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THE UNIVERSITY OF ALBERTA

WILDLIFE HABITAT ON ALBERTA PRIVATE LANDS:
AN ANALYSIS OF LAND USE TRADE-OFFS

by

Ted J. Haney

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF SCIENCE

IN

AGRICULTURAL ECONOMICS

DEPARTMENT OF RURAL ECONOMY

EDMONTON, ALBERTA

SPRING, 1991



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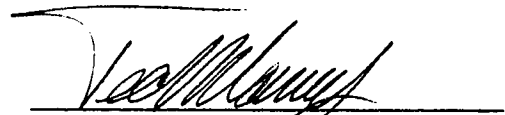
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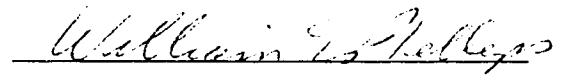
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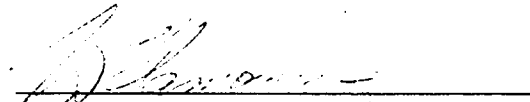
The important thing to realize is that invention is, in its strictest sense, as familiar a process as argument, no more and no less mysterious. Once we get this into our heads, scientific creativity will have been won back from the mystery-mongers (Caws, 1969: 1380).

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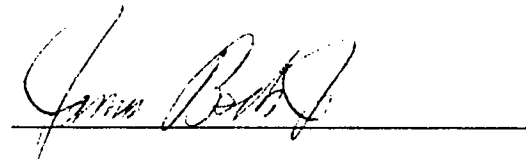
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OF MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS.



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Date: April 17, 1991

ABSTRACT

There is a conflict between private landowners rights and public wildlife rights in Alberta. This conflict is expressed in the reduction or removal of wildlife habitat for agricultural purposes on private lands in Alberta. The landowners' decisions to alter habitat may not reflect society's value on the displaced wildlife.

Factors that affect habitat change on private lands within the agricultural regions of Alberta were investigated. Survey respondents chose more often to alter wildlife habitat that was situated on irrigated cultivation than wildlife habitat that was situated on dryland cultivation. Survey respondents chose more often to voluntarily preserve a woodlot than a slough, without enrolling in any preservation program. Survey respondents' age, proportion of land enrolled in a preservation program, land use interaction beliefs, net household income, economic outlook, personal value of wildlife, belief in the effectiveness of compensation, risk acceptance, and belief in the economic value of wildlife all significantly affect either their decision to alter or preserve wildlife habitat or their choice of wildlife habitat preservation program.

The survey results were, in part, analyzed using a random utility model applied through the use of a multi-nomial logit analysis. The above factors were analyzed and incentive

compatible mechanisms that are, or may be, used to attain social welfare wildlife goals were investigated. The two most acceptable land use options for dryland cultivation were lease for wildlife management and contract for joint agriculture-wildlife management. The two most acceptable land use options for irrigated cultivation were contract for joint agriculture-wildlife management and alter wildlife habitat for agricultural purposes. The two least acceptable land use options for private land were sale and donation for wildlife management.

The combination of landowner attributes, current and potential land use, and wildlife habitat preservation program attributes will determine the success of preservation efforts. Landowners must believe that they would be no worse off by preserving their land for wildlife habitat. This belief may be affected by the availability of both financial and non-financial incentives to preserve wildlife habitat.

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WILDLIFE HABITAT ON ALBERTA PRIVATE LANDS:
AN ANALYSIS OF LAND USE TRADE-OFFS

I. INTRODUCTION

There is a conflict between private landowners rights and public wildlife rights in Alberta. This conflict is expressed in the reduction or removal of wildlife habitat for agricultural purposes on private lands in Alberta. The landowners' decisions to alter habitat may not reflect society's value on the displaced wildlife. The purpose of this study is to investigate the factors that affect habitat change on private lands within the agricultural regions of Alberta. The study will also analyze these factors and investigate program prescriptions that are, or may be, used to attain social welfare goals.

1. Research Objectives

Wildlife property rights are held by the public and the resource is protected from direct depletion through public regulation. Habitat is not protected on privately owned land, as Fee Simple property rights are held by the landowners. Public wildlife and private habitat property rights are in conflict. The central issue remains to identify and assess

alternate program prescriptions to offset this property rights imbalance.

There is an array of policy instruments that can be used to solve the property rights imbalance. These instruments include such options as expropriation, zoning (i.e., conservation reserves), taxation, and other regulatory instruments. None of these are considered in this study. Current real property rights entitlements are assumed to remain intact, and emphasis is on voluntary compliance with various incentive compatible mechanisms. This study is intended to identify mechanisms which are acceptable to landowners, cost effective (in some fashion), and may balance public wildlife rights and private real property rights. A compensation mechanism must be found where private land owners would be "no worse off", in the long term, for maintaining habitat. The eventual compensation mechanism must be flexible enough to allow the public to express, in monetary and non-monetary terms, its willingness to have specific habitat preserved. The policy mechanism must also allow private landowners to alter this same habitat if the proposed compensation is insufficient to make them "no worse off." The problem is to identify mechanisms within the present institutional framework which exist or may be developed that will control the removal of habitat that is critical to wildlife within the agricultural regions of Alberta. Once the

property rights have been balanced, the private costs of maintaining wildlife habitat will be paid by governments on the public's behalf. In this way the costs and benefits of wildlife use and conservation may be closely associated.

To fulfil the purpose of this study, three interrelated objectives must be met. These objectives are:

1. To evaluate likely landowner behavioral responses to alternate program prescriptions;
2. To identify and determine the effect of those landowner characteristics which are significantly related to wildlife habitat preservation decisions, and;
3. To merge the results of objectives 1 and 2 to assess wildlife potential and program effectiveness on privately owned agricultural land.

Investigation of alternate program activities designed to encourage those landowners currently not preserving habitat to preserve or enhance habitat will be completed. Further investigation of landowner knowledge levels with respect to the compatibility of agricultural and wildlife habitat retention activities will be completed. This additional

information will be used to further investigate the decision-making process used by landowners when preserving or developing wildlife habitat. Landowner motivations will be studied in order to better understand the effects of alternate program activities.

2. Organization of Study

The theoretical foundations of this study will be developed in Chapter II. A historical perspective to the problem of wildlife habitat preservation will be presented. The problem situation will be presented next. Landowner decision criteria will then be investigated. The theoretical basis for production and consumption decisions will be investigated. This study will make use of relevant utility theory, welfare economics, institutional economics, and production economics literature.

The methods and survey design used in this study will be presented in Chapter III. The theoretical constructs developed in Chapter II will be applied to Alberta private land owners. A description of the random utility model and the multi-nomial logit model will then be presented in the context of the problem situation. The sampling techniques and survey design used will be described next. A description of the data to be collected for the study (factual situation) will finally be presented.

The results of qualitative and quantitative analyses will be described in Chapter IV. This presentation will provide the factual basis to clarify the previously identified rights imbalance, as expressed through land-use conflicts.

A restatement of objectives and a summary of major findings will be presented in Chapter V. Relevant conclusions with respect to alternate program prescriptions will then be offered. Implications for current and future wildlife habitat program development will finally be presented.

II. BACKGROUND AND THEORETICAL FOUNDATIONS

1. Introduction

The purpose of this chapter is to provide a historical perspective to the problem situation, to present the methodological approach to the study of natural resource rights imbalances, and to present the theoretical basis for landowners' decisions. The methodology and theory will be applied to actual land use trade-off options. These findings will then be used to qualitatively analyze existing programs used in North America to address the property rights imbalance between wildlife and private alternative land uses.

2. Background

Many of Canada's property rights institutions were inherited from England with the formation of the British North American Act of 1867 and the establishment of Canada's judiciary. Common law defines the ownership rights of many assets, including land and wildlife.

The English institution of real property (land) rights has been largely preserved in Canada. Ownership rights accorded to landowners include: the right to lease, the right to use, the right to give, the right to sell, and the right to not do

any of the above (Province of Alberta, 1989). Canada's legal system has put many caveats on the bundle of real property rights in order to ensure that all uses are legal, that development is consistent with legal uses, and that uses don't adversely affect the quality of specified real property attributes (ie. pollution control, weed control).

The English institution of wildlife rights has not been maintained in Canada. The concept that wildlife is a common good, without ownership by any one individual has remained consistent since Roman times (Bean, 1983). English common law dictates that the right of use of wildlife belongs to the owner of the land where that wildlife is located (Bean, 1983). In this way, the institutions of real property rights and wildlife property rights are balanced. The real property owner possesses the rights to improve or remove wildlife habitat and will directly suffer the consequences in terms of wildlife population changes. Under this institutional framework, society's welfare with respect to the use of wildlife is secondary and is dependent upon private landowners protecting wildlife and habitat.

"Unlike fisheries, the wildlife resource is not mentioned specifically in the British North America Act of 1867. The resource automatically and without challenge became a provincial and territorial responsibility until main federal

involvement was established in 1917 with the passing of the Migratory Bird Convention Act and the National Wildlife Policy and Program in 1966." (Boag, et al, 1980: 1-2). "In Canada wildlife is the sole resource that remains the sole property of the Crown, even on lands that are privately owned." (Ryder and Boag, nd: 35). Society owns wildlife and the governments are charged with its maintenance and protection (Environment Council of Alberta, 1989). Since rights are not well-defined and are not privately transferable, control over the resource must take the form of legislated regulations to prevent rapid wildlife depletion (Province of Alberta, 1984). While the public owns all wildlife and possesses all the rights flowing from the wildlife, it is the responsibility of private landowners to maintain and improve habitat. Since the wildlife is valued and protected by society and habitat is owned by individuals, social welfare loss can occur if habitat is removed. At present, the majority of costs associated with improving wildlife habitat on private lands for the purpose of increasing social welfare are at the expense of private gain. In this way, the Canadian institutions of real property rights and wildlife rights are imbalanced (Ciriacy-Wantrup, 1968). Imbalance exists among a group of people when the distribution of costs is not closely associated with the distribution of benefits from use and conservation of a resource (Ciriacy-Wantrup, 1968). Without balanced property rights, wildlife and habitat goals may not be achieved.

Wildlife habitat on privately owned lands within the agricultural regions of Alberta is being altered for agricultural purposes (Usher and Scarth, 1990). This process represents the landowners' attempts to increase their financial returns from the land (D.A. Westworth, 1990). Society values wildlife and therefore values the preservation of habitat required to support wildlife. Wildlife value is derived from four sources of wildlife demand. Consumptive demand such as hunting or trapping, is competitive with all other sources of demand, as the action of hunting removes wildlife for other uses. Non-use demand is the observation or study of wildlife. Option demand is the right to hunt or observe wildlife in the future. Existence demand is the desire to preserve wildlife for the future, regardless of other use or option demands. This form of demand requires that wildlife populations are not depleted beyond a critical minimum level (Ciriacy-Wantrup, 1968).

Despite the value placed on wildlife and its preservation, the public has traditionally not:

1. Compensated private landowners for the opportunity costs incurred by not developing wildlife habitat for agricultural production, or;

2. Defined and released certain rights over non-introduced wildlife to private landowners in exchange for habitat protection and/or improvement.

The emergence of vocal environmental organizations has increased public awareness of and concern for the protection and preservation of wildlife in Alberta. It is presently uncertain whether the development of environmental awareness will lead to a balancing of public and private property rights, or instead will cause the rights imbalance to increase.

Various wildlife and habitat management approaches are currently pursued in Canada (Environment Council of Alberta, Renewable Resources Sub-Committee, 1989) (Haney, et al, 1991). The government of Alberta has funded two pilot projects to test the effectiveness of alternate incentive compatible programs designed to encourage private landowners to preserve or enhance wildlife habitat. The Landowner Habitat Project (LHP), a pilot project of the Alberta Fish and Wildlife Division, has attempted to internalize private landowners' wildlife habitat externality.

The Red Deer County Habitat Retention on Private Land Program was initiated as a three year pilot project in 1978 by Alberta

Fish and Wildlife Division (Ewaschuk and D.A. Westworth, 1983). Financial incentives were offered to private landowners who enrolled in one of five program options. The program options are presented in Table 1.

Option	Parcel Size	Term	Fence Requirement	Agricultural Practices	Annual Payment (\$/Ac.)
1	> 40 Ac.	15 Years	Yes	Limited	Negotiated
2	< 40 Ac.	15 Years	Yes	None	\$5.00
3	< 40 Ac.	3 Years	No	None	\$5.00
4	> 40 Ac.	3 Years	No	Limited	Negotiated
5	20 Acres	3 Years	Yes	Pheasant Rearing	Cost Share and Negotiated

Option 5 required landowners to initiate a pheasant captive breeding and release program with cost sharing in year one. A negotiated annual "Habitat Recognition Payment" was offered in the second and third years.

A total of 83 landowners participated in this program with over 11,000 total enrolled acres. An evaluation of this project suggested that insufficient financial incentives were offered, and that important wildlife habitat, from a biological perspective, was not targeted. Partially as a result of these problems, the majority of enrolled lands were either non-arable, or were marginally arable.

The Landowner Habitat Project (LHP) was initiated as a three year pilot project in 1986 by Alberta Fish and Wildlife Division (D.A. Westworth, 1990). Financial and recognition incentives were offered to landowners in three regions of Alberta within a flexible structure. Land leases and joint management contracts were available to private landowners who met management criteria. High quality project signs were erected at the building sites of LHP participants. Only lands with a high wildlife habitat potential were accepted into the project. All land lease rates were based on 80% of existing local cash lease rates. Compensation for modifying agricultural activities, for the benefit of wildlife, was based on 80% of the cooperators' reduced net income. Technical assistance was offered to all cooperating landowners in the form of wildlife habitat development plans. An evaluation of this project was completed in 1990. The basis of this evaluation was a survey comprised of 82 randomly selected non-participants of the LHP and 89 LHP participants (94% of total participants). Landowners were asked questions related to socioeconomic classification, wildlife and habitat knowledge and attitude, farming operation and practices, LHP program awareness and satisfaction, and wildlife recreation. This study suggested that the flexible nature and level of financial compensation was appealing to LHP participants. It was suggested that the LHP should be promoted to wildlife user groups in order to increase awareness of landowners' view of

recreationists. It was suggested that highly motivated landowners should be encouraged to cooperate on a volunteer or purely recognition basis. In summation, this evaluation found the LHP to be a successful pilot project, and recommended a province-wide expansion.

While both of these pilot projects provided vital information as to the acceptability of several wildlife habitat program alternatives, major questions remain unanswered. Of primary concern to this study, was the lack of landowner motivation and decision making process description and analysis. What are the reasons that landowners choose to participate, renew agreements, withdraw from the program, or not cooperate?

3. Problem Situation

A researcher must recognize that confusion exists before he can recognize that a problem exists (Northrop, 1942: 12). Clues or facts must exist to guide the researcher toward the identification of the problem. If no factual clues exist, the researcher will be unable to identify a problem (Dewey, 1938: 108). The solutions to the specified problem must explain some of the original confusion.

Answers to the following questions are required before a resolution of the property rights imbalance can occur:

1. What is the status of wildlife habitat quantity and quality on private lands in Alberta?
2. What have been the biological effects on wildlife by the alteration of habitat on private lands?
3. Do private landowners understand the possible adverse effects on wildlife, and therefore social welfare costs, of converting habitat into agricultural production?
4. What quantity and quality of habitat on private lands is acceptable to the public and the landowner?
5. What alternate agricultural land uses exist for wildlife habitat?
6. What are the landowners' opportunity costs of not altering wildlife habitat?
7. What forms of compensation would be effective in encouraging private landowners to incur the opportunity costs of maintaining habitat (ie. public recognition, regulations, monetary)?

8. What level of compensation is the public willing to pay to control the removal of habitat to socially acceptable levels?

The lack of information regarding the value of wildlife to the public, the opportunity costs of private landowners, and the mechanism to balance the property rights are primarily responsible for the present conflict between the demand for wildlife and the demand for agricultural land.

The problem of habitat removal, which adversely affects publicly valued wildlife, will be dealt with in this study. The public institution of wildlife rights is in conflict with the private institution of real property rights. The public may consider wildlife to be valuable and may be willing to ensure that species will be preserved, but has no rights over the maintenance of habitat on private lands. Private landowners have no extraordinary rights over the wildlife on their lands, but must incur the costs of maintaining the necessary habitat if the publicly owned asset is to be protected. Markets, which may otherwise allow these rights to be traded, have not formed. Since society has traditionally not compensated landowners for the use of private property for the attainment of stabilized or increased wildlife populations, private lands may not have been used for these

goals. A basic root of the problem therefore, appears to be an institutional property rights imbalance.

The nature of the root difficulty may be the reason why the problem has not yet been solved. A root difficulty may be classified as: failure of logical consistency of theory, unknown facts or relationships, value problems, and new phenomena (Northrop, 1947: 19 - 20). The current problem may be related to all four classifications. It is logical that if two competing property rights are not linked with a pricing mechanism or market, then the resulting imbalance will hinder the achievement of the goals of both parties. Additional facts are required to determine what form(s) of pricing mechanism(s) or conditional market(s) may harmonize the competing property rights. The public may attach a much greater value to wildlife preservation than it is willing to pay for habitat maintenance. This project will not deal with the issues of value. There have been new agricultural technologies introduced which have accelerated the removal of habitat.

While society values the preservation of wildlife, the costs of maintaining habitat are primarily incurred by private landowners. The problematic situation is that an imbalance of property rights has led to the destruction of wildlife habitat on Alberta farms.

The primary symptom of this rights imbalance is that habitat is being removed from private lands within the agricultural regions of Alberta. The public has become increasingly aware that this habitat removal may have negative effects on wildlife, and therefore on social welfare. A further possible symptom may be the development of mutual distrust between wildlife preservation advocates and private landowners.

Landowners, hunters, wildlife observers, public policy makers, and the general public are all affected by this problem. Public demand for private habitat preservation may primarily affect landowners who possess critical habitat.

The desired situation may exist when the public is satisfied that social welfare is being maintained through the survival of wildlife and the private landowners are compensated for the opportunity costs which they incur in the maintenance of habitat necessary for the survival of wildlife. Application of economic theory can provide guidelines toward the solution of the original problem situation.

3. Theoretical Basis

The notion of value is grounded in utility theory. The wildlife habitat problem is an expression of the stakeholders' utility. Utility is revealed through the theoretical notion

of demand. Effective demand is reflected through the market institution (e.g., consumer demand for food produces a derived demand for agricultural commodities, which in turn produces a derived demand for agricultural inputs including land resources). Agricultural land values are derived from consumer food demand which reflects their utility for those consumer products.

Ineffective demand exists when market institutions do not function. Utility is not revealed through demand, but may be revealed through collective action (e.g., consumer demand for wildlife does not produce a derived demand for privately owned wildlife habitat). Since the market institution does not function in such cases, collective action may be expressed through the formation of public policies and programs (e.g., The Land Owner Habitat Project).

Utility among the various stakeholders in the problem situation represents an initial state from which a more efficient allocation of resources may improve social welfare (i.e., a net gain in aggregate utility).

Restating the above, utility theory suggests that private landowners will attempt to maximize utility (i.e., profit maximization) from land holdings. Utility can be derived from tangible sources such as net farm income, or from intangible

sources such as aesthetics. By inference, landowners' decisions are directed by particular utility functions. A landowner may alter wildlife habitat for agricultural purposes if net farm income is preferred to the aesthetic qualities of wildlife and habitat. A landowner may alternately choose to shift more to preservation and enhancement of wildlife habitat if aesthetics are valued more than net income at the margin. A better understanding of these utility functions (i.e. motivations) may allow for efficient public intervention where society wishes to preserve declining wildlife habitat on private lands. Certain monetary or non-monetary incentives may allow private landowners to preserve wildlife habitat while at the same time being made no worse off.

Private landowners must consider technically independent factors of production. If a fractional portion of land is enrolled in a habitat preservation program, the productivity of the non-enrolled lands remains constant. The level of compensation required to encourage a landowner to retire agricultural land, or to not alter wildlife habitat for agricultural purposes is a direct function of the expected production of the agricultural land. It should therefore be expected that either higher compensation must be paid for lands with a high agriculture potential, as compared to land with low potential, or participation rates will be lower. The technical rate of substitution between land and compensation

may also decrease as the proportion of total owned land enrolled increases. As remaining lands in a farm enterprise becomes more scarce, its value to the operation tends to increase. While production theory adequately describes landowners' response to tangible production, it does not address the intangible value that landowners may place on private land stewardship principles. These principles guide landowners toward actions that society believes ought to reflect value of land ownership. The situation may arise where landowners' decisions may not reflect society's values.

"An externality is defined as the case where an action of one economic agent affects the utility or production possibilities of another in a way that is not reflected in the marketplace." (Just, et al, 1982: 269). The market may fail due to the presence of technical problems, public good problems, or ownership problems. Technical problems exist where the cost to cure exceeds the cost of damage. This situation may occur when an economic agent is entitled to pollute because the private cost of pollution abatement equipment exceeds the public cost of pollution. Public goods problems exist where a public good is consumed. This situation may occur when congestion occurs at recreation sites as individuals consume the amenities of wilderness areas. Ownership problems exist where rights are poorly defined, and a public good may become subject to depletion. This situation may occur where wildlife

is not subject to private ownership until it is "captured." In each of the above cases, consumption entitlements exist and economic agents possess separable utility functions.

By causing an economic agent to internalize an externality, social welfare gains may occur. A Pareto superior situation will exist where at least one person is made "better off" without making anyone "worse off." (Boadway and Bruce, 1984). This situation can occur where society compensates private landowners for preserving wildlife habitat. Society is made no worse off if the value of increased wildlife is not less than the value of compensation paid. This relationship can be expressed as the willingness to pay (WTP). Private landowners are made no worse off if the value of compensation is not less than their private costs of habitat preservation. This relationship can be expressed as the willingness to accept compensation (WTA).

Private landowners may choose to alter wildlife habitat for agricultural purposes. The landowners are entitled to remove habitat by the legal fee title real property rights they hold. The public's welfare, or utility, is adversely affected by the private landowners' actions through a resultant reduction in publicly owned and valued wildlife. There currently exists no mechanism that internalizes societies costs of reduced wildlife in the cost functions of private landowners. This

situation is typical of an ownership externality. A solution to this externality will link the private and public costs and benefits associated with wildlife habitat preservation and enhancement on private lands.

Economic institutions are "collective conventions and rules that establish acceptable standards of individual and group behaviour." (Bromley, 1982: 12). These institutions are defined both "by legal and jurisdictional rules and in part by social conventions, mores, and habits." (Adamowicz, et al, 1985: 2). Resource use conflicts may occur where legal entitlements and social expectations are not closely associated. Legal and social definitions of a particular institution may diverge over time. Conflict may also occur where two or more institutions are interrelated and allow conflicting actions.

While private landowners are entitled to alter wildlife habitat for agricultural purposes, societies preservation expectations are not satisfied. If rules are enacted that restrict the landowners' rights to alter wildlife habitat, either the original entitlements must be changed, or the landowners must be willing to "sell" those entitlements (Adamowicz, 1990). The social cost of changing fee simple real property entitlements through revoking rights and privileges may possibly be higher than the benefit of

preserving wildlife habitat. The public may "purchase" certain real property rights from private landowners in order to protect publicly owned wildlife assets. Through fee simple acquisition of private lands, all real property rights are purchased. Selected strands of the rights may be acquired through land leases, management contract, and conservation easements.

The economic theory described above, guides all further empirical analysis. The decision criteria used by landowners when preserving or altering wildlife habitat are assumed to conform with utility and production theory. Society's willingness to pay landowners to modify agricultural practices is assumed to conform with utility (welfare) and institutional theory. The analytical models employed to describe these relationships also conform to the above theories.

III. RESEARCH METHODS AND SURVEY DESIGN

1. Introduction

The purpose of this chapter is to present the research methods used in the analysis of data gathered in a landowner survey. A decision criteria model and support for its selection as well as a rigorous analysis of the model will be presented. The development and application of an original survey instrument will be described. Finally, a description of the data used in this study, and the results of collinearity analysis will be presented.

2. Utility and Revealed Preferences

The application of theory must allow the investigation of the decision-making process used by landowners when considering wildlife habitat preservation and alteration options. In order to do this, a set of discrete land use choices will be used to elicit landowner perceptions for various wildlife habitat program options. Landowners will not be asked to rate or describe the utility attributes of discrete land use options. Since direct measures of utility derived from options are normally unavailable, option selection criteria must be based on selected landowner attributes. Landowner attributes can be used to provide an indirect reflection of

the respondents' utility functions. These attributes and associated factors that affect landowners' utility are listed in Table 2.

ATTRIBUTES	FACTORS
Study Region	Regional
Total Acreage	Scale
Owned/Leased Land	Tenure
Percent Land LHP Enroled	Prior Experience
Age	Life Stage
Education	Knowledge and Exposure
Household Size	Family Structure
Personal Wildlife Value	Wildlife Perception
Economic Future	Prosperity
Risk	Risk
Wildlife Economic Value	Wildlife Compatibility
Financial Compensation Effectiveness	Financial Incentive
Land Use Compatibility	Compatibility
Primary Enterprise	Agricultural
Net Income	Financial
Interviewer	Interviewer Bias

These landowner attributes provide the basis for empirical analysis. These attributes will be used to indirectly measure the effect of respondents' utility functions on the selection of land use options. Through a greater understanding of the effects of these attributes on the actions of private

landowners, programs and policies directed toward preserving wildlife habitat on private land may be adjusted to increase the probability of success.

The objective of analysis is to identify those landowner attributes that affect the choice of land use alternatives described in the three scenario sections of the survey. The purpose of this understanding is to analyze alternative program prescriptions to the rights imbalance problem described in Chapters I and II. Existing programs may be altered or new programs may be developed which satisfy the requirements of landowners for the preservation of wildlife habitat on private lands.

Frequencies of responses from land owners and valid percent of responses will be determined. These frequencies and percentages will allow a qualitative review of the data. General response rates, and attitudes held by land owners will be examined at this stage of analysis. Crosstabs will be calculated to give response frequencies for selected questions by study region and by land owner status. Qualitative analyses will be completed, at a cursory level, to understand differences in response patterns between landowners in different geographical locations and participation groups. Breakdowns will be calculated to give response value means, standard deviations, and frequencies by location and by

participation status. Comparisons will be made between the rankings of selected responses and between socioeconomic profiles. These comparisons will allow the identification of those characteristics which, after aggregation, vary between respondent groups.

The methods used must provide indications of how and why landowners chose particular wildlife habitat preservation or alteration options. This approach allowed an indirect investigation of those components of the landowners' utility functions that affect land use decisions.

In the random utility model the utility to a consumer of an alternative is specified as a linear function of the characteristics of the consumer and the attributes of the alternative, plus an error term. The probability that a particular consumer will choose a particular alternative is given by the probability that the utility of that alternative to that consumer is greater than the utility to that consumer from all other available alternatives (Kennedy, 1985: 191-192).

As stated in Chapter II, utility can be gained from tangible (financial) and intangible (recognition) sources. The utility that individual i obtains from land use choice j , can be represented as follows:

$$U_{ij} = V(\pi_{ij}; \epsilon_{ij}),$$

where π_{ij} and ϵ_{ij} are the observable and random components of

the utility function. It is assumed that an option will be chosen if it has the highest utility among the available options. The decision criteria is therefore based on the relative utility gained from one option over another. In order to proceed empirically, a linear form of the random utility function may be written as:

$$U_{ij} = \alpha_j + \beta_j X_i,$$

for the i^{th} individual and the j^{th} land use option. The variable X_i represents the attributes of the i^{th} individual.

The probability of option j being chosen over all other available options may be written as:

$$Pr \{U_{ij} > U_{ik} \forall j \in K\}$$

Let

$$U_{ij} = \alpha_j + \beta_j X_i + \epsilon_j$$

Then

$$\begin{aligned} Pr\{j \text{ chosen}\} &= Pr \{ \alpha_j + \beta_j X_i + \epsilon_j > \alpha_k + \beta_k X_i \} \forall k \\ &= Pr \{ \epsilon_j - \epsilon_k > \alpha_k - \alpha_j + \beta_k X_i - \beta_j X_i \} \forall k \\ &= Pr \{ \epsilon_k - \epsilon_j \leq (\alpha_j - \alpha_k) + (\beta_j - \beta_k) X_i \} \forall k \end{aligned}$$

The probability of discrete option j being chosen over all

other options contained in the choice set K is therefore based on the difference in option specific constants ($\alpha_j - \alpha_k$) and the difference in the parameters of X_i ($\beta_j - \beta_k$). In order to estimate the final probability, the model must be normalized on one α and one β . It is the distribution on the error terms ($\epsilon_k - \epsilon_j$) that is assumed to conform to a logistic distribution.

To gain further information as to the probabilistic relationships between landowner attributes and land use choices, universal multi-nomial logit analyses will be completed. These analyses will lead to estimated probabilities of landowners choosing individual land use options in the scenario section. The probability function of this model employs a logistic distribution (Amemiya, 1981). This distribution function has the superior quality of constraining probabilities between 0 and 1. The random utility errors are assumed to be independently and identically distributed in a Weibull (extreme-value) distribution (Kennedy, 1985).

$$P_{ij} = \frac{\exp(\beta'_{ij} x_i)}{1 + \sum_{k=1}^{m-1} \exp(\beta'_{ik} x_i)}$$

where: P_{ij} = probability of individual i choosing option j ,
 and
 $i = (1, 2, \dots, n)$ individuals, and
 $j, k = (1, 2, \dots, m)$ options, and
 x_i = vector of characteristics of individual i , and
 β_{ij} = matrix of parameters (Maddala).

The probability of individual i choosing option j is consistent with utility theory and is based upon the respondents' perceived marginal utility difference of choice alternatives.

Model performance is based primarily upon maximum likelihood ratios, calculated on the base of the fully restricted model (all non-constant coefficients set to zero). An initial OLS estimate of the coefficients was fit into the following likelihood function:

$$L = \prod_{i=1}^n P_{i1}^{Y_{i1}} P_{i2}^{Y_{i2}} \dots P_{im}^{Y_{im}}$$

where: $Y_{i1} = 1$ if individual i chooses option 1,
and

$Y_{i1} = 0$ otherwise

or

$$\ln(L) = \sum_{i=1}^n \sum_{j=1}^m y_{ij} \ln P_{ij}$$

The equation to solve for obtaining the ML estimates is:

$$\frac{\partial \ln(L)}{\partial \mathbf{B}_k} = 0$$

where: $k = 1, 2, \dots, m-1$ (Maddala)

Since the logistic probability function is highly nonlinear in β_{ij} , the maximum likelihood does not have a closed form solution. The Newton-Raphson iterative procedure was used to estimate this nonlinear function. The $(t+1)^{\text{st}}$ round estimate of β_{ij} is estimated by:

$$\beta_{t+1} = \beta_t - \frac{\left(\frac{\partial \ln(L)}{\partial \beta} \Big|_{\beta_t} \right)}{\left(\frac{\partial^2 \ln(L)}{\partial \beta \partial \beta'} \Big|_{\beta_t} \right)}$$

"The properties of the log-likelihood function for both the normal and the logistic c.d.f.'s guarantee that this method will converge to the global maximum based on any set of starting values β_0 . Furthermore, we know that the maximum likelihood estimators are consistent, asymptotically efficient, and asymptotically normally distributed." (Judge, et al, 1988: 792).

It is this empirical model that produces the probabilities of behaviour, given selected choices among alternate land uses and selected land owner attributes. A survey of landowners includes questions designed to elicit responses suitable for the use of this model, from which insights into landowner utility and behaviour responses can form the basis for wildlife habitat program formulation and analysis.

A number of performance criteria may be applied to the above described model. The application of these performance tests form part of the study results.

Goodness of fit tests are restricted primarily to likelihood ratio tests and to the percent of decisions correctly predicted. Maddala's pseudo R^2 is calculated as follows:

$$\text{Maddala's } R^2 = 1 - \left(\frac{L_0}{L_{ML}} \right)^{2/n}$$

where: $\ln(L_0)$ is the $\ln(L)$ subject to the constraint that all the regression coefficients, except for the constant, are restricted to zero, and

$\ln(L_{ML})$ is the $\ln(L)$ of the specified model at the maximum likelihood parameter estimates.

Maddala's pseudo R^2 is a form of likelihood ratio test where the maximum likelihood value of the fully restricted model is divided by the likelihood value of the tested specification. This proportion is then raised to the power $2/n$, and the result is then subtracted from one. This statistic is therefore adjusted for the number of observations.

McFadden's pseudo R^2 is calculated as follows:

$$\text{McFadden's } R^2 = 1 - \frac{\ln(L_{ML})}{\ln(L_0)}$$

where: $\ln(L_0)$ is the $\ln(L)$ subject to the constraint that all the regression coefficients, except for the constant, are restricted to zero, and

$\ln(L_{ML})$ is the $\ln(L)$ of the specified model.

McFadden's pseudo R^2 is a form of likelihood ratio test where the maximum log likelihood value of the tested specification is divided by the log likelihood value of the fully restricted model. This proportion is then subtracted from one.

Craig and Uhler's pseudo R^2 is calculated as follows:

$$\text{Craig \& Uhler's } R^2 = \frac{L_{ML}^{2/n} - L_0^{2/n}}{1 - L_0^{2/n}}$$

where: $\ln(L_0)$ is the $\ln(L)$ subject to the constraint that all the regression coefficients, except for the constant, are restricted to zero, and

$\ln(L_{ML})$ is the maximum $\ln(L)$ of the specified model.

Craig and Uhler's pseudo R^2 is calculated by subtracting the maximum log likelihood value of the fully restricted model, raised to the power $2/n$, from the maximum log likelihood value of the tested specification, raised to the power $2/n$. This difference is then divided by 1 minus the maximum log likelihood value of the fully restricted model, raised to the power $2/n$. This statistic is therefore adjusted for the number of observations.

Theory suggests that explanatory variables should be linearly independent in the MNL model. When collinear relationships exist between explanatory variables, the resulting parameter estimates may be inefficient. The estimation of choice probabilities will be correct, but the variance of coefficient estimates will be high. The MNL model is, at least partially, unable to distinguish between the effect of related explanatory variables.

The MNL model will estimate the probability of each respondent choosing particular land use options. The options which will be calculated to have the highest probability of being chosen will be treated as the predicted option. Predictions will then be compared to respondents' actual choices and the percentage of correct predictions will be calculated.

Three specifications of the model will be used. Unrestricted, choice restricted, and fully restricted specifications will be investigated. The unrestricted model will result in estimates of the β_{ij} parameters for all choice options, using all selected explanatory variables. The choice restricted model will result in estimates of the β_{ij} parameters for the two most popular choice options, using all selected explanatory variables. The fully restricted model will result in estimates of the β_{ij} parameters for the two most popular choice options, using the two selected "best" explanatory variables.

The inclusion of selected land owner attributes may cause the multi-nomial logit model not to converge and to subsequently fail. These specific attributes will be excluded. All observations with missing values will be removed from the sample data to ensure that remaining observations contain complete explanatory variable sets.

This model may violate the assumption of independence-of-irrelevant-alternatives, as "the relative probability of choosing two existing alternatives is unaffected by the presence of additional alternatives." (Kennedy, 1985: 192). This problem is limited if the landowners are able to identify each option clearly as a separate choice.

3. Previous Study Sample Design

A master list of 180 respondents for a previous Landowner Habitat Project (LHP) study by D.A. Westworth & Associates Ltd. (1990), completed for the preparation of the report entitled "An Evaluation of the Landowner Habitat Program" was used as the master landowner contact list for this study. Included were 9 names of landowners who were not interviewed by the project consultants. The consultant's master landowner contact list was prepared in two stages. Of the 95 landowners participating in the Landowner Habitat Project (LHP), 89 (94%) participants cooperated in the completion of the previous survey. A total of 82 non-participating landowners were randomly selected and surveyed. Landowners were surveyed in three study areas between 1 November, 1988 and 31 January 1989 (D.A. Westworth & Associates, 1990).

4. Current Study Sample Design

A survey instrument was developed in June, 1990 and field tested in July, 1990 on four out-of-sample respondents. Adjustments were made to the survey instrument, and the final version was prepared in August, 1990.

Attempts were made to survey, in person, all of the 180 landowners on the compiled master landowner contact list. A

total of 32 landowners could not be contacted, were unable to cooperate, or were unwilling to cooperate in completing a survey for this study. A total of 148 landowners were surveyed, including 80 participants in the LHP, and 68 non-participants. The distribution of respondents between study regions was: 47 (32%) in the county of Minburn (East-central Alberta); 66 (44%) in the County of Red Deer (Central Alberta), and; 35 (24%) in the Eastern and Bow River Irrigation Districts (Southern Alberta). The in-person surveys were completed between 15 August, 1990 and 31 October, 1990.

Certain answers given by respondents on the previous LHP survey were appended to their responses to the current survey to produce a complete data set. Those 9 landowners not originally surveyed by the project consultants were asked questions, to be used in this study, in follow-up telephone interviews. These telephone surveys were completed between 15 January, 1991 and 31 January, 1991. All landowners were classified by individual identification number, participation status, and study region.

5. Survey Questionnaire Design

The survey questionnaire used in this study had seven main sections (Appendix I). The following describes the content of each section.

a. Section One

The first section contained six questions. The first five likert scaled questions related to the landowners' relative value of wildlife and profit, relative value of non-monetary awards and profit, economic future, and perception of farming as a business. Landowners were asked to rate each statement with a five-point likert scale response of either strongly agree, agree, neutral, disagree, or strongly disagree. The last question in this section required a yes/no response as to whether respondents accepted a risky versus a risk free investment option which produced an equal financial return.

b. Section Two

The second section of the survey questionnaire contained three wildlife habitat-agriculture land use scenarios. The first scenario described a hypothetical 10-acre slough in the corner of a dryland cultivated 160-acre field. Respondents were given the option of either: subdividing and selling the slough

and surrounding 30 acres of cultivation at market en bloc value for wildlife habitat preservation; subdividing and donating the slough and surrounding 30 acres of cultivation in return for an income tax exemption equal to the market value of the land (en bloc value) for wildlife habitat preservation; leasing the slough and surrounding 30 acres of cultivation at 80% of the local cash lease rate for similar land (en bloc value) for wildlife habitat preservation; contracting for five years to seed the 30 acres of cultivation to dense nesting cover (hay or grass), maintain the slough, and not to undertake any agricultural operations within the parcel before July 15 each year in return for compensation equal to 80% of expected decreased net profit; drain the slough and cultivate the entire field, or; continue farming without any changes and without any wildlife habitat programs. Follow-up questions investigated landowners preference in dealing with public or private organizations, receiving non-financial incentives, length of land leases, form and timing of compensation payments, reasons for draining the slough, and reasons for continuing without any changes.

The second scenario described a hypothetical 10-acre slough in the corner of an irrigated and cultivated 160-acre field. The same options for selling, donating, leasing, contracting, draining, or maintaining the property were available to the landowners as in the previous scenario. This second scenario

was presented only to landowners within the irrigated study region.

The third scenario described a hypothetical 40-acre woodlot in the corner of a dryland cultivated 160-acre field. The same options for selling, donating, leasing, draining, or maintaining the property were available to the landowners as in the previous scenarios. The option to contract for joint agriculture-wildlife management was not offered in this third scenario.

c. Remaining Sections

The third section contained four questions related to the landowners' acceptance of four non-financial incentives. Landowners were asked whether they would require more, less, or the same level of financial compensation if they were also: publicly presented with a certificate of recognition; given free lifetime hunting/fishing licenses; given free honorary lifetime memberships to a conservation organization, or; given project signs for public posting.

The fourth section contained nine questions. These were five-point likert scale questions which related to; landowners' public responsibility for wildlife habitat protection; governments' public responsibility for wildlife habitat

protection on private lands; direct economic effect of wildlife populations; landowners' value of wildlife, and; landowners' perceptions of the effectiveness of financial incentives in maintaining wildlife habitat on private lands. The landowners were asked to rate each statement with a likert scale response of either: strongly agree; agree; neutral; disagree, or; strongly disagree.

The fifth section contained three questions. Three land use compatibility matrices were constructed by matching four agricultural land uses with five wildlife habitat land uses. Four agricultural land uses consisted of dryland cultivation, irrigated cultivation, dryland pasture, and irrigated pasture. Five wildlife habitat land uses consisted of shelter belts, ditch/fence cover, grassed waterways, sloughs and grassed uplands, and woodlots. Respondents were asked to rate each interaction on a five point likert scale of strongly compatible, compatible, neutral, competitive, or strongly competitive. Respondents were asked to rank all land use interactions in terms of agricultural profitability, wildlife preservation and production, and control of water and wind erosion.

The sixth section contained three socio-economic questions related to the landowners': primary farming operation; changes

in landbase since the previous LHP study, and; net household income.

The seventh section contained three open ended summation questions allowing landowners to answer: how they would decide to participate in a government habitat retention program; if and why it is important to maintain wildlife habitat, and; if they have any further comments.

d. Other Information

A small subset of responses to selected questions contained in the previous LHP survey were added to the above survey in order to complete the data set. Responses regarding total land base, age of landowner, education level of landowner, number of individuals in the household, length of time enrolled in LHP (participants only), and number of acres in LHP (participants only) were used.

6. Data

Information collected for this study was entered into an electronic database. A small subset of data from the previous LHP study's data set was also entered in this database. A working database containing twenty-seven variables was constructed. The variable listing is contained in Table 3.

Table 3: Variable List From Survey Questionnaire			
#	VARIABLE	DEFINITION	LHP SURVEY
1	ID	Identification Number of Respondent	Previous and Current
2	S	Participation Status (LHP or Non-LHP)	Previous and Current
3	R	Study Region	Previous and Current
4	TAO	Total Acres Owned	Previous
5	TAL	Total Acres Leased	Previous
6	LHPL	Percent Acres in LHP	Previous and Current
7	AGE	Age	Previous
8	EDUC	Highest Education	Previous
9	SO	People Over 18 Years	Previous
10	SU	People Under 18 Years	Previous
11	CONSID	Importance of Wildlife	Current
12	ECONFUT	Economic Future Bright	Current
13	RISK	Choose Risky Investment	Current
14	DSLUGH	Dryland Slough Choice	Current
15	ISLOUGH	Irrigated Slough Choice	Current
16	WOODLOT	Dryland Woodlot Choice	Current
17	VALUE	Farmers Value Wildlife	Current
18	MV	Economic Value of Wildlife	Current
19	ALTER	Compensation Effectiveness	Current
20	PCOMP	Profit-Habitat Compatibility	Current
21	WCOMP	Wildlife-Habitat Compatibility	Current
22	ECOMP	Erosion-Habitat Compatibility	Current
23	ENT	Primary Farming Enterprise	Current

#	VARIABLE	DEFINITION	LHP SURVEY
24	INC	Net Household Income	Current
25	OAC	Owned Acres Changed	Current
26	LAC	Leased Acres Changed	Current
27	INT	Interviewer	Current

Variable ID consisted of survey respondents' identification numbers. A numerical code identifying the respondents' participation status in the Landowner Habitat Program (LHP) constituted variable S. Variable R reflected a classification code identifying each of the three study regions in which respondents were located.

The summation of all acres owned by each respondent generated variable TAO. The summation of all acres leased by each respondent formed variable TAL. Variable LHPL reflected the proportion of all acres ($TAO - OAC + TAL - LAC$) enrolled in the LHP. Variable age consisted of the respondents' age. In order to normalize variable age near 1, all responses were divided by 80.

A numerical code reflecting the respondents' education achievement constituted variable EDUC. The total number of people over the age of 18 years living in the respondents' households made variable SO. Variable SU consisted of the

total number of people under the age of 18 years living in the respondents' households.

Respondents' ratings (1=Strongly Agree; 2=Agree; 3=Neutral; 4=Disagree; 5=Strongly Disagree) of the statement "Farmers must consider wildlife when seeking to maximize profits" constituted variable CONSID. The respondents' ratings (1=Strongly Agree; 2=Agree; 3=Neutral; 4=Disagree; 5=Strongly Disagree) of the statement "My economic future on this present farm is bright" generated variable ECONFUT. Variable RISK consisted of the respondents' response (1=Accept Risk; 0=Reject Risk) to a return-neutral investment option involving one risky and one risk free investment.

Variable DSLOUGH consisted of the respondents' responses to land use options regarding the hypothetical dryland slough scenario. The respondents' responses to land use options regarding the hypothetical irrigated slough scenario generated variable ISLOUGH. Variable WOODLOT reflected the respondents' responses to land use options regarding the hypothetical dryland woodlot scenario.

The respondents' ratings (1=Strongly Agree; 2=Agree; 3=Neutral; 4=Disagree; 5=Strongly Disagree) of the statement "Farmers, in general, value wildlife habitat on their farms" generated variable VALUE. Variable MV was formed by

respondents' ratings (1=Strongly Agree; 2=Agree; 3=Neutral; 4=Disagree; 5=Strongly Disagree) of the statement: "Increased wildlife populations on a farm increases its market value." The respondents' ratings (1=Strongly Agree; 2=Agree; 3=Neutral; 4=Disagree; 5=Strongly Disagree) of the statement "My neighbours will alter less habitat in the future if they are compensated to maintain it" made variable ALTER.

Variable PCOMP consisted of the respondents' mean of ratings to the agricultural profitability-wildlife habitat land use interaction matrix. The respondents' mean of ratings to the wildlife preservation and production-wildlife habitat land use interaction matrix constituted variable WCOMP. Variable ECOMP reflected the respondents' mean of ratings to the control of water and/or wind erosion-wildlife habitat land use interaction matrix.

The respondents' responses (1=grain; 2=cattle; 3=hogs; 4=poultry; 5=dairy; 6=forage; 7=other) to the question "Which of the following is the primary operation on your farm?" generated variable ENT. Variable INC was formed by the respondents' responses to the question: "Which category best represents your net household (farm and non-farm) income?." The respondents were able to indicate which of eleven income cohorts best represented their situation. The midpoint of

each cohort, divided by 100,000 was used as the variable value for analysis.

The summation of all owned acreage changes since the previous LHP survey for each respondent made variable OAC. Variable LAC consisted of the summation of all leased acreage changes since the previous survey for each respondent. Variable INT consisted of a numerical code identifying the interviewer of each respondent.

From the above list of variables, the following twelve variables were selected for further data analyses. The three dependent variables investigated included: DSLOUGH, ISLOUGH, and WOODLOT. Each of these variables consisted of responses indicating the preferred mechanism for either preserving or altering wildlife habitat.

The nine explanatory variables selected for the Dryland Slough scenario data analysis included: LHPL, AGE, ECOMP, INC, ECONFUT, VALUE, ALTER, RISK, and MV. Certain explanatory variables were eliminated from the Irrigated Slough and Dryland Woodlot data analyses as these variables caused the multi-nomial logit (MNL) procedure not to converge and to subsequently fail. The five explanatory variables selected for the Irrigated Slough scenario data analysis included: AGE, INC, VALUE, ALTER, and MV. The eight explanatory variables

selected for the Dryland Woodlot scenario data analysis included: LHPL, AGE, ECOMP, INC, ECONFUT, VALUE, ALTER, and MV.

The purpose of LHPL was to identify the effects of degree of involvement with the Landowner Habitat Project. AGE was used to identify the effects of age on the preferred mechanism. The purpose of ECOMP was to identify the effects of perceived wildlife habitat erosion control benefits on the preferred mechanism. INC was used to identify the effects of net income on the preferred mechanism. The purpose of ECONFUT was to identify the effects of perceived economic future on the preferred mechanism. VALUE was used to identify the effect of personal value of wildlife on the preferred mechanism. The purpose of ALTER was to identify effect of perceived effectiveness of compensation on the preferred mechanism. RISK was used to identify the effect of riskiness on the preferred mechanism. The purpose of MV was to identify the effect of perceived financial effect of wildlife on the preferred mechanism.

All observations with missing observations were excluded from the analyses. A total of 123 observations were used for the "unrestricted" specification Dryland Slough MNL analysis. A total of 92 observations were used for the "restricted" specification Dryland Slough MNL analysis.

A total of 30 observations were used for the "unrestricted" specification Irrigated Slough MNL analysis. A total of 20 observations were used for the "restricted" specification Irrigated Slough MNL analysis.

A total of 122 observations were used for the "unrestricted" specification Dryland Woodlot MNL analysis. A total of 102 observations were used for the "restricted" specification Dryland Woodlot MNL analysis.

IV. RESULTS

The purpose of this chapter is to present the empirical results arising from the data analysis. The qualitative results presented below identify the proportion of survey responses to the questions contained in the survey questionnaire (Appendix I). The random utility model application and multi-nomial logit analysis results follow the qualitative results section.

1. Qualitative Survey Results

While 79% of the surveyed LHP participants either strongly agreed or agreed that farmers must consider wildlife when seeking to maximize profits, only 57% of the surveyed non-participants responded similarly. This indicated that LHP participants viewed private land stewardship responsibilities more favourably than non-participants.

A total of 90% of surveyed LHP participants, and 88% of non-participants chose to either lease or contract the dryland slough in order to preserve habitat. Contracting for joint habitat preservation and agricultural uses was most popular in both groups.

While 53% of surveyed LHP participants chose to either lease or contract the irrigated slough for habitat preservation, 19% of the non-participants responded similarly. While 21% of surveyed LHP participants chose to drain the irrigated slough, 56% of the non-participants responded similarly. This indicated that non-participants in the irrigated study region viewed agricultural land uses as more valuable than did participants. LHP participants may have had their attitudes toward habitat preservation altered by virtue of their experience.

A total of 68% of the surveyed LHP participants and 58% of the non-participants chose to either sell, donate, or lease the dryland woodlot for habitat preservation. The lease option was the most popular choice for participants and non-participants.

Over 80% of surveyed LHP participants and non-participants indicated that they would require the same lease compensation whether or not non-financial incentives (certificates of recognition, free hunting/fishing licenses, free memberships, or project signs) were offered.

Over 80% of surveyed LHP participants and non-participants either strongly agreed or agreed that farmers are responsible,

to all those now living and to future generations, to maintain wildlife habitat in order protect wildlife populations.

A total of 41% of surveyed LHP participants and 35% of surveyed non-participants either strongly agreed or agreed that the government had the responsibility to enforce wildlife habitat preservation on private land in Alberta while 84% of surveyed LHP participants and non-participants either strongly agreed or agreed that the government had the responsibility to compensate farmers for their costs of maintaining wildlife habitat on their farms. These responses indicated that private landowners prefer to have their wildlife habitat management entitlements purchased or leased rather than confiscated. This also indicates that landowner resistance may develop to a restrictive regulation approach to wildlife habitat preservation.

While 63% of surveyed LHP participants either strongly agreed or agreed with the statement that farmers, in general, value wildlife on their farms, 74% of surveyed non-participants responded similarly. While 100% of surveyed LHP participants either strongly agreed or agreed with the statement that they value wildlife on their farms, 94% of surveyed non-participants responded similarly. This indicated that LHP participants believed they personally valued wildlife slightly more than farmers in general.

A total of 34% of surveyed LHP participants either strongly agreed or agreed with the statement that increased wildlife populations on a farm increases its market value while 16% of surveyed non-participants responded similarly. This indicated that non-participants viewed wildlife as more highly competitive with agricultural activities than did surveyed participants. Wildlife depredation was the most common reason given for increased wildlife populations causing decreased farm market values.

While 81% of surveyed LHP participants either strongly agreed or agreed with the statement that they would alter less habitat in the future if they were compensated to maintain it, 75% of surveyed non-participants responded similarly. While 62% of surveyed LHP participants either strongly agreed or agreed with the statement that their neighbours would alter less habitat in the future if they were compensated to maintain it, 52% of surveyed non-participants responded similarly. While both groups agreed that compensation was an effective method of encouraging wildlife habitat preservation on private lands, LHP participants believed compensation to be more effective than did non-participants.

Respondents were asked to rate land use interactions on a five point likert scale of: 1=Strongly Compatible; 2=Compatible; 3=Neutral; 4=Competitive, and; 5=Strongly Competitive. All

land use interactions in terms of effect on wildlife and erosion control were rated, in aggregate, to be neutral or compatible by respondents across participation status and survey region. The majority of land use interactions in terms of agricultural profitability were also rated, in aggregate, to be neutral or compatible. Those land use interactions that received more competitive and strongly competitive ratings than compatible and strongly compatible ratings may be viewed as sources of potential conflict. These interactions are highlighted in Table 4.

All land use interactions that received more competitive and strongly competitive ratings than compatible and strongly compatible ratings are listed in Table 4. The primary sources of expected land use conflict existed between sloughs & uplands and woodlots, and dryland cultivation, irrigated cultivation, and irrigated pasture. The primary study regions where land use conflict may exist are the County of Red Deer and the irrigated study region. Both LHP participants and non-participants viewed specific land use interactions as more competitive than compatible. This indicates that the primary focus of land use modification programs should be directed

toward preserving sloughs & uplands and woodlots on dryland cultivation, irrigated cultivation, and irrigated pasture.

Table 4: Competitive Land Use Interactions Between Agricultural and Wildlife Land Uses			
Agriculture Land Use	Wildlife Habitat Land Use	Study Region	LHP Status
Sloughs & Uplands	Dryland Cult.	Red Deer	Participant
Sloughs & Uplands	Dryland Cult.	Red Deer	Non-Part.
Woodlots	Dryland Cult.	Red Deer	Participant
Woodlots	Dryland Cult.	Red Deer	Non-Part.
Sloughs & Uplands	Irrigated Cult.	Red Deer	Participant
Sloughs & Uplands	Irrigated Cult.	Irrigated	Participant
Sloughs & Uplands	Irrigated Cult.	Red Deer	Non-Part.
Woodlots	Irrigated Cult.	Minburn	Participant
Woodlots	Irrigated Cult.	Red Deer	Participant
Woodlots	Irrigated Cult.	Irrigated	Participant
Woodlots	Irrigated Cult.	Red Deer	Non-Part.
Sloughs & Uplands	Irrigated Past.	Red Deer	Non-Part.

Note: The land use pairings in Table 4 represent those interactions that respondents rated as competitive more often than complimentary by the survey respondents.

A total of 43% of surveyed LHP participants responded that grain was their primary operation, while 53% of surveyed non-participants responded similarly. A total of 43% of surveyed LHP participants responded that cattle was their primary

operation, while 29% of surveyed non-participants responded similarly. All other surveyed LHP participants and non-participants responded that hogs, forage, dairy, or some other enterprise was their primary operation.

The mean household net income was reported higher for surveyed non-participants (\$46,885.00 calculated as cohort mid-points) than for surveyed LHP participants (\$39,872.00 calculated as cohort mid-points). The highest household net income was reported for surveyed non-participants in the irrigated study region (\$65,625.00 calculated as cohort mid-points). The lowest household net income was reported for surveyed LHP participants in the County of Minburn (\$24,400.00 calculated as cohort mid-points).

The three most common Other Benefits requested by respondents with the three scenario questions were increased compensation, more access control to project lands, and more capital improvements on project lands. Respondents indicated that they expected or experienced more trespass interference and property damage with publicly posted LHP projects. Commonly requested capital improvements included improved water facilities (i.e., dugouts and wells) and shelterbelt improvement (i.e., tree planting).

Many landowners were sensitive to the perception that wildlife habitat was being preserved, at least partially, at the expense of rural land owners for the benefit of Canadian and American urban hunters (i.e., doctors and lawyers). This concern suggested that many landowners believe that the entire cost of wildlife habitat preservation should be paid by the public.

The results of the qualitative analysis indicated that many differences existed, after aggregation, between respondents from different study regions and from different participation groups. These identified differences provided clues as to how and why specific landowners decided to choose specific land use options in the hypothetical scenarios. These potential explanations were investigated further with quantitative analysis.

2. Model Performance and Specification Results

The utility and probability models described in Chapter III were used to attain further results. They are presented below, but preceded by model performance and independence results that have a direct bearing on survey results and analyses.

Three specifications were estimated for the three land use scenarios. The unrestricted specification used all available explanatory variables to estimate the probability of respondents choosing each of the land use options. The choice restricted specification used all available explanatory variables to estimate the probability of respondents choosing between the two land use options that were selected the highest number of times. Those respondents indicating other land use alternatives were removed from the analysis. The choice and explanatory variable restricted specification used only AGE and INC as explanatory variables to estimate the probability of respondents choosing between the two land use options that were selected the highest number of times.

a. Tests of Multi-Nomial Logit Model Performance

The four Goodness of Fit statistics that were calculated for each of the nine MNL model specifications are given in Table 5. The first statistic calculated was the Percent Correctly Predicted. The other three statistics were pseudo R^2 measures, and were formally described in Chapter III.

Table 5: Goodness of Fit Measures				
Specification	Percent Correctly Predicted	Maddala's pseudo RSq.	McFadden's pseudo RSq.	Craig & Uhler's pseudo RSq.
Dryland Slough:				
Unrestricted	65.04	0.4684	0.2443	0.0717
Choice Restricted	81.52	0.2090	0.1969	0.1154
Choice & Explan. Var. Restricted	76.09	0.1248	0.1119	0.0623
Irrigated Slough:				
Unrestricted	53.33	0.4337	0.1868	0.0383
Choice Restricted	75.00	0.2887	0.2475	0.1371
Choice & Explan. Var. Restricted	70.00	0.1700	0.1354	0.0692
Dryland Woodlot:				
Unrestricted	58.20	0.2347	0.1153	0.0335
Choice Restricted	68.63	0.0605	0.0477	0.0238
Choice & Explan. Var. Restricted	67.65	0.0325	0.0252	0.0124

A wide variation of model performance was achieved. It may be noted that the predictive power and the goodness of fit measures for the dryland slough scenario was superior to the other two scenarios.

b. Explanatory Variable Dependency

A correlation matrix was constructed with the explanatory variables in each of the nine regression specifications. The purpose of this estimation was to identify possible relationships between explanatory variables.

Correlation coefficients above .300 indicate that explanatory variables are relatively strongly linearly correlated and may produce inefficient parameter estimations. All correlation estimates above .300 are reported.

i. Unrestricted Specification

The results of the correlation estimation of the Dryland Slough unrestricted explanatory variable set produced the relationships (Corr. > .300) presented in Table 6.

#	First Explanatory Variable	Second Explanatory Variable	Correlation
1	INC	ECONFUT	.321
2	AGE	RISK	-.413
3	ALTER	MV	.373

The results of the correlation estimation of the Irrigated Slough unrestricted explanatory variable set produced the significant relationships (Corr. > .300) presented in Table 7.

#	First Explanatory Variable	Second Explanatory Variable	Correlation
1	LHPL	ECOMP	.358
2	AGE	ECOMP	.307
3	INC	ECONFUT	.392
4	INC	ALTER	-.355
5	ECONFUT	RISK	.381
6	ALTER	MV	.369

The results of the correlation estimation of the Dryland Woodlot unrestricted explanatory variable set produced the significant relationships (Corr. > .300) presented in Table 8.

#	First Explanatory Variable	Second Explanatory Variable	Correlation
1	INC	ECONFUT	.368
2	AGE	RISK	-.412
3	ALTER	MV	.356

The above relationships indicated the existence of certain correlations. As household net income increased, respondents

also believed that their economic future was brighter. As age increased, respondents were more risk averse. As compensation was believed to have been more effective, respondents also tended to believe that wildlife populations increase farm market value. As the percentage of land enrolled in the LHP increased, respondents also believed that habitat preservation techniques were more effective at controlling erosion. As age increased, respondents also believed that habitat preservation techniques were more effective at controlling erosion. As household net income increased, respondents also believed that compensation was less effective in inducing landowners to preserve wildlife habitat. As economic future was perceived to be brighter, respondents were less risk averse. As household net income increased, respondents also believed that habitat preservation techniques were more effective at controlling erosion. As the percentage of land enrolled in the LHP increased, respondents also believed that compensation was less effective in inducing landowners to preserve wildlife habitat. As the personal value of wildlife increased, respondents were more risk averse. As economic future was perceived to be brighter, respondents also tended to believe that increased wildlife populations increase farm market value.

ii. Restricted Specifications

The results of the correlation estimation of the Dryland Slough restricted explanatory variable set produced the significant relationships (Corr. > .300) presented in Table 9.

#	First Explanatory Variable	Second Explanatory Variable	Correlation
1	AGE	RISK	-.367
2	ALTER	MV	.447

The results of the correlation estimation of the Irrigated Slough restricted explanatory variable set produced the significant relationships (Corr. > .300) presented in Table 10.

#	First Explanatory Variable	Second Explanatory Variable	Correlation
1	LHPL	ECOMP	.318
2	INC	ECOMP	.413
3	LHPL	ALTER	-.339
4	AGE	RISK	-.325
5	ECONFUT	RISK	.382
6	VALUE	RISK	-.348

Table 10: Irrigated Slough Restricted Correlation Results			
#	First Explanatory Variable	Second Explanatory Variable	Correlation
7	ECONFUT	MV	.425
8	ALTER	MV	.409

The results of the correlation estimation of the Dryland Woodlot restricted explanatory variable set produced the significant relationships (Corr. > .300) presented in Table 11.

Table 11: Dryland Woodlot Restricted Correlation Results			
#	First Explanatory Variable	Second Explanatory Variable	Correlation
1	INC	ECONFUT	.337
2	AGE	RISK	-.371
3	MV	ALTER	.320

The above relationships indicated the existence of certain correlations. As household net income increased, respondents also believed that their economic future was brighter. As age increased, respondents were more risk averse. As compensation was believed to have been more effective, respondents also tended to believe that wildlife populations increase farm market value. As the percentage of land enrolled in the LHP increased, respondents also believed that habitat preservation

techniques were more effective at controlling erosion. As age increased, respondents also believed that habitat preservation techniques were more effective at controlling erosion. As household net income increased, respondents also believed that compensation was less effective in inducing landowners to preserve wildlife habitat. As economic future was perceived to be brighter, respondents were less risk averse. As household net income increased, respondents also believed that habitat preservation techniques were more effective at controlling erosion. As the percentage of land enrolled in the LHP increased, respondents also believed that compensation was less effective in inducing landowners to preserve wildlife habitat. As the personal value of wildlife increased, respondents were more risk averse. As economic future was perceived to be brighter, respondents also tended to believe that increased wildlife populations increase farm market value.

3. Multi-Nomial Logit Analysis Results

The land use choice alternatives for the dryland and irrigated slough scenarios included sell (1), donate (2), lease (3), contract (4), drain (5), and continue without any changes (6). The land use choice alternatives for the dryland woodlot scenario included sell (1), donate (2), lease (3), clear (4), and continue without any changes (5). The one unrestricted

model specification and the two restricted model specifications were used to obtain estimates for each of the three scenarios.

a. Unrestricted Specification

The unrestricted model specification was estimated first. The probability of all choice alternatives were estimated with all the possible explanatory variables.

i. Dryland Slough Scenario

The results of the estimation of the Dryland Slough unrestricted MNL model¹ produced the significant relationships presented in Table 12.

¹An additional MNL analysis was completed with PCOMP used in place of ECOMP. PCOMP proved to be a significant explanatory variable in describing respondents' choices of leasing over donating, contracting over donating, and leasing over continuing without change.

An additional MNL analysis was completed with the addition of the dummy variable INT, where INT=1 for those respondents interviewed by Ted Haney and INT=0 otherwise. INT proved to be a significant explanatory variable in describing respondents' choices of contracting or selling over continuing without change. This result suggested the presence of interviewer bias.

Table 12: Dryland Slough Unrestricted Results				
#	Variable	Choice over Choice	Coefficient	P > t
1	Constant	Contract over Sell	19.08	.052
2	Constant	Contract over Donate	16.65	.057
3	Constant	Contract over Lease	6.664	.032
4	Constant	Contract over No Change	6.195	.058
5	Constant	Drain over Sell	29.93	.035
6	Constant	Drain over Donate	27.5	.041
7	Constant	Drain over Lease	17.52	.100
8	Constant	Drain over No Change	17.05	.112
9	LHPL	Donate over Sell	21.76	.110
10	LHPL	Lease over Sell	22.75	.089
11	LHPL	Contract over Sell	22.10	.098
12	LHPL	No Change over Sell	21.02	.117
13	AGE	Lease over Sell	9.843	.060
14	AGE	Lease over Donate	7.249	.138
15	AGE	Lease over Contract	6.234	.002
16	AGE	Lease over No Change	3.643	.135
17	AGE	No Change over Contract	2.591	.187
18	ECOMP *	Sell over Donate	4.157	.197
19	ECOMP *	Sell over Lease	7.134	.009
20	ECOMP *	Sell over Contract	7.131	.008
21	ECOMP *	Sell over Drain	8.350	.015
22	ECOMP *	Sell over No Change	6.642	.015
23	ECOMP *	Donate over Lease	2.977	.115
24	ECOMP *	Donate over Contract	2.974	.110
25	ECOMP *	Donate over Drain	4.193	.139
26	ECOMP *	Donate over No Change	2.466	.193
27	INC	Donate over Sell	7.331	.121

#	Variable	Choice over Choice	Coefficient	P > t
28	INC	Lease over Sell	7.595	.089
29	INC	Contract over Sell	6.520	.138
30	INC	Drain over Sell	10.16	.058
31	INC	No Change over Sell	6.554	.142
32	ECONFUT *	No Change over Sell	0.9951	.182
33	VALUE *	Donate over Drain	1.664	.086
34	VALUE *	Lease over Drain	1.270	.104
35	VALUE *	Contract over Drain	1.332	.079
36	VALUE *	No Change over Sell	1.086	.186
37	VALUE *	No Change over Drain	1.525	.055
38	ALTER *	Contract over Sell	1.428	.082
39	ALTER *	Contract over Lease	0.4642	.195
40	ALTER *	No Change over Sell	1.565	.072
41	ALTER *	No Change over Donate	1.045	.178
42	ALTER *	No Change over Lease	0.6014	.197
43	RISK	Lease over Sell	2.688	.108
44	RISK	Lease over Contract	0.8853	.151
45	RISK	Lease over No Change	1.149	.130
46	MV *	Lease over Contract	0.6341	.027
47	MV *	Lease over No Change	0.8313	.024

Note: * - Likert scale: 1=Strongly Disagree to 5=Strongly Agree.

The coefficients in Table 12 were estimated by the MNL analysis. The coefficients are multiplied by the value of explanatory variables ($x\beta$) for use in the Logit.

The p value in Table 12 estimates the probability that the coefficients (β) are not different from zero. The existence of p values less than 0.10 suggest strong behavioral responses. The existence of p values more than 0.10 but less than 0.20 suggest weak behavioral responses. Relationships with p values over 0.20 were not reported.

The significant relationships in Table 12 indicated the existence of certain behavioral responses. Independent of all other factors in the model, respondents would rather contract the dryland slough for joint habitat preservation and agricultural uses than sell, donate, or lease the slough for habitat preservation, or continue with no change. Independent of all other factors in the model, respondents would rather drain the dryland slough rather than sell, donate, or lease the slough for habitat preservation, or continuing with no change.

Increased percentage of land enrolled in LHP increased the probability of a respondent donating or leasing the dryland slough for habitat preservation, contracting the slough for joint habitat preservation and agricultural uses, or continuing without any change rather than selling the slough for habitat preservation.

Older respondents tended to lease the dryland slough for habitat preservation rather than selling or donating the slough for the same purpose, contracting the slough for joint habitat preservation and agricultural uses, or continuing without any change. Increased age also increased the probability of a respondent continuing without any change rather than contracting the slough for joint habitat preservation and agricultural uses.

As a respondent believed more strongly that wildlife habitat preservation effectively controlled erosion, the probability of selling the dryland slough for habitat preservation rather than donating or leasing the slough for habitat preservation, contracting the slough for joint habitat preservation and agricultural uses, draining the slough, or continuing without any change also increased. Increased belief in the effectiveness of wildlife habitat preservation controlling erosion increased the probability of a respondent donating the dryland slough for habitat preservation rather than leasing the slough for habitat preservation, contracting the slough for joint habitat preservation and agricultural uses, draining the slough, or continuing without any change.

Respondents with higher net income tended to donate or lease the slough for habitat preservation, contract the slough for joint habitat preservation and agricultural uses, drain the slough, or continue without any change rather than selling the slough for habitat preservation. By not selling, landowners chose to maintain future land use options.

Increased perception of a bright economic future increased the probability of a respondent continuing without any change rather than selling the dryland slough for habitat preservation. By not selling, landowners chose to maintain future land use options.

Increased personal value of wildlife caused the probability of a respondent donating or leasing the dryland slough for habitat preservation, or contracting the slough for joint habitat preservation and agricultural uses rather than draining the slough to increase. Increased personal value of wildlife increased the probability of a respondent continuing without any change rather than selling the slough for habitat preservation, or draining the dryland slough.

As a respondent believed more strongly that compensation would cause less habitat alteration in the future, the probability of a respondent contracting the dryland slough for joint habitat preservation and agricultural uses rather than selling or leasing the slough for habitat preservation increased. Increased belief in the effectiveness of compensation also increased the probability of a respondent continuing without any change rather than, donating, or leasing the dryland slough for habitat preservation.

If a respondent chose the risky investment option, the probability of that respondent leasing the dryland slough for habitat preservation rather than selling the slough for the same purpose, contracting the slough for joint habitat preservation and agricultural uses, or continuing without any change increased.

Increased belief that wildlife populations increase farm market value increased the probability of a respondent leasing the dryland slough for habitat preservation rather than contracting the slough for joint habitat preservation and agricultural uses, or continuing without any change.

The above results indicate that respondents who were older, who believed in the effectiveness of wildlife habitat preservation in controlling erosion, who had smaller net household incomes, and who personally valued wildlife, had the highest probability of preserving and enhancing a slough on their dryland cultivation.

ii. Irrigated Slough Scenario

The results of the estimation of the Irrigated Slough unrestricted MNL model produced the significant relationships presented in Table 13.

Table 13: Irrigated Slough Unrestricted Results				
#	Variable	Choice over Choice	Coefficient	P > t
1	AGE	No Change over Drain	6.925	.190
2	INC	Drain over Sell	16.29	.186
2	INC	Drain over Contract	3.667	.101
4	ALTER *	Drain over Sell	2.577	.158
5	MV *	Sell over Drain	2.153	.163
6	MV *	Contract over Drain	.9866	.151

Note: * - Likert scale: 1=Strongly Disagree to 5=Strongly Agree.

The coefficients in Table 13 were estimated by the MNL analysis. The coefficients are multiplied by the value of explanatory variables ($x\beta$) for use in the Logit.

The p value in Table 13 estimates the probability that the coefficients (β) are not different from zero. The existence of p values less than 0.10 suggest strong behavioral responses. The existence of p values more than 0.10 but less than 0.20 suggest weak behavioral responses. Relationships with p values over 0.20 were not reported.

The older the respondent, the higher the probability of that respondent continuing without any change rather than draining the slough.

Respondents were more likely to drain the irrigated slough rather than selling the slough for wildlife preservation or contracting the slough for joint habitat preservation and agricultural uses if they had high net income.

Increased belief in the effectiveness of compensation increased the probability of a respondent draining the dryland

slough rather than selling the slough for habitat preservation.

As respondents believed more strongly that wildlife populations increase farm market value the probability of those respondents selling the dryland slough for habitat preservation or contracting the slough for joint habitat preservation and agricultural uses rather than draining the slough increased.

The above results indicate that respondents who were older, who had smaller net household incomes, who did not believe in the effectiveness of compensation, and who believed in the economic value of wildlife, had the highest probability of preserving and enhancing a slough on their irrigated cultivation.

iii. Dryland Woodlot Scenario

The results of the estimation of the Dryland Woodlot unrestricted MNL model produced the significant relationships presented in Table 14.

TABLE 14: Dryland Woodlot Unrestricted Results				
#	Variable	Choice over Choice	Coefficient	P > t
1	Constant	Sell over Donate	21.69	.092
2	Constant	Lease over Donate	18.34	.138
3	Constant	Clear over Donate	21.00	.100
4	Constant	No Change over Donate	18.15	.144
5	AGE	Donate over Clear	9.073	.124
6	AGE	Lease over Clear	6.618	.054
7	AGE	No Change over Clear	6.590	.044
8	ECOMP *	Donate over Sell	3.918	.129
9	ECOMP *	Donate over Lease	3.523	.157
10	ECOMP *	Donate over Clear	3.621	.162
11	ECOMP *	Donate over No Change	3.607	.148
12	ECONFUT *	No Change over Sell	0.5187	.172
13	ALTER *	Lease over Sell	0.6290	.173
14	MV *	Sell over Lease	0.6197	.155
15	MV *	Sell over Clear	0.9352	.107
16	MV *	Sell over No Change	0.7301	.104

Note: * - Likert scale: 1=Strongly Disagree to 5=Strongly Agree.

The coefficients in Table 14 were estimated by the MNL analysis. The coefficients are multiplied by the value of explanatory variables ($x\beta$) for use in the Logit.

The p value in Table 14 estimates the probability that the coefficients (β) are not different from zero. The existence of p values less than 0.10 suggest strong behavioral responses. The existence of p values more than 0.10 but less than 0.20 suggest weak behavioral responses. Relationships with p values over 0.20 were not reported.

Independent of all other factors in the model, respondents would rather sell or lease the woodlot for preservation

purposes, clear the woodlot, or continue without any change rather than donate the woodlot for preservation purposes.

Increasing age increased the probability of a respondent donating or leasing the dryland woodlot for habitat preservation, or continuing without any change rather than clearing the woodlot.

As a respondent believed that wildlife habitat preservation effectively controlled erosion, the probability of that respondent donating the woodlot for habitat preservation rather than selling or leasing the woodlot for habitat preservation, draining the woodlot, or continuing without any change increased.

Respondents believing they had a bright economic future were more likely to continue without any change rather than selling the woodlot for habitat preservation.

As respondents believed that compensation effectively encourages landowners to preserve wildlife habitat, they tended to lease the woodlot for habitat preservation rather than selling the woodlot for the same purpose.

Increased belief that wildlife populations increase farm market value increased the probability of a respondent selling

the woodlot for habitat preservation rather than leasing the woodlot for habitat preservation, clearing the woodlot, or continuing without any change.

The above results indicate that respondents who were older, who believed in the effectiveness of wildlife habitat preservation in controlling erosion, and who believed in the economic value of wildlife, had the highest probability of preserving and enhancing a woodlot on their dryland cultivation.

b. Choice Restricted Specification

The second specification tested was choice restricted. The probability of the two most common choices were selected from the entire choice set. All those responses reflecting less popular options were excluded. This specification was estimated with the entire explanatory variable set.

i. Dryland Slough Scenario

The results of the estimation of the Dryland Slough choice restricted MNL model produced the significant relationships presented in Table 15.

#	Variable	Choice over Choice	Coefficient	P > t
1	Constant	Contract over Lease	5.287	.079
2	AGE	Lease over Contract	6.197	.002
3	ALTER *	Contract over Lease	0.6307	.084
4	RISK	Lease over Contract	0.9269	.147
5	MV *	Lease over Contract	0.7600	.017

Note: * - Likert scale: 1=Strongly Disagree to 5=Strongly Agree.

The coefficients in Table 15 were estimated by the MNL analysis. The coefficients are multiplied by the value of explanatory variables ($x\beta$) for use in the Logit.

The p value in Table 15 estimates the probability that the coefficients (β) are not different from zero. The existence of p values less than 0.10 suggest strong behavioral responses. The existence of p values more than 0.10 but less than 0.20 suggest weak behavioral responses. Relationships with p values over 0.20 were not reported.

Independent of all other factors in the model, respondents would rather contract the dryland slough for joint habitat preservation and agricultural uses than lease the slough for habitat preservation.

Older respondents were more likely to lease the dryland slough for habitat preservation rather than contracting the slough for joint habitat preservation and agricultural uses.

Increased belief in the effectiveness of compensation increased the probability of a respondent contracting the

dryland slough for joint habitat preservation and agricultural uses rather than leasing the slough for habitat preservation.

A landowner selecting the risky investment was more likely to lease the dryland slough for habitat preservation rather than to contract the slough for joint habitat preservation and agricultural uses.

Respondents were more likely to lease the dryland slough for habitat preservation rather than contracting the slough for joint habitat preservation and agricultural uses if they believed that wildlife populations increase farm market value.

The above results indicate that respondents who were younger, who believed in the effectiveness of compensation, who were risk averse, and who did not believe in the economic value of wildlife, were more likely to contract to manage a slough on their dryland cultivation for joint agriculture-wildlife purposes than to lease the slough for wildlife management.

ii. Irrigated Slough Scenario

The results of the estimation of the Irrigated Slough choice restricted MNL model produced the significant relationships presented in Table 16.

#	Variable	Choice over Choice	Coefficient	P > t
1	AGE	Contract over Drain	5.383	.199
2	INC	Drain over Contract	3.025	.127
3	ALTER *	Drain over Contract	0.9294	.187
4	MV *	Contract over Drain	0.9497	.144

Note: * - Likert scale: 1=Strongly Disagree to 5=Strongly Agree.

+ - No Significant Relationships to the 90% Level of Confidence.

The coefficients in Table 16 were estimated by the MNL analysis. The coefficients are multiplied by the value of explanatory variables ($x\beta$) for use in the Logit.

The p value in Table 16 estimates the probability that the coefficients (β) are not different from zero. The existence of p values less than 0.10 suggest strong behavioral responses. The existence of p values more than 0.10 but less than 0.20 suggest weak behavioral responses. Relationships with p values over 0.20 were not reported.

The probability of respondents contracting the irrigated slough for joint habitat preservation and agricultural uses rather than draining the slough was higher for older respondents.

High net income respondents were more likely to drain the irrigated slough rather than contracting the slough for joint habitat preservation and agricultural uses.

Increased belief in the effectiveness of compensation increased the probability of a respondent draining the

irrigated slough rather than contracting the slough for joint habitat preservation and agricultural uses.

Respondents believing that wildlife populations increase farm market value were more likely to contract the irrigated slough for joint habitat preservation and agricultural uses rather than draining the slough.

The above results indicate that respondents who were older, who had lower household net income, who did not believe in the effectiveness of compensation, and who believed in the economic value of wildlife, were more likely to contract to manage a slough on their irrigated cultivation for joint agriculture-wildlife purposes than to drain the slough.

iii. Dryland Woodlot Scenario

The results of the estimation of the Dryland Woodlot choice restricted MNL model produced the significant relationships presented in Table 17.

TABLE 17: Dryland Woodlot Choice Restricted Results				
#	Variable	Choice over Choice	Coefficient	P > t
1	INC	No Change over Lease	1.251	.170

Note: * - Likert scale: 1=Strongly Disagree to 5=Strongly Agree.

The coefficient in Table 17 was estimated by the MNL analysis. The coefficient is multiplied by the value of explanatory variables ($x\beta$) for use in the Logit.

The p value in Table 17 estimates the probability that the coefficient (β) is not different from zero. The existence of p values less than 0.10 suggest strong behavioral responses. The existence of p values more than 0.10 but less than 0.20 suggest weak behavioral responses. Relationships with p values over 0.20 were not reported.

Increased net income increased the probability of a respondent continuing without any change rather than leasing the dryland woodlot for habitat preservation.

c. Choice and Explanatory Variable Restricted Specification

The third specification tested was choice and explanatory variable restricted. The probability of the two most common choices were estimated with AGE and INC explanatory variables.

i. Dryland Slough Scenario

The results of the estimation of the Dryland Slough choice and explanatory variable restricted MNL model produced the significant relationships presented in Table 18.

Table 18: Dryland Slough Choice and Explanatory Variable Restricted Results				
#	Variable	Choice over Choice	Coefficient	P > t
1	AGE	Lease over Contract	5.091	.003
2	INC	Lease over Contract	1.565	.089

Note: * - Likert scale: 1=Strongly Disagree to 5=Strongly Agree.

The coefficients in Table 18 were estimated by the MNL analysis. The coefficients are multiplied by the value of explanatory variables ($x\beta$) for use in the Logit.

The p values in Table 18 estimate the probability that the coefficients (β) are not different from zero. The existence of p values less than 0.10 suggest strong behavioral responses. The existence of p values more than 0.10 but less than 0.20 suggest weak behavioral responses. Relationships with p values over 0.20 were not reported.

The probability of a respondent leasing the dryland slough for habitat preservation rather than contracting the slough for joint habitat preservation and agricultural uses increased with age.

High net income respondents were more likely to lease the dryland slough for habitat preservation rather than

contracting the slough for joint habitat preservation and agricultural uses.

The above results indicate that respondents who were younger, and who had lower household net income, were more likely to contract to manage a slough on their dryland cultivation for joint agriculture-wildlife purposes than to lease the slough for wildlife management.

ii. Irrigated Slough Scenario

The results of the estimation of the Irrigated Slough choice and explanatory variable restricted MNL model produced the significant relationship presented in Table 19.

#	Variable	Choice over Choice	Coefficient	P > t
1	AGE	Contract over Drain	5.495	.150

Note: * - Likert scale: 1=Strongly Disagree to 5=Strongly Agree.

+ - No Significant Relationships to the 90% Level of Confidence.

The coefficient in Table 19 was estimated by the MNL analysis. The coefficient is multiplied by the value of explanatory variables ($x\beta$) for use in the Logit.

The p value in Table 19 estimates the probability that the coefficient (β) is not different from zero. The existence of p values less than 0.10 suggest strong behavioral responses. The existence of p values more than 0.10 but less than 0.20 suggest weak behavioral

responses. Relationships with p values over 0.20 were not reported.

Increased age increased the probability of a respondent contracting the irrigated slough for joint habitat preservation and agricultural uses rather than draining the slough.

iii. Dryland Woodlot Scenario

The results of the estimation of the Dryland Woodlot choice and explanatory variable restricted MNL model produced the significant relationships presented in Table 20.

#	Variable	Choice over Choice	Coefficient	P > t
1	Constant	Lease over No Change	1.489	.143
2	INC	No Change over Lease	1.449	.071

Note: * - Likert scale: 1=Strongly Disagree to 5=Strongly Agree.

The coefficient in Table 20 was estimated by the MNL analysis. The coefficient is multiplied by the value of explanatory variables ($x\beta$) for use in the Logit.

The p value in Table 20 estimates the probability that the coefficient (β) is not different from zero. The existence of p values less than 0.10 suggest strong behavioral responses. The existence of p values more than 0.10 but less than 0.20 suggest weak behavioral responses. Relationships with p values over 0.20 were not reported.

Independent of all other factors in the model, respondents would rather lease the dryland woodlot for habitat preservation uses than continue without any change.

Increased net income increased the probability of a respondent continuing without any change rather than leasing the dryland woodlot for habitat preservation.

4. DISCUSSION

Potential land use conflicts were identified between sloughs and woodlots (wildlife land uses), and cultivation and irrigated pasture (agricultural land uses). These potential conflicts exist, as the presence of sloughs or woodlots exclude cultivation or adversely affect the ability to irrigate pasture. These are the land use conflicts that must be resolved in order to attain social welfare wildlife goals.

Certain landowner attributes affected the choice of land use options in the dryland slough scenario. Increased participation in the present landowner habitat program and increased net household income caused landowners not to choose the subdivide and sell option. Increased age caused landowners to choose to the lease option. Increased belief in the ability of wildlife habitat land uses to control erosion caused landowners to choose the subdivide and sell option.

Increased risk acceptance and increased belief in the economic value of wildlife caused landowners to choose the lease option.

The choice of land use options in the irrigated slough scenario were affected by the following land owner attributes. Increasing age and belief in the economic value of wildlife caused landowners not to choose the drain option. Increased net household income and belief in the effectiveness of compensation caused landowners to choose to the drain option.

The following landowner attributes affected the choice of land use options in the dryland woodlot scenario. Independent of all other factors in the model, landowners did not want to choose the subdivide and donate option. Older landowners chose not to clear the woodlot. Increased belief in the ability of wildlife habitat to control erosion caused landowners to choose the subdivide and donate option. The perception of a bright economic future and effectiveness of compensation caused landowners to not choose the subdivide and sell option. Landowners tended to choose the subdivide and sell option if they believed in the economic value of wildlife.

Based on the above analysis, older landowners who have lower household net incomes, who personally value wildlife, who

believe wildlife habitat land uses control erosion, who believe in the economic value of wildlife, and who do not believe in the effectiveness of compensation, are most likely to either voluntarily preserve wildlife habitat or will enrol in a wildlife habitat preservation program like the Landowner Habitat Project

Further analysis of these results may suggest adjustments to existing programs, or may suggest new programs that would be more effective in balancing private wildlife habitat rights and public wildlife rights. The new program options would be more effective, as landowner requirements would be more fully reflected in their design.

V. SUMMARY, CONCLUSIONS, AND IMPLICATIONS

1. Summary and Conclusions

A rights imbalance exists between privately owned wildlife habitat and publicly owned wildlife. In the pursuit of agricultural activities, landowners are altering wildlife habitat at the expense of wildlife carrying capacity. There currently exists no market in which society can express the public cost of decreasing wildlife populations to private landowners. The institutions of real property ownership and the wildlife are therefore not balanced.

The purpose of this study was to identify incentive compatible mechanisms by which society may cause private landowners to internalize the public value of wildlife. A total of 148 landowners were surveyed for this study. Socioeconomic, and wildlife attitude questions were asked in order to understand the landowners' motivations. Three scenarios were presented to the landowners where they were asked to select land use options that either preserved or enhanced wildlife habitat, or altered it for agricultural purposes. The land use options involving the preservation and enhancement of wildlife habitat represented incentive compatible mechanisms that may be used to correct the persistent rights imbalance.

A data set was constructed with responses to the current LHP survey, and a small subset of responses to the previous LHP survey. A multi-nomial logit analysis was completed in an attempt to explain the probability of landowners choosing specific land use options by their socioeconomic and wildlife attitude responses. The purpose of this analysis was to identify those factors that, when incorporated, would increase the efficiency of future wildlife habitat preservation programs.

The results suggested the existence of relationships between survey responses and the land use options chosen in three scenario sections. Factors affecting land use option selection included involvement in current preservation programs, landowner age, belief in the ability of wildlife habitat land uses to control erosion, net household income, economic future, personal value of wildlife, belief in the effectiveness of compensation, landowner risk acceptance, and belief in the economic value of wildlife. These revealed preferences are to be interpreted as indirect reflections of the respondents' utility functions. Through the study of these relationships, specific incentive compatible mechanisms can be developed which may provide the respondents with substitutes for agricultural land in their production functions.

2. Limitations

Two primary limitations of this research were identified. Landowner interviews were completed within one time frame and within three geographical regions of Alberta. The findings of this study will only remain valid for a period of time. Public attitudes, commodity and land prices, and other social and economic forces all affect the decision making process (parameters) of landowners. As these forces change over time, so may the response of landowners to wildlife habitat preservation programs. In order to remain valid over time, this study must be periodically repeated.

The application of the study findings to landowners outside the geographical study regions must be approached with caution. If landowners in other regions possess the same utility (parameters) as landowners in the three study regions, the findings may be applied. It is not clear that landowners in other regions will react the same to land use choices. In order to remain valid in other regions, landowners in the new regions must also be studied.

3. Program Implications

The success or failure of any program with the purpose of changing the actions of a target group is constrained by the

behavioral responses of the individuals within that target group. In the present case, the purpose of the Landowner Habitat Project, and any permanent program that may grow from the project, is to encourage landowners to modify their present behaviour of altering wildlife habitat on their private lands. The incentives or regulations contained in such a program will be most successful if they are compatible with the behavioral responses of the landowners.

The above analysis indicated that landowners who did not consider habitat preservation a good erosion control mechanism, or who had high net incomes, or who did not personally value wildlife were most likely to alter and remove dryland slough wildlife habitat. This information allows public agencies to specifically target these groups. The dryland slough leasing and contracting options were picked with the highest frequency. Respondents who were older, or more risk accepting, or believed that wildlife increased farm market values tended to select the lease option. Respondents who believed in the effectiveness of compensation tended to select the contract option.

The marketing and promotion of preservation programs could highlight the advantages of habitat preservation with respect to erosion control. The financial incentives of the program must be marketed strongly to the high income landowners, as

farming is their primary business in many cases and lifestyle concerns are less important. Respondents also felt strongly that it is the government's responsibility to compensate private landowners for their costs of maintaining wildlife habitat on their private lands. General promotion of wildlife value may increase landowners' awareness and acceptance of preservation programs. Specific attention must be taken to address the perception that wildlife is being protected at the private cost of rural landowners for the primary benefit of urban hunters and wildlife viewers. Compensation programs to offset the perception that wildlife depredation causes decreased farm market values must be either developed or promoted to encourage landowners to preserve habitat.

The analysis indicated that respondents who were younger, or who had higher net incomes, or who believed in the effectiveness of compensation in preserving wildlife habitat, or who did not believe that wildlife increased farm market values were most likely to alter and remove irrigated slough wildlife habitat. This information allows public agencies to specifically target these groups. The irrigated slough contracting and draining options were picked with the highest frequency. Respondents who were older, or who believed that wildlife increased farm market values tended to select the contract option. Respondents who had higher net incomes, or

who believed in the effectiveness of compensation tended to select the drain option.

Although the age of landowners cannot be changed, more study of younger landowners may indicate what incentives will encourage this group to preserve wildlife habitat. The financial incentives of the program must be marketed strongly to the high income landowners, as farming is their primary business in many cases and lifestyle concerns are less important. General promotion of wildlife value may increase landowners' awareness and acceptance of preservation programs. The only other benefit requested by respondents was increased compensation. The two most common reasons given for draining irrigated sloughs were interference with irrigation, and use for crop production. These conflicts must be resolved in order to increase habitat preservation within irrigated regions.

The above analysis indicated that respondents who were younger, or who did not believe that wildlife habitat was a good mechanism for controlling erosion, or who did not believe that wildlife increased farm market values were most likely to alter and remove dryland woodlot wildlife habitat. This information allows public agencies to specifically target these groups. Continuing without change and leasing dryland woodlot options were picked with the highest frequency.

Respondents who had higher net incomes tended to select the continuing without change option.

Although the age of landowners cannot be changed, more study of younger landowners may indicate what incentives will encourage this group to preserve wildlife habitat. General promotion of wildlife value may increase landowners' awareness and acceptance of preservation programs. The marketing and promotion of preservation programs could highlight the advantages of habitat preservation with respect to erosion control. The three most common other benefits requested by respondents were increased compensation, access control to project lands, and shorter lease terms. The two most common reasons given for clearing dryland woodlots were use for crop production, and adverse financial effect. These conflicts must be resolved in order to increase habitat preservation within wooded regions.

Further research is required to monitor the development, promotion, and acceptance of an expanded Landowner Habitat Project. The development of the expanded program should reflect the requirements of targeted landowners. The promotion of the program should target those landowners who possess attributes that may increase their probability of enrolling. An analysis of those landowners participating and not participating in the expanded program is required to

confirm whether the landowner attributes identified in this study continue to successfully estimate the probability of program enrolment.

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APPENDIX I.
SURVEY LETTER, QUESTIONNAIRE, AND SUPPLEMENTAL
QUESTIONNAIRE

WILDLIFE HABITAT PRESERVATION ON PRIVATE LANDS

Dear Landowner:

Your participation in the Landowner Habitat Project study of 1988/89 was greatly appreciated. We would like to present you, at the end of this interview, with a summary of that study and also with statistics from Alberta Fish and Wildlife Division regarding current LHP enrolment.

The Department of Rural Economy of the University of Alberta, in conjunction with Alberta Fish and Wildlife Division, The Recreation Parks and Wildlife Foundation, and Wildlife Habitat Canada, is studying alternate wildlife habitat preservation programs. The present survey is being administered to participants of the recent project completed by D.A. Westworth and Associates project in which the Landowner Habitat Project was reviewed. The Westworth study answered many questions, but also posed new questions. The process by which farmers decide to preserve or alter habitat, and the acceptability of various program alternatives are among those questions.

The questions which follow are not limited solely to the Landowner Habitat Project, but are concerned with all wildlife habitat on privately owned lands in Alberta. This survey will only take about 25 minutes to complete. The purpose of this survey is to better understand the decision making process used by landowners when preserving or alter wildlife habitat on their own land. This knowledge will be used to design wildlife habitat program alternatives within the LHP framework.

We would like to again request your cooperation in participating in the following questionnaire. To ensure that your individual responses to the questions will be held in strict confidence, they will be combined with those of other interview participants.

Thank you for your participation.

WILDLIFE HABITAT PRESERVATION ON PRIVATE LANDS CODE:

(NOTE TO INTERVIEWER: USE NUMERIC CODE 99 FOR NO RESPONSE)

I. WILDLIFE KNOWLEDGE/ATTITUDES

On a scale of: 1 Strongly Agree; 2 Agree; 3 Neutral; 4 Disagree; 5 Strongly Disagree (circle appropriate answer), please rate the following five statements.

1. Farmers must consider wildlife when seeking to maximize profits. 1 2 3 4 5
2. Receiving a non-monetary award for outstanding wildlife habitat preservation is worth a great deal and can compensate for lower profits. 1 2 3 4 5
3. Maximizing profits is more important than insuring wildlife populations for generations yet to come. 1 2 3 4 5
4. My economic future on this present farm is bright. 1 2 3 4 5
5. Farming is just like any other business. 1 2 3 4 5

Please answer the following questions as indicated (circle appropriate answer).

6. PLEASE CONSIDER THE FOLLOWING HYPOTHETICAL SITUATION:

Suppose that you have \$50,000.00 available for investment purposes, and that you could purchase a 1 year guaranteed investment certificate and it would earn 10% interest. Would you instead invest it in a specific 1 year farm venture if in 7 chances in 10 you would recover your investment plus 15% and in 3 chances in 10 you would only recover your original investment.

_____ YES _____ NO

7. DRYLAND SLOUGH AREA:

This section of the questionnaire is part of an experiment designed to provide an indication of program acceptability. The details which follow relate to a hypothetical situation to give you a reference point for your answers, and DO NOT reflect any specific plans on behalf of the Government.

Suppose You own a particular 160 acre field with average soil quality. Area average yields are produced on 150 acres of dryland cultivation. There is a 10 acre semi-permanent slough area in one corner (see map). This slough area can be seeded and harvested 1 year out of 4. The slough area is wet and can not be farmed 3 years out of 4. The presence of the slough alters the field's cultivation pattern on wet years. It is possible to drain the slough area by mechanically contouring the land. If drained, this slough would be converted into dryland cultivation of similar quality to the rest of the field. On wet years, this slough supports migratory bird (ie. ducks) and upland (ie. pheasant) bird nesting and cover. In order to provide high quality habitat, 30 acres of dryland cultivation surrounding the 10 acre slough would have to be seeded to dense nesting cover (hay or grass). This would produce a 40 acre parcel of high quality wildlife habitat.

Given the background information and the following options, which would you choose?

A. Subdivide and sell in fee simple the 40 acre parcel, for 100% of appraised market value, for habitat preservation (if chosen go to A-1), or;

B. Subdivide and donate in fee simple the 40 acre parcel, in exchange for a 100% of land value income tax exemption, for habitat preservation (if chosen go to B-1), or;

C. Lease out the 30 acres of dryland cultivation for 80% of local cash rental rates, and receive compensation for 80% of expected decreased net profit in return for not farming the 10 acre slough during the 1 dry year in 4 (if chosen go to C-1), or;

D. Seed the 30 acres of dryland cultivation to hay, and sign a five year contract to receive compensation for 80% of expected decreased net profit in return for agreeing not to undertake any farming practices within the 40 acre parcel before July 15 each year (if chosen go to D-1), or;

E. Drain the slough (if chosen go to E-1), or;

F. Continue without any changes (if chosen go to F-1).

A-1. Would you rather sell the slough to:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Duck's Unlimited)?
- No preference

A-2. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Duck's Unlimited)?

A-3. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 8)

B-1. Would you rather donate the slough to:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Duck's Unlimited)?
- No preference

B-2. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Duck's Unlimited)?

B-3. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 8)

C-1. Would you rather lease the slough to:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Duck's Unlimited)?
- No preference

C-2. Would you rather lease the slough:

- For 10 years with no grantee of renewal, or
- For 20 years with no grantee of renewal, or
- In perpetuity with a caveat being registered on the title that would remain if the land was sold.

C-3. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Duck's Unlimited)?

C-4. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 8)

D-1. Would you rather sign the contract with:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Duck's Unlimited)?
- No preference

D-2. Would you rather receive compensation:

- In annual cash payments, or
- In annual Provincial Income Tax rebates, or
- In a one-time up-front cash payment equal to the present value of expected future payments?

D-3. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Duck's Unlimited)?

D-4. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 8)

E-1. What are your reasons for choosing this option rather than any of the others?

Would an increase in compensation levels change your mind?
(Proceed to Question 8)

F-1. What are your reasons for choosing this option rather than any of the others?

Would an increase in compensation levels change your mind?
(Proceed to Question 8)

8. IRRIGATED SLOUGH AREA:

This section of the questionnaire is part of an experiment designed to provide an indication of program acceptability. The details which follow relate to a hypothetical situation to give you a reference point for your answers, and DO NOT reflect any specific plans on behalf of the Government.

Suppose You own a particular 160 acre field with average soil quality. Area average yields are produced on 150 acres of irrigated cultivation. The field is irrigated with a side-roll wheel move system. There is a 10 acre semi-permanent slough area in one corner (see map), which is not the irrigation water source. This slough area can be seeded and harvested 1 year out of 4. The slough area is wet and can not be farmed 3 years out of 4. The presence of the slough alters the field's cultivation pattern on wet years. It is possible to drain the slough area by mechanically contouring the land. If drained, this slough would be converted into irrigated cultivation of similar quality to the rest of the field. On wet years, this slough supports migratory bird (ie. ducks) and upland (ie. pheasant) bird nesting and cover. In order to provide high quality habitat, 30 acres of irrigated cultivation surrounding the 10 acre slough would have to be seeded to dense nesting cover (hay or grass), and would not have to be irrigated. This would produce a 40 acre parcel of high quality wildlife habitat.

Given the background information and the following options, which would you choose?

A. Subdivide and sell in fee simple the 40 acre parcel, for 100% of appraised market value, for habitat preservation (if chosen go to A-1), or;

B. Subdivide and donate in fee simple the 40 acre parcel, in exchange for a 100% of land value income tax exemption, for habitat preservation (if chosen go to B-1), or;

C. Lease out the 30 acres of irrigated cultivation for 80% of local cash rental rates, and receive compensation for 80% of expected decreased net profit in return for not farming the 10 acre slough during the 1 dry year in 4 (if chosen go to C-1), or;

D. Seed the 30 acres of irrigated cultivation to hay, and sign a five year contract to receive compensation for 80% of expected decreased net profit in return for agreeing not to undertake any farming practices within the 40 acre parcel before July 15 each year (if chosen go to D-1), or;

E. Drain the slough (if chosen go to E-1), or;

F. Continue without any changes (if chosen go to F-1).

A-1. Would you rather sell the slough to:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Duck's Unlimited)?
- No preference

A-2. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Duck's Unlimited)?

A-3. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 9)

B-1. Would you rather donate the slough to:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Duck's Unlimited)?
- No preference

B-2. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Duck's Unlimited)?

B-3. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 9)

C-1. Would you rather lease the slough to:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Duck's Unlimited)?
- No preference

C-2. Would you rather lease the slough:

- For 10 years with no grantee of renewal, or
- For 20 years with no grantee of renewal, or
- In perpetuity with a caveat being registered on the title that would remain if the land was sold.

C-3. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Duck's Unlimited)?

C-4. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 9)

D-1. Would you rather sign the contract with:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Duck's Unlimited)?
- No preference

D-2. Would you rather receive compensation:

- In annual cash payments, or
- In annual Provincial Income Tax rebates, or
- In a one-time up-front cash payment equal to the present value of expected future payments?

D-3. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Duck's Unlimited)?

D-4. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 9)

E-1. What are your reasons for choosing this option rather than any of the others?

Would an increase in compensation levels change your mind?
(Proceed to Question 9)

F-1. What are your reasons for choosing this option rather than any of the others?

Would an increase in compensation levels change your mind?
(Proceed to Question 9)

9. DRYLAND WOODLOT AREA:

This section of the questionnaire is part of an experiment designed to provide an indication of program acceptability. The details which follow relate to a hypothetical situation to give you a reference point for your answers, and DO NOT reflect any specific plans on behalf of the Government.

Suppose You own a particular 160 acre field with average soil quality. Area average yields are produced on 120 acres of dryland cultivation. There is a 40 acre woodlot in one corner (see map). This woodlot is of no commercial logging value. It is possible to clear the woodlot. If cleared, this woodlot would be converted into dryland cultivation of similar quality to the rest of the field. This woodlot supports bird nesting cover and permanent deer shelter.

Given the background information and the following options, which would you choose?

- A. Subdivide and sell the woodlot, for 100% of appraised market value, for habitat preservation (if chosen go to A-1), or;
- B. Subdivide and donate in fee simple the woodlot, in exchange for a 100% of land value income tax exemption, for habitat preservation (if chosen go to B-1), or;
- C. Lease the woodlot for 80% of local cash rental rates for similar woodlots (ie. grazing rates), for habitat preservation (if chosen go to C-1), or;
- D. Clear the woodlot (if chosen go to D-1), or;
- E. Continue without any changes (if chosen go to E-1).

A-1. Would you rather sell the woodlot to:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Nature Conservancy)?
- No preference

A-2. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Nature Conservancy)?

A-3. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 10)

B-1. Would you rather donate the woodlot to:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Nature Conservancy)?
- No preference

B-2. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Nature Conservancy)?

B-3. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 10)

C-1. Would you rather lease the woodlot to:

- The Government (ie. Fish and Wildlife Division), or to
- A private Wildlife Habitat organization (ie. Nature Conservancy)?
- No preference

C-2. Would you rather lease the woodlot:

- For 10 years with no grantee of renewal, or
- For 20 years with no grantee of renewal, or
- In perpetuity with a caveat being registered on the title that would remain if the land was sold.

C-3. Would you prefer to either:

- Receive no other benefits, or
- Be given public recognition by having your land posted, or
- Be given free lifetime hunting/fishing licenses, or
- Be given an honorary lifetime membership in a private conservation organisation (ie. Nature Conservancy)?

C-4. Are there any other benefits that would make this option more attractive to you (specify)?

(Proceed to Question 10)

D-1. What are your reasons for choosing this option rather than any of the others?

Would an increase in compensation levels change your mind?
(Proceed to Question 10)

E-1. What are your reasons for choosing this option rather than any of the others?

Would an increase in compensation levels change your mind?
(Proceed to Question 10)

Please answer the following questions as indicated

10. Suppose you were originally satisfied with a particular lease compensation level with no other benefits, for each of the following INDIVIDUAL options would you require more, less, or the same compensation:

A. If You were publicly presented with a Certificate of Recognition: _____

B. If You were given free lifetime hunting/fishing licenses: _____

C. If You were given a lifetime membership in a conservation organisation: _____

D. If Your land was publicly posted with Project signs: _____

On a scale of: 1 Strongly Agree; 2 Agree; 3 Neutral; 4 Disagree; 5 Strongly Disagree (circle appropriate answer), please rate the following nine statements.

11. Farmers have a responsibility toward all those now living to maintain wildlife habitat so as to protect wildlife populations. 1 2 3 4 5

12. Farmers have a responsibility toward future generations to maintain wildlife habitat so as to protect wildlife populations. 1 2 3 4 5

13. The government has the responsibility to enforce wildlife habitat preservation on private lands in Alberta. 1 2 3 4 5

14. The government has the responsibility to compensate farmers for their costs of maintaining wildlife habitat on their farms. 1 2 3 4 5

15. Farmers, in general, value wildlife habitat on their farms. 1 2 3 4 5

16. I value wildlife habitat on my farm. 1 2 3 4 5

17. Increased wildlife populations on a farm increases its market value. 1 2 3 4 5

18. I will alter less habitat in the future if I am compensated to maintain it. 1 2 3 4 5

19. My neighbours will alter less habitat in the future if they are compensated to maintain it. 1 2 3 4 5

II. Land Use Compatibility

This section of the questionnaire is part of an experiment designed to provide an indication of land use compatibility. In each of the following three questions, four separate agricultural land uses are compared with five separate wildlife habitat land uses. You are asked to rate the level of compatibility between land uses.

20. Please rate the following land use interactions for agricultural profitability on a scale of:

1 Strongly Compatible; 2 Compatible; 3 Neutral; 4 Competitive; 5 Strongly Competitive

INTERACTION MATRIX	SHELTER BELTS	MAINTAIN DITCH/FENCE COVER	GRASSED WATERWAYS	MAINTAIN SLOUGHS/GRASSED UPLANDS	MAINTAIN WOODLOTS
DRYLAND CULT.					
IRRIGATED CULT.					
DRYLAND PASTURE			XXXXXXXXXX		
IRRIGATED PASTURE			XXXXXXXXXX		

21. Please rate the following land use interactions for wildlife preservation and production on a scale of:

1 Strongly Compatible; 2 Compatible; 3 Neutral; 4 Competitive; 5 Strongly Competitive

INTERACTION MATRIX	SHELTER BELTS	MAINTAIN DITCH/FENCE COVER	GRASSED WATERWAYS	MAINTAIN SLOUGHS/GRASSED UPLANDS	MAINTAIN WOODLOTS
DRYLAND CULT.					
IRRIGATED CULT.					
DRYLAND PASTURE			XXXXXXXXXX		
IRRIGATED PASTURE			XXXXXXXXXX		

22. Please rate the following land use interactions for control of water and/or wind erosion on a scale of:

1 Strongly Compatible; 2 Compatible; 3 Neutral; 4 Competitive; 5 Strongly Competitive

INTERACTION MATRIX	SHELTER BELTS	MAINTAIN DITCH/ FENCE COVER	GRASSED WATERWAYS	MAINTAIN SLOUGHS/ GRASSED UPLANDS	MAINTAIN WOODLOTS
DRYLAND CULT.					
IRRIGATED CULT.					
DRYLAND PASTURE			XXXXXXXXXX		
IRRIGATED PASTURE			XXXXXXXXXX		

(NOTE TO INTERVIEWER: PRESENT LHP SUMMARY TO LANDOWNER NOW)

III. FARMING OPERATIONS/PRACTICES

23. Which of the following is the primary operation on your farm? (circle appropriate response)

- a) grain
- b) cattle
- c) hogs
- d) poultry
- e) dairy
- f) forage
- g) other (specify)

24. If your landbase changed since the last survey, please specify which changes occurred.

LAND TYPE		ACRES OWNED	ACRES LEASED	RENTAL/LEASE RATE (\$/ACRE)
Cultivated:	dry			
	irrig			
Hay:	dry			
	irrig			
Pasture:	dry			
	irrig			
Range:	dry			
	irrig			
Summerfallow:	dry			
	irrig			
Sloughs/Ponds:				
Woodlots:				
Idle Grassland:				
Other(specify):				

25. Which category best represents your net household (farm and non-farm) income (please circle appropriate category):

- | | |
|------------------------|------------------------|
| a. under \$10,000 | g. \$60,000 - \$69,999 |
| b. \$10,000 - \$19,999 | h. \$70,000 - \$79,999 |
| c. \$20,000 - \$29,999 | i. \$80,000 - \$89,999 |
| d. \$30,000 - \$39,999 | j. \$90,000 - \$99,999 |
| e. \$40,000 - \$49,999 | k. \$100,000 and over |
| f. \$50,000 - \$59,999 | |

Please answer the following questions in point form.

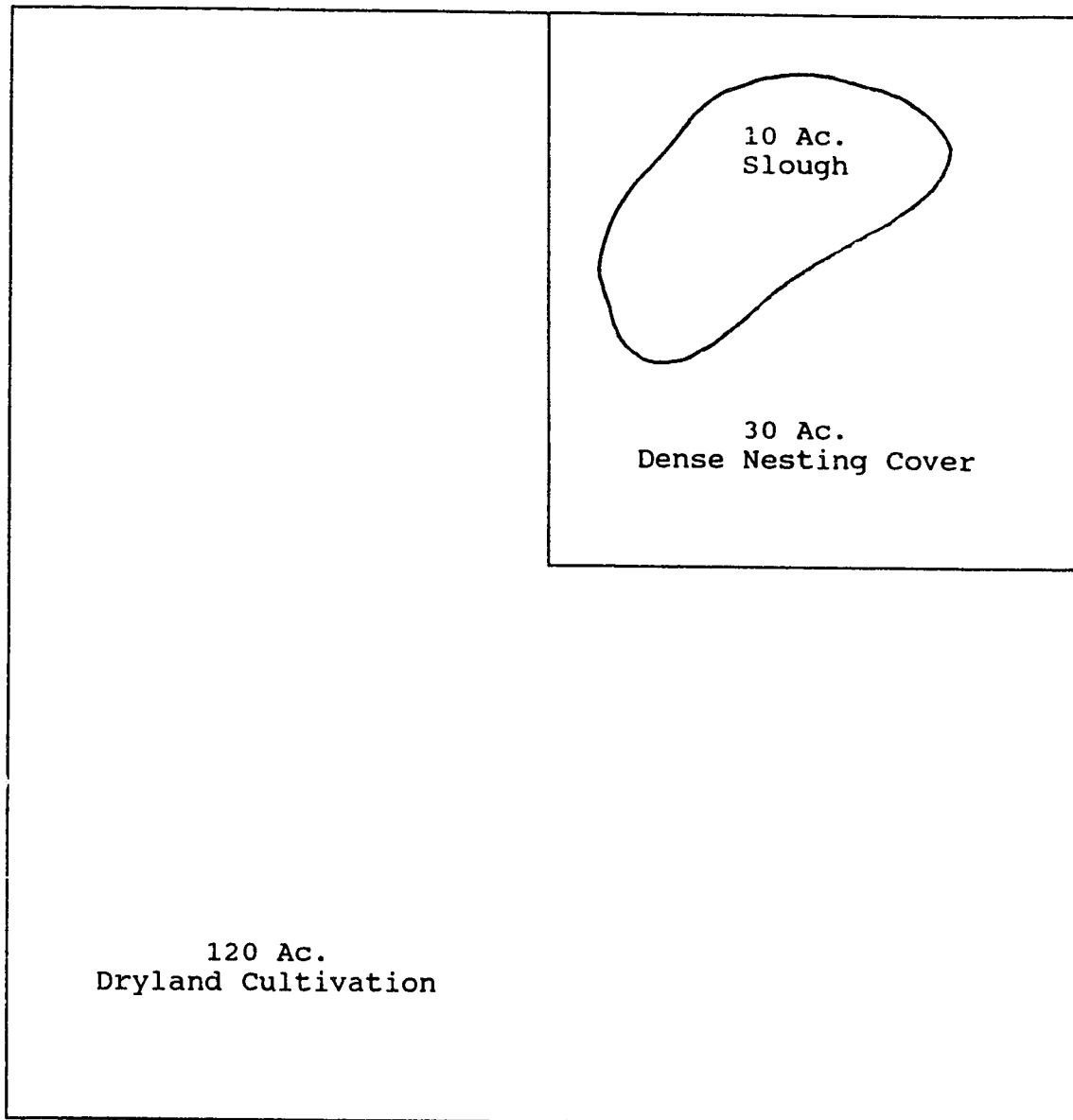
26. How would you decide whether or not to participate in a Government Habitat Retention Program?

27. Do you think it's important to maintain wildlife habitat?

Why?

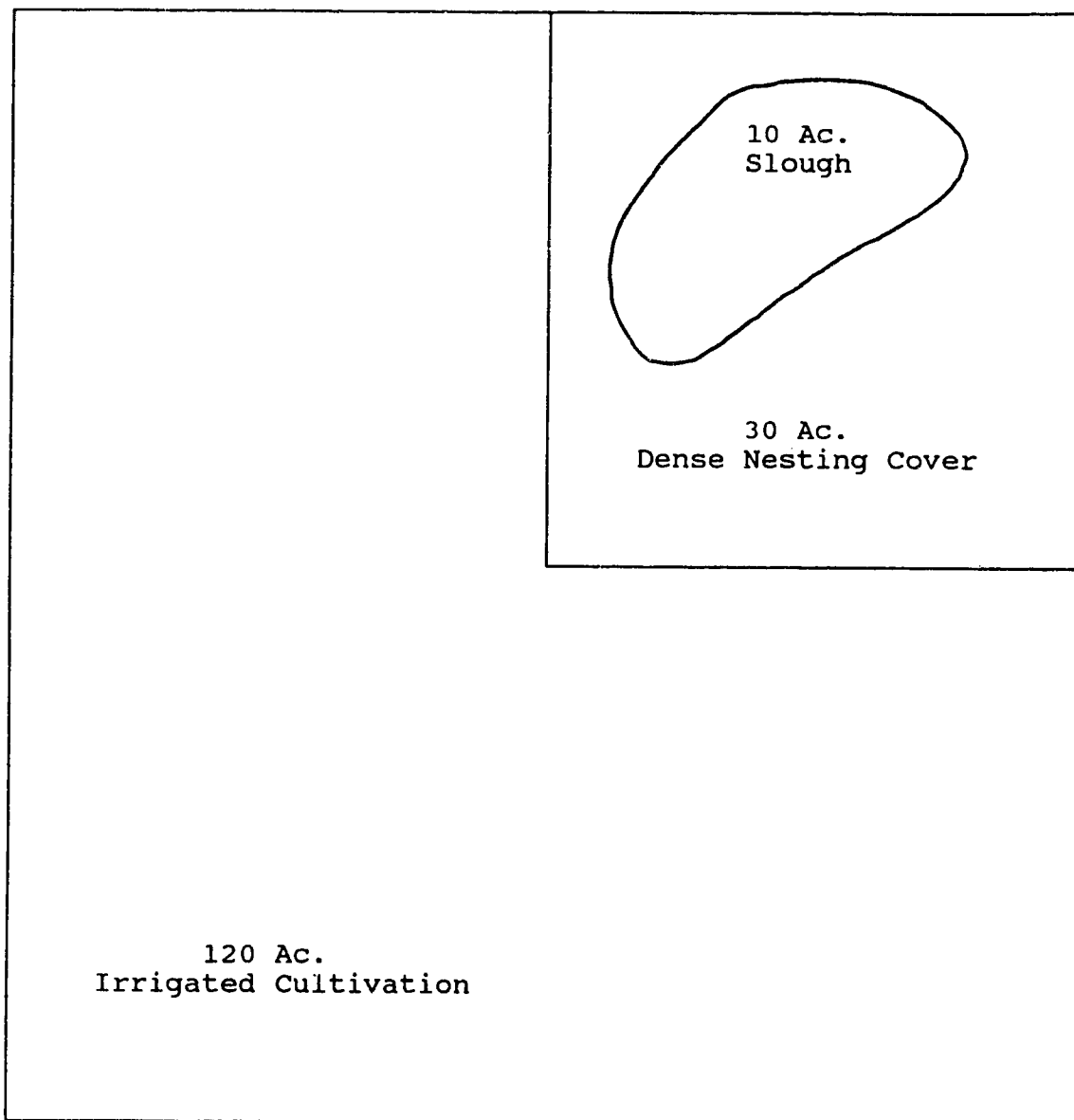
28. Do you have any further comments?

7. DRYLAND SLOUGH AREA MAP



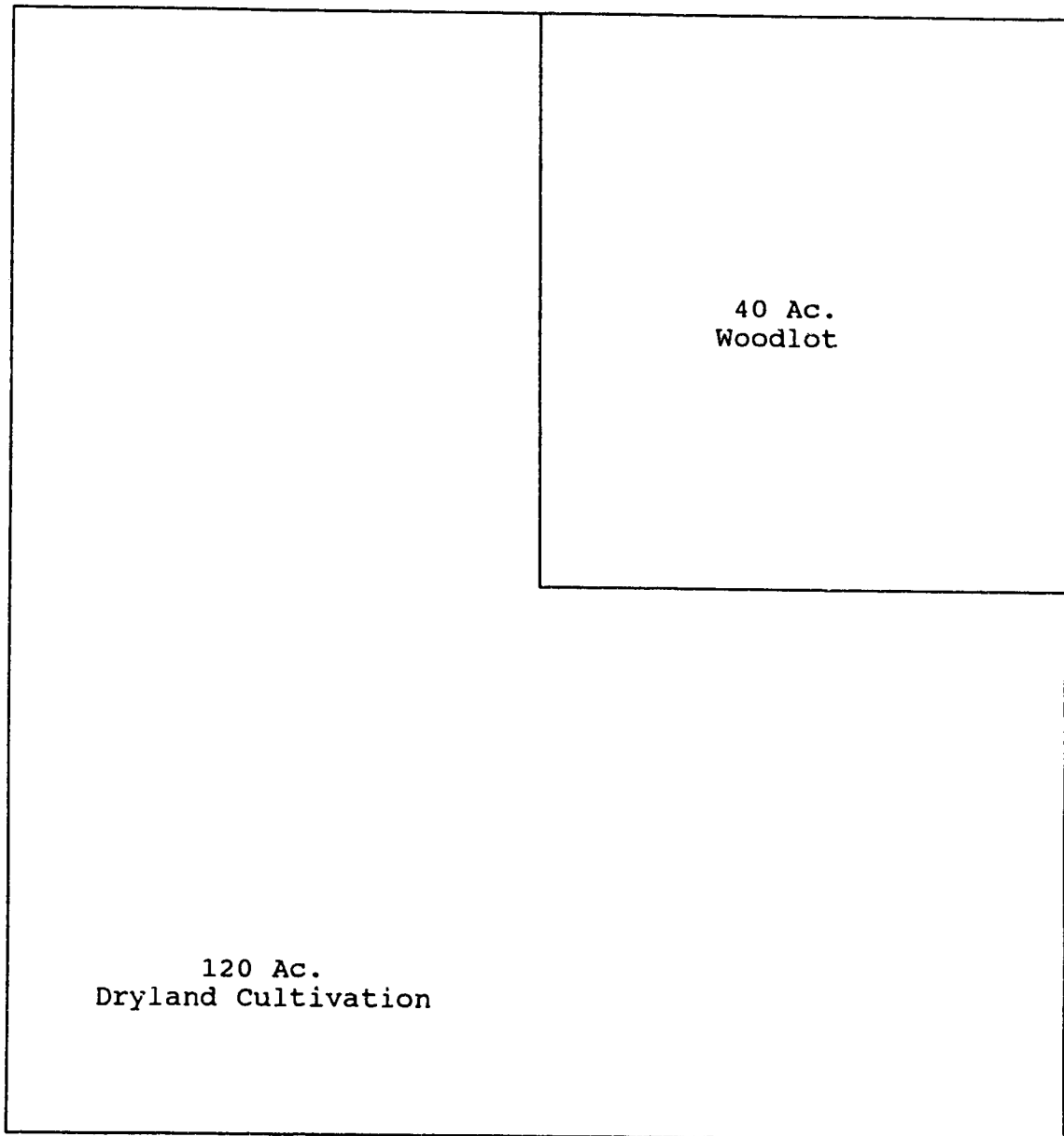
160 ACRE TOTAL FIELD SIZE

8. IRRIGATED SLOUGH AREA MAP



160 ACRE TOTAL FIELD SIZE

9. WOODLOT AREA MAP



160 ACRE TOTAL FIELD SIZE

WILDLIFE HABITAT PRESERVATION ON PRIVATE ALBERTA LANDS
SUPPLEMENTAL TELEPHONE INTERVIEW

NAME:
STATUS:
REGION:

CODE:

1. AS OF DECEMBER 31, 1988, HOW MANY ACRES OF YOUR FARM WERE:

LAND TYPE		ACRES OWNED	ACRES LEASED	RENTAL/LEASE RATE (\$/ACRE)
Cultivated:	dry			
	irrig			
Hay:	dry			
	irrig			
Pasture:	dry			
	irrig			
Range:	dry			
	irrig			
Summerfallow:	dry			
	irrig			
Sloughs/Ponds:				
Woodlots:				
Idle Grassland:				
Other(specify):				

2. AGE OF LANDOWNER: _____ YEARS
3. EDUCATION: _____ YEARS
HIGHEST LEVEL ATTAINED: _____
4. NUMBER IN HOUSEHOLD (INCL. SELF): _____
OVER 18 YEARS: _____
UNDER 18 YEARS: _____
5. DATE OF LHP ENROLMENT: _____ = _____ MOS.
6. ACRES IN LHP: _____ ACRES

APPENDIX II.

PREVIOUS LHP SURVEY RESULTS

The following material is a summary taken directly from the unpublished report by D. A. Westworth and Associates (1990), and was provided to all survey participants of the current LHP study with the permission of the authors.

In 1986, the Alberta Fish and Wildlife Division initiated a three year pilot project designed to encourage habitat retention practices among landowners in agricultural areas of the province. The Landowner Habitat Project (LHP), through various incentive mechanisms, promotes land use practices that benefit both the landowner and the wildlife resource the land supports. A study was initiated in 1988 to evaluate the effectiveness of the project in achieving its goals, to assess various funding scenarios, and to identify requirements for province-wide expansion.

The study was conducted in three areas of the province and included the Counties of Minburn and Red Deer and the Eastern and Bow River Irrigation Districts. Of the 95 landowners participating in the LHP, 93% (88) were interviewed using a detailed questionnaire designed to assess landowners' general wildlife knowledge and attitudes towards wildlife habitat, farming operations, demographic characteristics, and perceptions of the LHP. In addition to the participant interviews, a total random sample of 82 non-participating landowners was also made in the study regions.

Demographic comparisons of landowner status and study regions indicated that the majority of landowners interviewed had spent a large proportion of their life on the farm. Participants in the LHP tended to attain a higher education level, and reported higher income levels than non-participants. The majority of the landowners in each of the three study regions were engaged in mixed farming operations. Average farm sizes ranged from 261 ha to 541 ha.

When asked about changes to their landbase, only 13% of the participants interviewed indicated that some changes had occurred over the past 10 years. By comparison, 23% of non-participants had drained or backsloped their lands. Land-clearing (brushing, woodlot removal) accounted for 65% of the land base changes for participants and 85% for non-participants.

The majority of the landowners interviewed valued the presence of wildlife on their land and were aware of the importance of various types of habitat to wildlife. When queried about the condition of wildlife on their land, 44% of the participants rated it as excellent, 51% rated it as good, and just 3% of

the participants rated it as poor. Non-participants, however, tended to rate lower the condition of wildlife habitats on their lands. The majority of both participants and non-participants gave much lower ratings when asked what they thought the condition of wildlife habitat was on areas around their lands. The perception by both participants and non-participants that the condition of wildlife habitat is much better on their lands than on lands owned by others is significant in that it may influence their tendency to manage their land in ways that are beneficial to wildlife or their willingness to become involved in habitat preservation programs.

Almost two-thirds of the landowners (participants and non-participants) felt that the amount of wildlife habitat available on their land was stable. Again the majority of landowners interviewed saw the situation as being much less favourable on neighbouring lands. Recent exposure to crop depredation by wildlife did not appear to be a significant factor in the landowners' attitudes toward wildlife or to their willingness to become involved in the LHP.

A majority of participants interviewed indicated that they were very satisfied or satisfied with the LHP. In addition, financial incentives offered by the LHP were considered adequate by most of the participants. However, participants tended to consider incentives offered and soil and water quality/conservation concerns significantly less important than non-participants. By comparison, wildlife-related concerns of issues are significantly more important to participants than to non-participants.

The report includes a discussion on issues and concerns that will ultimately influence the success of the LHP in Alberta. Non-participants indicated that incentives offered, soil quality/conservation concerns, and water quality/conservation concerns are LHP features that may influence program participation, significantly more than participants did. Participants indicated that personal interest in wildlife and wildlife habitat, habitat recognition/promotion (awards, signs), increase families awareness for wildlife, and increase families awareness of wildlife habitat are LHP features that may influence program participation, significantly more than non-participants did. Those surveyed in the County of Minburn (participants and non-participants) indicated that soil quality/conservation concerns are LHP features that may influence program participation, significantly more than those surveyed in other areas did.

Participation in the LHP reached the following levels during the past 2 years.

1989

LOCATION	AGREEMENTS	ACRES
Irrigation Districts	26	1,690
Red Deer	62	10,823
Minburn	35	5,918
Total	123	18,431

1990

LOCATION	AGREEMENTS	ACRES
Irrigation Districts	58	5,062
Red Deer	126	18,926
Minburn	89	14,770
Total	273	38,758

Overall the LHP appears to be a cost-effective method of retaining wildlife habitat in Alberta. The project itself was widely accepted by participants and non-participants interviewed during the study and it is likely to receive widespread support once the project is expanded throughout the province. However, agricultural programs and other economic, political, and social forces promoting the intensification of farming activities in existing agricultural areas and the expansion of agriculture into northern regions may offset any potential gains and benefits the LHP may have for wildlife habitat. To some extent, this has already happened in the White Area of the province where the population goals established by Fish and Wildlife Division for the white-tailed deer are being reduced considerably. A province-wide expansion of the LHP will also require a considerable amount of funding and to this end, a number of funding alternatives are identified and evaluated.

APPENDIX III.

FREQUENCIES OF CURRENT SURVEY RESULTS

This section contains the frequencies of responses from the completed surveys. A copy of the survey questionnaire is contained in APPENDIX I.

TABLE. III-1: Respondent LHP Status		
STATUS	FREQUENCY	VALID PERCENT
Participant	80	54.1%
Non-participant	68	45.9%

Note: Results of this frequency table relate to the survey questionnaire in Appendix I.

TABLE. III-2: Respondent Study Region		
Study Region	FREQUENCY	VALID PERCENT
Minburn	47	31.8%
Red Deer	66	44.6%
Irrigation	35	23.7%

Note: Results of this frequency table relate to the survey questionnaire in Appendix I.

TABLE. III-3: Farmers Must Consider Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	27	18.2%
Agree	75	50.7%
Neutral	27	18.2%
Disagree	14	9.5%
Strongly Disagree	5	3.4%

Note: Results of this frequency table relate to question 1 of the survey questionnaire in Appendix I.

Rank	FREQUENCY	VALID PERCENT
Strongly Agree	15	10.1%
Agree	51	34.5%
Neutral	39	26.4%
Disagree	33	22.3%
Strongly Disagree	10	6.8%

Note: Results of this frequency table relate to question 2 of the survey questionnaire in Appendix I.

Rank	FREQUENCY	VALID PERCENT
Strongly Agree	7	4.8%
Agree	22	15.0%
Neutral	20	13.6%
Disagree	65	44.2%
Strongly Disagree	33	22.4%

Note: Results of this frequency table relate to question 3 of the survey questionnaire in Appendix I.

Rank	FREQUENCY	VALID PERCENT
Strongly Agree	13	9.2%
Agree	54	38.0%
Neutral	28	19.7%
Disagree	33	23.2%
Strongly Disagree	14	9.9%

Note: Results of this frequency table relate to question 4 of the survey questionnaire in Appendix I.

TABLE. III-7: Farming Like Other Business		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	30	20.3%
Agree	46	31.1%
Neutral	7	4.7%
Disagree	44	29.7%
Strongly Disagree	21	14.2%

Note: Results of this frequency table relate to question 5 of the survey questionnaire in Appendix I.

TABLE. III-8: Take Risky Investment		
Rank	FREQUENCY	VALID PERCENT
Yes	78	52.7%
No	70	47.3%

Note: Results of this frequency table relate to question 6 of the survey questionnaire in Appendix I.

TABLE. III-9: Dryland Slough Area Scenario		
Land Use Option	FREQUENCY	VALID PERCENT
Subdivide and Sell	6	4.1%
Subdivide and Donate	4	2.7%
Lease	33	22.4%
Contract	75	51.0%
Drain	3	2.0%
No Change	26	17.1%

Note: Results of this frequency table relate to question 7 of the survey questionnaire in Appendix I.

TABLE. III-10: Rather Sell Dryland Slough To		
AGENCY	FREQUENCY	VALID PERCENT
Government	3	50.0%
Private	1	16.7%
No Preference	2	33.3%

Note: Results of this frequency table relate to question 7A1 of the survey questionnaire in Appendix I.

TABLE. III-11: Prefer To Receive Other Benefits		
BENEFIT	FREQUENCY	VALID PERCENT
No Other	1	16.7%
Project Signs	2	33.3%
Free Licenses	1	16.7%
Membership	2	33.3%

Note: Results of this frequency table relate to question 7A2 of the survey questionnaire in Appendix I.

TABLE. III-12: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
More Compensation	1	50.0%
Access Control	1	50.0%

Note: Results of this frequency table relate to question 7A3 of the survey questionnaire in Appendix I.

TABLE. III-13: Rather Donate Dryland Slough To		
AGENCY	FREQUENCY	VALID PERCENT
Government	2	50.0%
Private	1	25.0%
No Preference	1	25.0%

Note: Results of this frequency table relate to question 7B1 of the survey questionnaire in Appendix I.

TABLE. III-14: Prefer To Receive Other Benefits		
Benefit	FREQUENCY	VALID PERCENT
No Other	2	50.0%
Project Signs	0	0.0%
Free Licenses	1	25.0%
Membership	1	25.0%

Note: Results of this frequency table relate to question 7B2 of the survey questionnaire in Appendix I.

TABLE. III-15: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
Capital Improvements	1	100.0%

Note: Results of this frequency table relate to question 7B3 of the survey questionnaire in Appendix I.

TABLE. III-16: Rather Lease Dryland Slough To		
AGENCY	FREQUENCY	VALID PERCENT
Government	11	33.3%
Private	7	21.2%
No Preference	15	45.5%

Note: Results of this frequency table relate to question 7C1 of the survey questionnaire in Appendix I.

TABLE. III-17: Lease Term		
TERM	FREQUENCY	VALID PERCENT
10 Years	24	75.0%
20 Years	1	3.1%
In Perpetuity	7	21.9%

Note: Results of this frequency table relate to question 7C2 of the survey questionnaire in Appendix I.

TABLE. III-18: Prefer To Receive Other Benefits		
Benefit	FREQUENCY	VALID PERCENT
No Other	8	24.2%
Project Signs	13	29.4%
Free Licenses	8	24.2%
Membership	4	12.1%

Note: Results of this frequency table relate to question 7C3 of the survey questionnaire in Appendix I.

TABLE. III-19: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
More Compensation	4	33.3%
Access Control	1	8.3%
Shorter Lease	1	8.3%
Allow Livestock Grazing	1	8.3%
Compensate Wildlife For Depredation	2	16.7%
Recognition	1	8.3%
Cancel After 10 Years	1	8.3%
Good Lessee Maintenance	1	8.3%

Note: Results of this frequency table relate to question 7C4 of the survey questionnaire in Appendix I.

TABLE. III-20: Rather Contract Dryland Slough To		
AGENCY	FREQUENCY	VALID PERCENT
Government	30	40.0%
Private	21	28.0%
No Preference	24	32.0%

Note: Results of this frequency table relate to question 7D1 of the survey questionnaire in Appendix I.

TABLE. III-21: Compensation Form		
FORM	FREQUENCY	VALID PERCENT
Annual Cash	60	80.0%
Annual Income Tax Rebate	3	4.0%
One Time Up Front	12	16.0%

Note: Results of this frequency table relate to question 7D2 of the survey questionnaire in Appendix I.

TABLE. III-22: Prefer To Receive Other Benefits		
Benefit	FREQUENCY	VALID PERCENT
No Other	15	20.3%
Project Signs	29	39.2%
Free Licenses	17	23.0%
Membership	13	17.6%

Note: Results of this frequency table relate to question 7D3 of the survey questionnaire in Appendix I.

TABLE. III-23: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
More Compensation	4	19.0%
Access Control	3	14.3%
Capital Improvements	3	14.3%
Allow Livestock Grazing	1	4.8%
Keep Foreigners Out	1	4.8%
40+ Backflood Project	1	4.8%
Public Awareness	1	4.8%
Tax Compensation Payments Over 5 Years	1	4.8%
Longer Term	1	4.8%
Also Have Project Sign	1	4.8%
Waive Property Tax	2	9.5%
Flexible Owner Use	1	4.8%
Inform Owner of Success	1	4.8%

Note: Results of this frequency table relate to question 7D4 of the survey questionnaire in Appendix I.

TABLE. III-24: Reason #1 For Draining Dryland Slough		
REASON	FREQUENCY	VALID PERCENT
Adverse Financial Effect	1	33.3%
Use For Crops	1	33.3%
Too Much Set Aside Now	1	33.3%

Note: Results of this frequency table relate to question 7E of the survey questionnaire in Appendix I.

TABLE. III-25: Reason #2 For Draining Dryland Slough		
REASON	FREQUENCY	VALID PERCENT
Wildlife Depredation	1	100.0%

Note: Results of this frequency table relate to question 7E of the survey questionnaire in Appendix I.

TABLE. III-26: Would Increased Compensation Change Your Mind?		
RESPONSE	FREQUENCY	VALID PERCENT
Yes	2	66.7%
No	1	33.3

Note: Results of this frequency table relate to question 7E of the survey questionnaire in Appendix I.

TABLE. III-27 : Reason #1 For Continuing Without Any Changes		
REASON	FREQUENCY	VALID PERCENT
Already Supports Wildlife	3	11.5%
Own Reserve and Management	2	7.7%
Use For Livestock Too	1	3.8%
Enjoy Wildlife	2	7.7%
Keep Future Options Open	1	3.8%
Easy - No Red Tape	2	7.7%
Retain Control	1	3.8%
Wildlife Depredation	2	7.7%
Leave For Pasture	1	3.8%
Retirement	1	3.8%
Compensation Too Low	1	3.8%
Fair To Continue	1	3.8%
Nature Takes Care	1	3.8%
Destroy Natural Environment	1	3.8%
Small Farms Need Cultivation	1	3.8%
Effect On Rest Of Farm	1	3.8%
Hunting Livestock Loss	1	3.8%
Water Is Valuable	1	3.8%
No Practical Options	1	3.8%
Maximize Profits	1	3.8%

Note: Results of this frequency table relate to question 7F of the survey questionnaire in Appendix I.

TABLE. III-28: Reason #2 For Continuing Without Any Changes		
REASON	FREQUENCY	VALID PERCENT
Already Supports Wildlife	1	11.1%
Own Reserve and Management	1	11.1%
Use For Livestock Too	2	22.2%
Doesn't Affect Me	1	11.1%
Retain Control	1	11.1%
Ban All Hunting	1	11.1%
Do Not Need More Habitat	1	11.1%
Project Access Problems	1	11.1%

Note: Results of this frequency table relate to question 7F of the survey questionnaire in Appendix I.

TABLE. III-29: Would Increased Compensation Change Your Mind?		
RESPONSE	FREQUENCY	VALID PERCENT
Yes	9	34.6%
No	17	65.4%

Note: Results of this frequency table relate to question 7F of the survey questionnaire in Appendix I.

TABLE. III-30: Irrigated Slough Area Scenario		
Land Use Option	FREQUENCY	VALID PERCENT
Subdivide and Sell	3	8.6%
Subdivide and Donate	2	5.7%
Lease	1	2.9%
Contract	12	34.3%
Drain	13	37.1%
No Change	4	11.4%

Note: Results of this frequency table relate to question 8 of the survey questionnaire in Appendix I.

TABLE. III-31: Rather Sell Irrigated Slough To		
AGENCY	FREQUENCY	VALID PERCENT
Government	1	33.3%
Private	1	33.3%
No Preference	1	33.3%

Note: Results of this frequency table relate to question 8A1 of the survey questionnaire in Appendix I.

TABLE. III-32: Prefer To Receive Other Benefits		
Benefit	FREQUENCY	VALID PERCENT
No Other	2	66.7%
Project Signs	0	0.0%
Free Licenses	1	33.3%
Membership	0	0.0%

Note: Results of this frequency table relate to question 8A2 of the survey questionnaire in Appendix I.

TABLE. III-33: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
More Compensation	1	100.0%

Note: Results of this frequency table relate to question 8A3 of the survey questionnaire in Appendix I.

TABLE. III-34: Rather Donate Irrigated Slough To		
AGENCY	FREQUENCY	VALID PERCENT
Government	0	0.0%
Private	1	50.0%
No Preference	1	50.0%

Note: Results of this frequency table relate to question 8B1 of the survey questionnaire in Appendix I.

TABLE. III-35: Prefer To Receive Other Benefits		
Benefit	FREQUENCY	VALID PERCENT
No Other	2	100.0%
Project Signs	0	0.0%
Free Licenses	0	0.0%
Membership	0	0.0%

Note: Results of this frequency table relate to question 8B2 of the survey questionnaire in Appendix I.

TABLE. III-36: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
None Indicated	2	

Note: Results of this frequency table relate to question 8B3 of the survey questionnaire in Appendix I.

TABLE. III-37: Rather Lease Irrigated Slough To		
AGENCY	FREQUENCY	VALID PERCENT
Government	0	0.0%
Private	1	100.0%
No Preference	0	0.0%

Note: Results of this frequency table relate to question 8C1 of the survey questionnaire in Appendix I.

TABLE. III-38: Lease Term		
TERM	FREQUENCY	VALID PERCENT
10 Years	0	0.0%
20 Years	1	100.0%
In Perpetuity	0	0.0%

Note: Results of this frequency table relate to question 8C2 of the survey questionnaire in Appendix I.

TABLE. III-39: Prefer To Receive Other Benefits		
Benefit	FREQUENCY	VALID PERCENT
No Other	0	0.0%
Project Signs	1	100.0%
Free Licenses	0	0.0%
Membership	0	0.0%

Note: Results of this frequency table relate to question 8C3 of the survey questionnaire in Appendix I.

TABLE. III-40: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
None Indicated	1	

Note: Results of this frequency table relate to question 8C4 of the survey questionnaire in Appendix I.

TABLE. III-41: Rather Contract Irrigated Slough To		
AGENCY	FREQUENCY	VALID PERCENT
Government	2	16.7%
Private	6	50.0%
No Preference	4	33.3%

Note: Results of this frequency table relate to question 8D1 of the survey questionnaire in Appendix I.

TABLE. III-42: Compensation Form		
FORM	FREQUENCY	VALID PERCENT
Annual Cash	11	91.7%
Annual Income Tax Rebate	0	0.0%
One Time Up Front	1	8.3%

Note: Results of this frequency table relate to question 8D2 of the survey questionnaire in Appendix I.

TABLE. III-43: Prefer To Receive Other Benefits		
Benefit	FREQUENCY	VALID PERCENT
No Other	1	8.3%
Project Signs	6	50.0%
Free Licenses	2	16.7%
Membership	3	25.0%

Note: Results of this frequency table relate to question 8D3 of the survey questionnaire in Appendix I.

TABLE. III-44: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
More Compensation	1	25.0%
Capital Improvements	2	50.0%
Own Hunting Rights	1	25.0%

Note: Results of this frequency table relate to question 8D4 of the survey questionnaire in Appendix I.

TABLE. III-45: Reason #1 For Draining Irrigated Slough		
REASON	FREQUENCY	VALID PERCENT
Adverse Financial Effect	1	7.7%
Irrigation Interference	4	30.8%
Use For Crops	5	38.5%
Recover Irrigation Fixed Costs	1	7.7%
High Land Value	1	7.7%
Farming Is Primary Business	1	7.7%

Note: Results of this frequency table relate to question 8E of the survey questionnaire in Appendix I.

TABLE. III-46: Reason #2 For Draining Irrigated Slough		
REASON	FREQUENCY	VALID PERCENT
Adverse Financial Effect	2	33.3%
Irrigation Interference	3	50.0%
Recover Irrigation Fixed Costs	1	16.7%

Note: Results of this frequency table relate to question 8E of the survey questionnaire in Appendix I.

TABLE. III-47: Would Increased Compensation Change Your Mind?		
RESPONSE	FREQUENCY	VALID PERCENT
Yes	7	63.6%
No	4	36.4

Note: Results of this frequency table relate to question 8E of the survey questionnaire in Appendix I.

TABLE. III-48 : Reason #1 For Continuing Without Any Changes		
REASON	FREQUENCY	VALID PERCENT
Own Reserve and Management	1	25.0%
Use For Livestock Too	1	25.0%
Retain Control	1	25.0%
Leave For Pasture	1	25.0%

Note: Results of this frequency table relate to question 8F of the survey questionnaire in Appendix I.

TABLE. III-49: Reason #2 For Continuing Without Any Changes		
REASON	FREQUENCY	VALID PERCENT
Doesn't Affect Me	1	100.0%

Note: Results of this frequency table relate to question 8F of the survey questionnaire in Appendix I.

TABLE. III-50: Would Increased Compensation Change Your Mind?		
RESPONSE	FREQUENCY	VALID PERCENT
Yes	1	25.0%
No	3	75.0%

Note: Results of this frequency table relate to question 8F of the survey questionnaire in Appendix I.

LAND USE OPTION	FREQUENCY	VALID PERCENT
Subdivide and Sell	10	6.8%
Subdivide and Donate	5	3.4%
Lease	78	53.1%
Drain	9	6.1%
No Change	45	30.6%

Note: Results of this frequency table relate to question 9 of the survey questionnaire in Appendix I.

AGENCY	FREQUENCY	VALID PERCENT
Government	6	60.0%
Private	3	30.0%
No Preference	1	10.0%

Note: Results of this frequency table relate to question 9A1 of the survey questionnaire in Appendix I.

Benefit	FREQUENCY	VALID PERCENT
No Other	4	40.0%
Project Signs	2	20.0%
Free Licenses	2	20.0%
Membership	2	20.0%

Note: Results of this frequency table relate to question 9A2 of the survey questionnaire in Appendix I.

TABLE. III-54: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
More Compensation	1	50.0%
Capital Improvements	1	50.0%

Note: Results of this frequency table relate to question 9A3 of the survey questionnaire in Appendix I.

TABLE. III-55: Rather Donate Dryland Woodlot To		
AGENCY	FREQUENCY	VALID PERCENT
Government	1	20.0%
Private	3	60.0%
No Preference	1	20.0%

Note: Results of this frequency table relate to question 931 of the survey questionnaire in Appendix I.

TABLE. III-56: Prefer To Receive Other Benefits		
Benefit	FREQUENCY	VALID PERCENT
No Other	3	60.0%
Project Signs	1	20.0%
Free Licenses	0	0.0%
Membership	1	20.0%

Note: Results of this frequency table relate to question 9B2 of the survey questionnaire in Appendix I.

TABLE. III-57: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
More Compensation	1	100.0%

Note: Results of this frequency table relate to question 9B3 of the survey questionnaire in Appendix I.

TABLE. III-58: Rather Lease Dryland Woodlot To		
AGENCY	FREQUENCY	VALID PERCENT
Government	40	51.3%
Private	12	15.4%
No Preference	26	33.3%

Note: Results of this frequency table relate to question 9C1 of the survey questionnaire in Appendix I.

TABLE. III-59: Lease Term		
TERM	FREQUENCY	VALID PERCENT
10 Years	50	71.4%
20 Years	13	18.6%
In Perpetuity	7	10.0%

Note: Results of this frequency table relate to question 9C2 of the survey questionnaire in Appendix I.

TABLE. III-60: Prefer To Receive Other Benefits		
Benefit	FREQUENCY	VALID PERCENT
No Other	16	20.8%
Project Signs	37	48.1%
Free Licenses	14	18.2%
Membership	10	13.0%

Note: Results of this frequency table relate to question 9C3 of the survey questionnaire in Appendix I.

TABLE. III-61: Additional Other Benefit #1		
BENEFIT	FREQUENCY	VALID PERCENT
More Compensation	8	19.0%
Access Control	3	7.1%
Capital Improvements	5	11.9%
Shorter Lease Term	11	26.2%
Maintain Property Taxes	2	4.8%
Allow Livestock Grazing	1	2.4%
Prefer Monetary Incentives	1	2.4%
Public Awareness	1	2.4%
Close Deer Hunting Season	1	2.4%
Good Lessee Maintenance	2	4.8%
Escape Clause	2	4.8%
Also Have Sign	1	2.4%
Waive Property Taxes	1	2.4%
Flexible Owner Use	1	2.4%
Owner Hunting Rights	1	2.4%
More Owner Consultation	1	2.4%

Note: Results of this frequency table relate to question 9C4 of the survey questionnaire in Appendix I.

TABLE. III-62: Reason #1 For Clearing Dryland Woodlot		
REASON	FREQUENCY	VALID PERCENT
Adverse Financial Effect	2	22.2%
Use For Crops	5	55.6%
Habitat On Marginal Land	1	11.1%
Make A Living	1	11.1%

Note: Results of this frequency table relate to question 9D of the survey questionnaire in Appendix I.

TABLE. III-63: Reason #2 For Clearing Dryland Woodlot		
REASON	FREQUENCY	VALID PERCENT
Use For Crops	1	33.3%
Maintain Land Management	1	33.3%
Doesn't Help Livestock	1	33.3%

Note: Results of this frequency table relate to question 9D of the survey questionnaire in Appendix I.

TABLE. III-64: Would Increased Compensation Change Your Mind?		
RESPONSE	FREQUENCY	VALID PERCENT
Yes	8	100.0%
No	0	0%

Note: Results of this frequency table relate to question 9D of the survey questionnaire in Appendix I.

TABLE. III-65 : Reason #1 For Continuing Without Any Changes		
REASON	FREQUENCY	VALID PERCENT
Already Supports Wildlife	4	9.3%
Own Reserve and Management	4	9.3%
Use For Livestock Too	11	25.6%
Enjoy Wildlife	1	2.3%
Keep Future Options Open	3	7.0%
Few People Subdivide	1	2.3%
Don't Want To Clear	2	4.7%
Retain Control	4	9.3%
Erosion control	1	2.3%
No Bother To Leave It	1	2.3%
Can Afford To Leave It	1	2.3%
To Much Habitat Interference	1	2.3%
Nature Take Own Course	1	2.3%
Land Is Poor	1	2.3%
Natural Appeal	2	4.7%
Project Access Problem	2	4.7%
Wildlife Benefits Farm	1	2.3%
Enough Game Now	1	2.3%
No Practical Options	1	2.3%

Note: Results of this frequency table relate to question 9E of the survey questionnaire in Appendix I.

TABLE. III-66: Reason #2 For Continuing Without Any Changes		
REASON	FREQUENCY	VALID PERCENT
Already Supports Wildlife	8	33.3
Own Reserve and Management	2	8.3
Use For Livestock Too	1	4.2
Doesn't Affect Me	1	4.2
Easy - No Red Tape	1	4.2
Retain Control	2	8.3
Erosion Control	2	8.3
No Development Needed	1	4.2
Compensation Too Low	1	4.2
Can Not Clear All Trees	1	4.2
Renters - Rock The Boat	1	4.2
Project Access Problems	1	4.2
Keep Without Payment	1	4.2
Enough Game Now	1	4.2

Note: Results of this frequency table relate to question 9E of the survey questionnaire in Appendix I.

TABLE. III-67: Would Increased Compensation Change Your Mind?		
RESPONSE	FREQUENCY	VALID PERCENT
Yes	12	29.3%
No	29	70.7%

Note: Results of this frequency table relate to question 9E of the survey questionnaire in Appendix I.

TABLE. III-68: Marginal Compensation With a Certificate of Recognition		
MARGINAL COMPENSATION	FREQUENCY	VALID PERCENT
More	13	8.8%
Less	4	2.7%
Same	131	88.5%

Note: Results of this frequency table relate to question 10A of the survey questionnaire in Appendix I.

TABLE. III-69: Marginal Compensation With Free Hunting/Fishing Licenses		
MARGINAL COMPENSATION	FREQUENCY	VALID PERCENT
More	4	2.7%
Less	17	11.5%
Same	127	85.8%

Note: Results of this frequency table relate to question 10B of the survey questionnaire in Appendix I.

TABLE. III-70: Marginal Compensation With Free Lifetime Membership		
MARGINAL COMPENSATION	FREQUENCY	VALID PERCENT
More	6	4.1%
Less	6	4.1%
Same	136	91.9%

Note: Results of this frequency table relate to question 10C of the survey questionnaire in Appendix I.

TABLE. III-71: Marginal Compensation With Publicly Posted Project Signs		
MARGINAL COMPENSATION	FREQUENCY	VALID PERCENT
More	12	8.1%
Less	7	4.7%
Same	129	87.2%

Note: Results of this frequency table relate to question 10D of the survey questionnaire in Appendix I.

TABLE. III-72: Farmers Responsible To All Those Now Living		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	44	29.7%
Agree	80	54.1%
Neutral	7	4.7%
Disagree	12	8.1%
Strongly Disagree	5	3.4%

Note: Results of this frequency table relate to question 11 of the survey questionnaire in Appendix I.

TABLE. III-73: Farmers Responsible To Future Generations		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	45	30.4%
Agree	85	57.4%
Neutral	6	4.1%
Disagree	9	6.1%
Strongly Disagree	3	2.0%

Note: Results of this frequency table relate to question 12 of the survey questionnaire in Appendix I.

TABLE. III-74: Government Responsible To Enforce Habitat Preservation		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	14	9.5%
Agree	43	29.1%
Neutral	17	11.5%
Disagree	38	25.7%
Strongly Disagree	36	24.3%

Note: Results of this frequency table relate to question 13 of the survey questionnaire in Appendix I.

TABLE. III-75: Government Responsible To Compensate Farmers		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	50	33.8%
Agree	74	50.0%
Neutral	13	8.8%
Disagree	8	5.4%
Strongly Disagree	3	2.0%

Note: Results of this frequency table relate to question 14 of the survey questionnaire in Appendix I.

TABLE. III-76: Farmers, In General, Value Wildlife Habitat On Their Farms		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	32	21.8%
Agree	68	46.3%
Neutral	17	11.6%
Disagree	27	18.4%
Strongly Disagree	3	2.0%

Note: Results of this frequency table relate to question 15 of the survey questionnaire in Appendix I.

TABLE. III-77: I Value Wildlife Habitat On My Farm		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	89	64.5%
Agree	54	36.7%
Neutral	3	2.0%
Disagree	0	0.0%
Strongly Disagree	1	0.7%

Note: Results of this frequency table relate to question 16 of the survey questionnaire in Appendix I.

TABLE. III-78: Increase Wildlife Populations Increases Farm Market Value		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	8	5.4%
Agree	30	20.3%
Neutral	42	28.4%
Disagree	55	37.2%
Strongly Disagree	13	8.8%

Note: Results of this frequency table relate to question 17 of the survey questionnaire in Appendix I.

TABLE. III-79: I Will Alter Less Habitat In The Future If I Am Compensated		
Rank	FREQUENCY	VALID PERCENT
Strongly Agree	35	23.8%
Agree	80	54.4%
Neutral	16	10.9%
Disagree	13	8.8%
Strongly Disagree	1	2.0%

Note: Results of this frequency table relate to question 18 of the survey questionnaire in Appendix I.

Rank	FREQUENCY	VALID PERCENT
Strongly Agree	19	14.0%
Agree	59	43.4%
Neutral	44	32.4%
Disagree	12	8.8%
Strongly Disagree	2	1.5%

Note: Results of this frequency table relate to question 19 of the survey questionnaire in Appendix I.

Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	60	40.5%
Compatible	60	40.5%
Neutral	11	7.4%
Competitive	15	10.1%
Strongly Competitive	2	1.4%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	30	20.3%
Compatible	55	37.2%
Neutral	41	27.7%
Competitive	19	12.8%
Strongly Competitive	3	2.0%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-83: Grass Waterways-Dryland Cultivation Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	45	30.6%
Compatible	53	36.1%
Neutral	32	21.8%
Competitive	16	10.9%
Strongly Competitive	1	0.7%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-84: Sloughs-Dryland Cultivation Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	22	15.1%
Compatible	36	24.7%
Neutral	29	19.9%
Competitive	47	32.2%
Strongly Competitive	12	8.2%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-85: Woodlots-Dryland Cultivation Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	21	14.2%
Compatible	40	27.0%
Neutral	37	25.0%
Competitive	42	28.4%
Strongly Competitive	8	5.4%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-86: Shelterbelt-Irrigation Cultivation Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	25	19.4%
Compatible	58	45.0%
Neutral	25	19.4%
Competitive	18	14.0%
Strongly Competitive	3	2.3%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-87: Ditch Cover-Irrigation Cultivation Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	22	16.3%
Compatible	53	39.3%
Neutral	37	27.4%
Competitive	19	14.1%
Strongly Competitive	4	3.0%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-88: Grass Waterways-Irrigation Cultivation Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	29	21.6%
Compatible	53	39.6%
Neutral	28	20.9%
Competitive	17	12.7%
Strongly Competitive	7	5.2%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-89: Sloughs-Irrigation Cultivation Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	14	10.1%
Compatible	37	26.6%
Neutral	23	16.5%
Competitive	44	31.7%
Strongly Competitive	21	15.1%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-90: Woodlots-Irrigation Cultivation Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	13	9.6%
Compatible	29	21.3%
Neutral	33	24.3%
Competitive	36	26.5%
Strongly Competitive	25	18.4%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-91: Shelterbelt-Dryland Pasture Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	57	38.5%
Compatible	72	48.6%
Neutral	17	11.5%
Competitive	2	1.4%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-92: Ditch Cover-Dryland Pasture Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	37	25.0%
Compatible	68	45.9%
Neutral	34	23.0%
Competitive	7	4.7%
Strongly Competitive	2	1.4%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-93: Sloughs-Dryland Pasture Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	56	38.1%
Compatible	73	49.7%
Neutral	9	6.1%
Competitive	8	5.4%
Strongly Competitive	1	0.7%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-94: Woodlots-Dryland Pasture Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	37	25.2%
Compatible	75	51.0%
Neutral	23	15.6%
Competitive	9	6.1%
Strongly Competitive	3	2.0%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-95: Shelterbelt-Irrigated Pasture Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	38	27.1%
Compatible	66	47.1%
Neutral	23	16.4%
Competitive	11	7.9%
Strongly Competitive	2	1.4%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-96: Ditch Cover-Irrigated Pasture Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	26	18.4%
Compatible	73	51.8%
Neutral	28	19.9%
Competitive	11	7.8%
Strongly Competitive	3	2.1%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-97: Sloughs-Irrigated Pasture Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	28	20.0%
Compatible	61	43.6%
Neutral	22	15.7%
Competitive	27	19.3%
Strongly Competitive	2	1.4%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-98: Woodlots-Irrigated Pasture Interaction For Profit		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	21	14.9%
Compatible	62	44.0%
Neutral	25	17.7%
Competitive	26	18.4%
Strongly Competitive	7	5.0%

Note: Results of this frequency table relate to question 20 of the survey questionnaire in Appendix I.

TABLE. III-99: Shelterbelt-Dryland Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	70	47.3%
Compatible	74	50.0%
Neutral	4	2.7%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-100: Ditch Cover-Dryland Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	61	41.2%
Compatible	80	54.1%
Neutral	7	4.7%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-101: Grass Waterways-Dryland Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	58	39.5%
Compatible	78	53.1%
Neutral	11	7.5%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-102: Sloughs-Dryland Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	88	59.5%
Compatible	56	37.8%
Neutral	3	2.0%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-103: Woodlots-Dryland Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	92	62.2%
Compatible	52	35.1%
Neutral	3	2.0%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-104: Shelterbelt-Irrigation Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	62	43.1%
Compatible	74	51.4%
Neutral	8	5.6%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-105: Ditch Cover-Irrigation Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	64	44.8%
Compatible	73	51.0%
Neutral	6	4.2%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-106: Grass Waterways-Irrigation Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	59	41.5%
Compatible	68	47.9%
Neutral	14	9.9%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-107: Sloughs-Irrigation Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	77	53.5%
Compatible	60	41.7%
Neutral	6	4.2%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-108: Woodlots-Irrigation Cultivation Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	83	57.6%
Compatible	53	36.8%
Neutral	6	4.2%
Competitive	2	1.4%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-109: Shelterbelt-Dryland Pasture Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	74	50.0%
Compatible	68	45.9%
Neutral	6	4.1%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-110: Ditch Cover-Dryland Pasture Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	71	48.3%
Compatible	71	48.3%
Neutral	5	3.4%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-111: Sloughs-Dryland Pasture Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	90	61.2%
Compatible	53	36.1%
Neutral	3	2.0%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-112: Woodlots-Dryland Pasture Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	92	62.2%
Compatible	53	35.8%
Neutral	3	2.0%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-113: Shelterbelt-Irrigated Pasture Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	67	46.9%
Compatible	71	49.7%
Neutral	5	3.5%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-114: Ditch Cover-Irrigated Pasture Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	66	46.2%
Compatible	72	50.3%
Neutral	5	3.5%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-115: Sloughs-Irrigated Pasture Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	84	58.3%
Compatible	54	37.5%
Neutral	4	2.8%
Competitive	2	1.4%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-116: Woodlots-Irrigated Pasture Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	82	56.9%
Compatible	57	39.6%
Neutral	4	2.8%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-117: Shelterbelt-Dryland Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	102	68.9%
Compatible	44	29.7%
Neutral	2	1.4%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-118: Ditch Cover-Dryland Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	67	45.3%
Compatible	67	45.3%
Neutral	13	8.8%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-116: Woodlots-Irrigated Pasture Interaction For Wildlife		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	82	56.9%
Compatible	57	39.6%
Neutral	4	2.8%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 21 of the survey questionnaire in Appendix I.

TABLE. III-117: Shelterbelt-Dryland Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	102	68.9%
Compatible	44	29.7%
Neutral	2	1.4%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-118: Ditch Cover-Dryland Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	67	45.3%
Compatible	67	45.3%
Neutral	13	8.8%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-119: Grass Waterways-Dryland Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	94	63.5%
Compatible	49	33.1%
Neutral	4	2.7%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-120: Sloughs-Dryland Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	52	35.1%
Compatible	62	41.9%
Neutral	30	20.3%
Competitive	3	2.0%
Strongly Competitive	1	0.7%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-121: Woodlots-Dryland Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	71	48.0%
Compatible	68	45.9%
Neutral	9	6.1%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-122: Shelterbelt-Irrigation Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	81	57.0%
Compatible	56	39.4%
Neutral	5	3.5%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-123: Ditch Cover-Irrigation Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	59	41.8%
Compatible	67	47.5%
Neutral	15	10.6%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-124: Grass Waterways-Irrigation Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	79	55.2%
Compatible	54	37.8%
Neutral	8	5.6%
Competitive	2	1.4%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-125: Sloughs-Irrigation Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	46	32.4%
Compatible	64	45.1%
Neutral	27	19.0%
Competitive	5	3.5%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-126: Woodlots-Irrigation Cultivation Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	60	42.0%
Compatible	72	50.3%
Neutral	10	7.0%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-127: Shelterbelt-Dryland Pasture Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	73	49.3%
Compatible	49	33.1%
Neutral	25	16.9%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-128: Ditch Cover-Dryland Pasture Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	58	39.2%
Compatible	60	40.5%
Neutral	30	20.3%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-129: Sloughs-Dryland Pasture Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	54	36.5%
Compatible	56	37.8%
Neutral	36	24.3%
Competitive	2	1.4%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-130: Woodlots-Dryland Pasture Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	68	45.9%
Compatible	55	37.2%
Neutral	25	16.9%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-131: Shelterbelt-Irrigated Pasture Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	58	40.8%
Compatible	56	39.4%
Neutral	27	19.0%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-132: Ditch Cover-Irrigated Pasture Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	54	37.8%
Compatible	60	42.0%
Neutral	29	20.3%
Competitive	0	0.0%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-133: Sloughs-Irrigated Pasture Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	44	30.6%
Compatible	59	41.0%
Neutral	38	26.4%
Competitive	3	2.1%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-134: Woodlots-Irrigated Pasture Interaction For Erosion Control		
Rank	FREQUENCY	VALID PERCENT
Strongly Compatible	58	40.3%
Compatible	56	38.9%
Neutral	29	20.1%
Competitive	1	0.7%
Strongly Competitive	0	0.0%

Note: Results of this frequency table relate to question 22 of the survey questionnaire in Appendix I.

TABLE. III-135: Primary Operation		
ENTERPRISE	FREQUENCY	VALID PERCENT
Grain	70	47.3%
Cattle	54	36.5%
Hogs	5	3.4%
Dairy	3	2.0%
Forage	9	6.1%
Other	7	4.7%

Note: Results of this frequency table relate to question 23 of the survey questionnaire in Appendix I.

TABLE. III-136: Net Household Income		
INCOME COHORT	FREQUENCY	VALID PERCENT
< \$10,000	20	14.4%
\$10,000 - \$19,999	21	15.1%
\$20,000 - \$29,999	18	12.9%
\$30,000 - \$39,999	29	20.9%
\$40,000 - \$49,999	14	10.1%
\$50,000 - \$59,999	13	9.4%
\$60,000 - \$69,999	6	4.3%
\$70,000 - \$79,999	5	3.6%
\$80,000 - \$89,999	3	2.2%
\$90,000 - \$99,999	2	1.4%
\$100,000 and over	8	5.8%

Note: Results of this frequency table relate to question 25 of the survey questionnaire in Appendix I.