☐ Under 5,000	☐ 20,000 - 24,999	☐ 40,000 - 49,000
☐ 5,000 - 9,999	☐ 25,000 - 29,999	☐ 50,000 - 74,999
☐ 10,000 - 14,999	☐ 30,000 - 34,999	☐ 75,000 - 100,000
☐ 15,000 - 19,999	☐ 35,000 - 39,999	☐ over 100,000

Thank you for your help. Is there anything else you'd like to tell us about Lion hunting/chasing? We would appreciate any comments.

APPENDIX B

Estimated bivariate logistic contingent valuation equations.

Model	Statistics		Likelihood Ratio-Goodness of Fit Test		
	Intercept	Log (Bid)	Degrees of Freedom	Chi Square	p-Value
Full Sample	6.23	-1.034	8	13.38	.099
Residents	6.74	-1.14	8	13.40	.098
Nonresdnts	3.62	-.47	8	4.31	.83