

**LANDOWNER PERCEPTIONS TOWARDS ELK DAMAGE
MANAGEMENT AND ELK RANCHING IN THE
SWAN RIVER AREA, MANITOBA.**

by

Robert Purdy

A Practicum Submitted
In Partial Fulfillment of the
Requirements for the Degree,
Master of Natural Resources Management

Natural Resources Institute
The University of Manitoba
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July, 1987

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ABSTRACT

As evidence of the opportunistic and adaptive abilities of elk (*Cervus elaphus*), damage to agricultural interests has been a long-standing concern. Awareness that Canadian agriculture could benefit from these abilities has led to the recent interest of the four western Provinces in elk ranching.

Two interrelated management concerns became a focus for political action in the Swan River Area, and led to the implementation of the present study. Some farmers in the Swan River Area perceived that the Swan Valley Elk Ranch, established as a test project in 1982, began attracting wild elk that increased elk damage to farms in the vicinity. The first concern was that elk damage management was not effectively dealing with the perceived increase in elk damage, and secondly, opposition to the Swan Valley Elk Ranch indicated elk ranching development might conflict with interests of some farmers.

This study addresses these concerns by evaluating elk damage management and elk ranching from the perspective of farmers. I hope the results will be useful in improving elk damage management and in achieving responsible elk ranching development.

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Chapter I

INTRODUCTION

1.1 BACKGROUND

The opportunistic and adaptive abilities of elk (Cervus elaphus) account for this species' success in using agricultural products for food. Also, these abilities of elk to adjust to different environments makes the species suitable for husbandry operations such as elk ranching. The reason elk adjust so well to different environments may be that elk evolved in the diverse northern transitional habitat (plain and woodland edge) and have a relatively large brain compared to other cervids (Geist 1982).

1.1.1 Wildlife And Elk Damage Management

Wildlife depredation, or damage to agricultural interests by wildlife, began with agricultural settlement in North America. When colonists promoted the idea of wildlife as a public trust, they also made the state responsible for wildlife management. The paradox of private land and public wildlife refers to the unique situation in which landowners own land that supports wildlife, yet wildlife is a public resource. There are three consequences of this system. Firstly, publicly funded agencies must attempt to manage a wildlife resource which over much of the country is 'off limits' to these agencies (Boag et

al. 1980). Secondly, landowners benefit from putting wildlife habitat into agricultural production at the expense of the wildlife resource owned by society (Colpitts 1974). Finally, landowners absorb costs but essentially raise wildlife for the benefit of society.

The philosophy of wildlife damage management has been developing since wildlife managers first recognized an obligation to assist farmers with wildlife damage. Managers learned that without effective wildlife damage management human-wildlife relations are strained, unnecessary environmental stresses occur, and economic losses due to wildlife damage are high (See Anthony and Fisher 1977, Brown 1978, Saskatchewan 1978, and Rounds 1980).

Dorrance (1983) pointed out that resolution of human-wildlife conflicts produces tangible and intangible benefits to man and the environment and should be an integral, positive part of wildlife management. Problem wildlife management must integrate six essential components: damage prevention, damage compensation, control, public education and extension, program evaluation, and research. Moreover, these components should be tailored to economic considerations, land ownership, land use, type of damage, and species and abundance of wildlife involved (Dorrance 1983).

Damage prevention measures can be generally classified into exclusion, repellents, attractants, cultural methods, population control, and removal; compensation for damage is frequently provided when preventative measures are ineffective or impractical. The criteria used in deciding whether or not to implement these measures should include

economic, aesthetic, social, ecological, political, and administrative considerations. In addition, management objectives and plans should be a synthesis of interdisciplinary considerations, and should be based on accurate data. Once management action has been elected, control measures should be applied at the time, point and place where the animal is most sensitive with minimal impact on non-target species (Hawthorne 1980). Best results are usually achieved when two or more damage control methods are used in combination, however controls should be applied only until the objective is achieved, and costs should correspond to the overall worth of the objective (Hawthorne 1980).

Although jurisdiction over wildlife in Manitoba extends to the Federal Government, in some cases such as for migratory birds and for wildlife on Federally owned land, most wildlife in Manitoba, including elk, is under Provincial jurisdiction as conferred by the Natural Resources Transfer Agreement of 1930. Section 85(1) of the Manitoba Wildlife Act (Manitoba 1980) which administers the agreement states that:

"except as otherwise herein provided, all property rights, title and interests in and to wildlife are vested in the Crown."

The Province as proprietor of wildlife, however, is not liable for wildlife damage to agricultural interests by section 85(2) which states:

"notwithstanding subsection (1) or any other provision of this or any other Act of the legislature, no right of action lies and no right of compensation exists against the Crown for death, personal injury or property damage caused by wildlife."

Prior to 1950, landowners in Manitoba were left to deal with wildlife damage using their own resources. Since then, the Manitoba Department of Natural Resources (MDNR) has recognized the increasing dependence of effective wildlife management on the goodwill and cooperation of landowners. In Manitoba, MDNR policy PO/10/01 objective 2 states that:

"responsibility for damage in any form caused by wildlife will be shared in relationship to what people can reasonably do for themselves and to the amount of damage resulting from government activities."

The interpretation is that landowners must accept some wildlife damage as part of the risk of owning land, however the MDNR will provide compensation and damage prevention assistance according to the degree to which management of wildlife has contributed to wildlife damage.

Initially, efforts to prevent or reduce wildlife damage were often ineffective, not specific to target species, and inconsistent from area to area within Manitoba (Bidlake 1981). Over time, MDNR further developed wildlife damage management programs in response to landowner needs. Current programs can be classified as follows: the Waterfowl Crop Damage Prevention Program; the Waterfowl Crop Damage Compensation Program; the Problem Beaver Management Program; the Problem Wolf, Fox and Coyote Management Program; the Big Game Crop Damage Prevention Program; and the Big Game Crop Damage Compensation Program (D. Pastuck pers. comm.).

Despite the increased sophistication of programs, landowner concern has recently increased likely because farm economics and practices have changed and made wildlife damage increasingly intolerable

(MDNR 1979). As a result, wildlife biologists and landowners have formed three committees in depredation "hotspots" in Manitoba: the Riding Mountain Regional Liaison Committee was formed in 1980; the Spruce Woods and Area Wildlife and Game Bird Damage Committee was formed on January 28, 1985; and the Western Region Elk Management Committee was formed on March 7, 1986. One of the objectives of these fora is to instruct landowners on methods of wildlife damage prevention, and increase landowner awareness of damage control programs operating in the Province. Also, these committees serve to communicate to wildlife managers, concerns of landowners relating to wildlife damage and its management. Moreover, these committees strive to develop innovative ways to improve wildlife damage management.

In pre-settlement times, elk inhabited most of Manitoba's aspen parkland. From 1860 to 1920, agricultural settlement and uncontrolled hunting eliminated most elk in Manitoba (Bryant and Maser 1982). Today, some 8000 elk are limited to seven islands of elk habitat in Manitoba (MDNR 1982), and where these islands border with agricultural interests, depredation by elk occurs.

In Manitoba, elk damage management presently consists of two components; elk damage prevention and elk damage compensation. The Big Game Crop Damage Prevention Program began in 1960, and now includes assistance to landowners in discouraging elk, deer, moose and black bear from feeding on agricultural produce. (D. Pastuck pers. comm.). The Big Game Crop Damage Compensation Program began in 1974, and now pays compensation to farmers for damage due to elk, deer, moose and black bear to certain crops (D. Pastuck pers. comm.).

Elk damage has been documented for most agricultural produce including bale stacks and grain in bins, an especially common problem in severe winters. Elk preference for corn and sunflowers has forced some landowners on the perimeter of Spruce Woods Provincial Park, Manitoba, to produce crops that are less preferred by elk. Another type of elk damage is broken fences, which occurs sporadically especially if fences are obscured by bush, or if elk are panicked by hunters or other disturbance. Broken fences can allow stock to escape and cause further costs to the farmer or vehicle accidents. Currently, however, the extent of fence damage by elk is unknown (D. Pastuck pers. comm.),

In Manitoba, The Big Game Crop Damage Prevention Program has a dual purpose; to provide information to farmers on effective control measures and to actively assist farmers in damage prevention.

Modification of farming practices can help reduce elk damage especially if measures are implemented quickly before big game become accustomed to frequenting the area (MDNR 1979).

Exclusion measures such as deer and elk-proof fences are very effective in preventing damage to haystacks when stacks cannot be placed within an enclosed livestock feeding area (MDNR 1979). Although, fencing and barriers can be expensive, they may be cost-effective in situations where high value agricultural produce is subject to severe wildlife damage. Also, electric fences can be effective although there are capital, maintenance, as well as labour costs (MDNR 1979, Palmer et al. 1985, Montana 1985).

Repellents include scent, taste and noise repellents, which can be effective in reducing big game damage temporarily. The success of scent repellents depends on the availability of alternate wildlife forage (Hawthorne 1980). An important point is that many taste and scent repellents are not registered for food crops but were developed for forestry, ornamental trees, and fruit trees. Scaring devices are most effective for short term damage prevention, but ungulates eventually habituate, especially if alternate food is scarce (Hawthorne 1980).

When efforts implemented by a landowner fail, the landowner reports the damage incident to MDNR for assistance in damage prevention. MDNR provides assistance during the fall and winter mainly by providing bloodmeal and intercept feeders. Bloodmeal, which is a slaughter house by product, is most effectively used on haystacks or baled hay stored in a hay yard, and is made available to all landowners who request assistance or claim compensation for damage to haystacks by deer or elk (D. Pastuck pers. comm.). Conservation officers supply the bloodmeal and provide expertise, but application is the responsibility of the farmer. Intercept feeders are provided in severe damage cases when bloodmeal alone is ineffective. In these situations, elk damage can be effectively reduced by the provision of an alternative food source in the feeder. Conservation officers site feeders along heavily used game trails on the landowners' property. Generally, conservation officers leave the farmer a supply of feed and instructions on how to maintain the feeder. Damage to field crops during summer and early fall are difficult and often impossible to prevent.

There are other prevention methods being developed and used by MDNR. Lure crops of corn or alfalfa function by essentially short-stopping ungulates that would normally move off Crown land to damage agricultural crops. This concept has been recently recommended at Shilo, Manitoba, by MDNR. The drawback of this method is that herbicide, seed and fertilizer cost approximately \$1800 for a 4 hectare site, and rental equipment and the labour intensive nature of this method further add to expenses (Bidlake pers. comm.).

Culling elk is a control option when significant damage is occurring and when MDNR has determined that the wildlife population is too high. Trapping and transplanting elk are costly and time consuming, but are justified if other areas need stocking.

Each year in Manitoba, an estimated average of \$100,000 are paid out by MDNR to compensate farmers for elk damage (D. Pastuck pers. comm.). Actual damage figures are most likely several times this amount as some farmers consider their individual damage levels as negligible or they fail to apply for compensation, and also, compensation payments amount to 75% of appraised value of damage.

Big game damage compensation applies when prevention has been ineffective or not appropriate, and when landowners have made a reasonable effort to control damage. The Big Game Crop Damage Compensation Program operates according to Manitoba Regulation 212/82 under the Wildlife Act (Manitoba 1982). First, a landowner must report big game damage to the nearest Natural Resources Office as soon as reasonably possible. If the damage qualifies for compensation, a conservation

officer provides the farmer with a 'Blue Form' which gives the Manitoba Crop Insurance Corporation (MCIC) staff authority to undertake an assessment of damage (D. Pastuck pers. comm.). As specified in Manitoba Regulation 212/82, compensation may be granted for deer, elk, moose, and black bear damage to crops of wheat, oats, barley, mixed grain, flax, rye, field peas, buck wheat, canola, corn, sunflowers, sugar beets, alfalfa, timothy, sweet clover, and grass-legume mixtures, whether standing, mowed or swathed, in sheaves on the ground or stooks in the field, baled or in stacks or grain in storage. The landowner pays a \$25 assessment fee which is reimbursed by the MDNR upon approval of the damage claim. Payments equal 75% of the commercial value of the damage, but do not exceed \$7500 for each claim. Subsequent claims are considered only if the landowner has implemented preventative measures recommended by MDNR staff (MDNR 1979).

1.1.2 Elk Ranching

The idea that Canadian agriculture could benefit from elk was first discussed by the Alberta Wildlife Production Committee in 1974. The Committee, composed of representatives from the Alberta Fish and Wildlife Division, Alberta Agriculture, Canadian Wildlife Service, and the University of Alberta, examined game ranching as an alternative to further development of Alberta's Northern Aspen/Boreal zone for domestic livestock production (Hudson 1984a).

Big game ranching is the extensive production of big game and big game products for public consumption (Alberta 1984, Hudson 1984b). Big game ranching is not a recent development, as both Russia and Chi-

na can point to an ancient tradition as the origin of their modern deer ranching interests (Geist 1984).

The conservation concept of game ranching was developed by western biologists working in Eastern and Southern Africa. The biologists perceived that if protein requirements were met by native herbivores rather than imported domestic animals, the onslaught on native habitat and species might be reduced (Dasmann 1964). The earliest attempts became known as game cropping in which free-ranging sometimes migratory populations were harvested (Hudson 1984b). However, the scale of the operations elicited public opposition, and problems such as irregular supply and depredation further reduced the utility of this method (Hudson 1984b). Game ranching using fences has now entirely replaced game cropping practices. Although fences are expensive they serve to clarify ownership, prevent crop damage, and stabilize supply by restricting game movements (Hudson 1984b).

The conservation motive for game ranching is further supported by evidence that native herbivores are better than livestock at converting natural forage into protein (Telfer and Scotter 1975 and Hudson 1984a). Renecker (1984), found that the rate of digestion of grass and hay and aspen in nylon bags suspended in the rumen of elk was higher than in moose and cattle, and elk reached an asymptotic level more rapidly than did moose or cattle. Also, Alsager and Alsager (1984) found that feed costs for elk (\$0.60 per elk per day) were less than half that for cattle (\$1.49 per cow per day).

The potential for protein production using native herbivores has been endorsed by the World Conservation Strategy (IUCN/UNDP 1980). Geist (1985) points out that the conservation concept of game ranching was promoted to correct abuses of wildlife as a private commodity. However, Geist (1985) emphasizes that in North America wildlife is held as a public trust and believes that elk ranching would undermine this system. As evidence, Geist (1985) points to the destruction of wildlife caused by market hunters in North America in the late 19th century. Rather than being a conservation measure, Geist sees game ranching in North America as a threat to predator populations, and believes that this enterprise will result in more publically owned land converting to private ownership.

Despite the conservation motive for big game ranching, Canadian interest in game production has been mainly initiated by entrepreneurs interested in elk farming. Elk farming is the intensive production of elk and elk products for public consumption. The term 'elk ranching', however, is frequently used (especially by the press) to refer to both elk ranching and elk farming.

Canadian entrepreneurs rationalized that if New Zealanders could make money farming Red Deer and Fallow Deer then elk farming would be even more lucrative. New Zealanders domesticated the Red Deer in 1970 to supplement venison supplies to slaughter houses catering to the West German market. However, the arrival of Asian buyers on the scene made venison production a minor attraction compared to velvet production which is used for medicinal purposes (Yerex 1981). However, New Zealand is presently expanding the venison market by attempting to

open markets in the United States (Cooper 1985). Canadian elk are particularly valuable as they are even-tempered and produce more velvet relative to red deer, and are relatively disease free compared to other North American elk (Hutching 1983).

The first Canadian elk ranch was established in 1975 in Maidstone, Saskatchewan (Bates 1984). Since then, all four western provinces have examined the potential for game ranching, but have encountered considerable opposition from many sectors of the public. Prior to 1984, the existing legislation in Alberta provided for keeping big game in captivity for public and private viewing, and for sale of live animals, but not for marketing of products. Similar legislation exists in the other three western Provinces. For example, publicly held wildlife is regulated in Manitoba through provisions in the Manitoba Wildlife Act that expressly prohibits uses such as paid hunting, meat production or production of exotic products such as antler velvet. On October 30, 1984 the Alberta Government produced a discussion paper on big game production to raise public awareness so that enabling legislation could be formulated. The paper pointed to the opportunities in big game production. On November 13, 1984 the Alberta legislature passed legislation enabling the establishment of an open market in wildlife products. Saskatchewan and British Columbia are also pursuing development of game ranching and farming. In Manitoba, interest in elk ranching began with the establishment of the Swan Valley Elk Ranch in 1982 under a special licence provided by MDNR to private individuals. The objective of the project was to determine the viability and ramifications of elk ranching in Manitoba. However,

Manitoba recently opted not to develop game ranching when a proposal endorsing elk ranching was rejected by the Government of Manitoba on December 1, 1986. Similar public opposition to elk ranching exists in the other three western Provinces. Hence, despite developments, public opposition to elk production is such that the future of elk ranching and elk farming is uncertain in Canada.

1.1.3 The Swan River Area

In the Swan River Area, periodic elk surveys in winter since 1969 have documented elk sex ratios and age ratios in the Duck Mountain Provincial Forest. Two ways in which these data have been utilized is to assist in estimates of total elk numbers and to delimit elk wintering areas.

Elk damage levels in the Swan River Area (Figure 1.1) are typical of other elk damage hotspots in Manitoba (D. Pastuck pers. comm.). However, after the establishment of the Swan Valley Elk Ranch some local farmers perceived that the elk ranch began to attract local wild elk that increased elk damage on farms in the vicinity.

Opposition to elk ranching was initially limited to the Swan River Area. A series of public meetings with wildlife managers and farmers in attendance addressed concerns of farmers with regard to the elk ranch. The controversy led to a meeting on October 10, 1985 with two landowners from the Swan River Area and the Minister of Natural Resources, where the request was made that elk ranching development in Manitoba be put on hold until the matter could be investigated. On

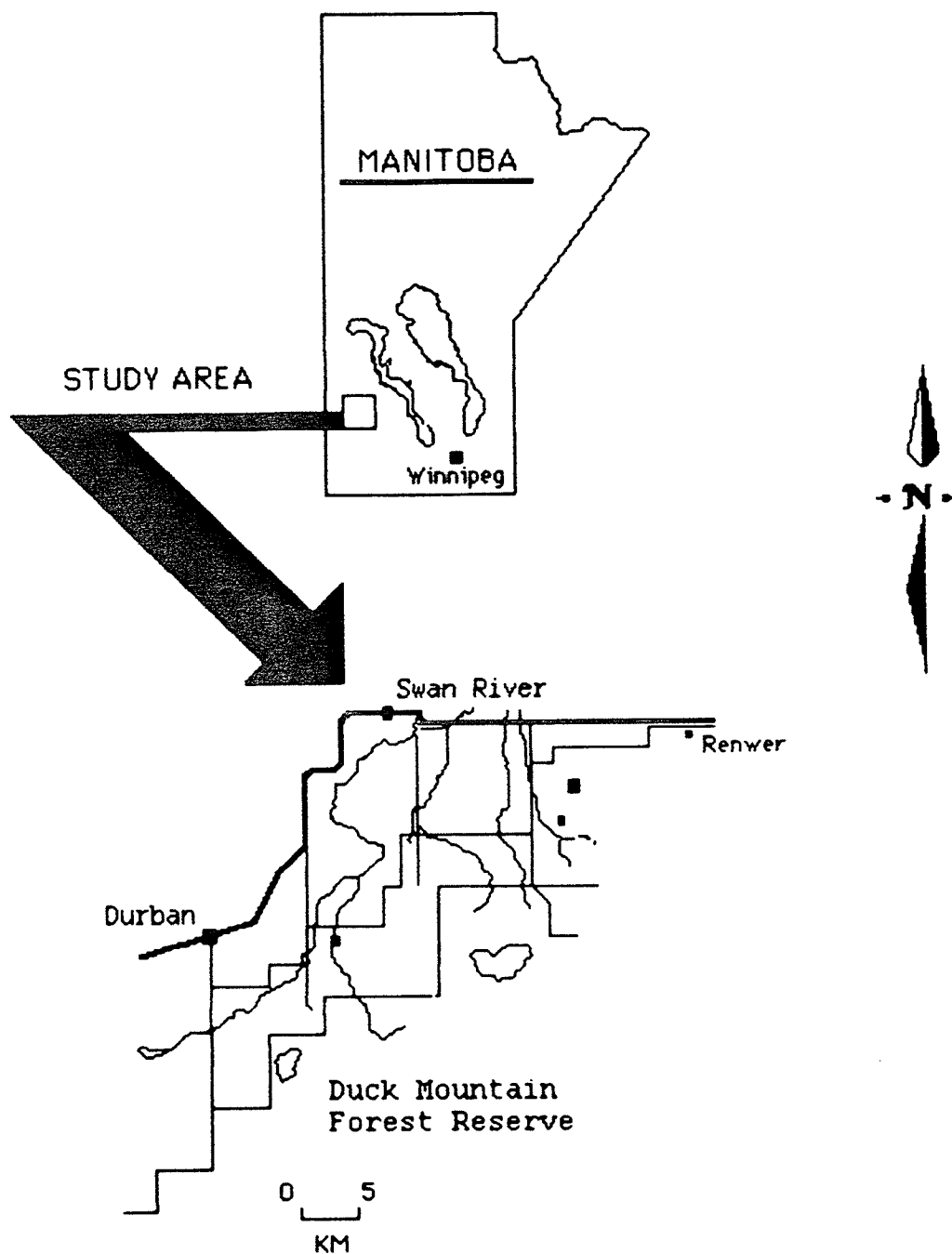


Figure 1.1: The Study Area in relation to Manitoba.

March 7, 1986, the Western Region Elk Management Committee was initiated by MDNR so that Swan River Area residents and wildlife managers could work together to manage elk, which included addressing concerns of elk damage and elk ranching. Meanwhile, the Amalgamated Anti-elk Ranching Association was organized by some Swan Valley residents. At their request, Dr. Valerius Geist, Professor of Environmental Design, University of Calgary, came to the Swan River Area to speak against elk ranching development. Also, many editorials in the Swan River Star and Times, discussed elk ranching. These editorials served to further raise awareness of Swan Valley residents of the elk ranching enterprise. Confronted with lobbying by both opponents and proponents of elk ranching, the Minister of Natural Resources made a commitment to resolve the issue. On December 1, 1986 a proposal for elk ranching was rejected by the Government of Manitoba, and the decision was made to phase out elk ranching, including the Swan Valley Elk Ranch.

1.2 PROBLEM STATEMENT

There are two interrelated management concerns to be addressed in the Swan River Area. The first is that some farmers perceive that elk damage management is not effectively dealing with elk damage farmers attribute to the Swan Valley Elk Ranch. Secondly, some farmers perceive that the Swan Valley Elk Ranch is adversely affecting their own operations by increasing elk damage by wild elk. These concerns are important in light of the increasing reality that wildlife is largely dependent on the discretion of farmers in agro-Manitoba.

1.3 OBJECTIVES

This practicum presents the findings of a study that assessed the nature of the controversy surrounding elk depredation and elk ranching in the Swan River Area, Manitoba. The objectives of the study were:

1. To assess elk damage management from the perspective of farmers:
 - a) to define equitable elk damage management;
 - b) to determine farmer attitudes and perceptions towards elk damage management.
2. To assess the implications of elk ranching from the perspective of farmers:
 - a) to review the literature to determine if an elk ranch can attract wild elk into the vicinity.
 - b) to examine the level of elk damage before the establishment of the Swan Valley Elk Ranch relative to post elk ranching levels.
 - c) to determine farmer perceptions towards the affect of elk ranching on levels of elk damage;
 - d) to determine farmer attitudes towards elk ranching development in their area;
3. to make recommendations to assist in future management decisions regarding elk damage management and elk ranching in the Swan River Area and in Manitoba.

1.4 DEFINITION OF TERMS

1. Elk: Although the common name of Cervus elaphus is now wapiti, the more familiar name 'elk' is used in the present research.
2. Elk depredation: refers to the damage inflicted on agricultural interests by wild elk.
3. Elk Farming: the intensive production of elk and elk products for public consumption. The present research refers to the Swan Valley Elk Ranch as an elk ranch and not as an elk farm since participants had this conception.
4. Elk Ranching: the extensive production of elk and elk products for public consumption (Hudson 1984).
5. The Province: refers to the Province of Manitoba.

1.5 JUSTIFICATION

The present research, through consultation with farmers in the Swan River Area, provides information for more effective elk damage management and compatible elk ranching development in agro-Manitoba. Social research has shown that management decisions are most effective and readily accepted when the individuals affected by the decisions are active in decision making (Likert and Likert 1976). Hence, it is vital to assess farmer perceptions to these concerns.

1.6 LIMITATIONS

The present research was conducted in the Swan River Area, and results will only be applicable there. Applicability to other areas depends on the nature of the resident elk population, elk habitat, farming practices, and prevailing farmer attitudes.

1.7 GENERAL METHODS

1.7.1 The Questionnaire

A quantitative - descriptive questionnaire utilizing a 7-point Likert scale was used to generate information concerning landowner perceptions with regard to elk damage management and elk ranching (Appendix B). In contrast to "open - ended" style questionnaires, the structural questionnaire has the advantage that results can be statistically analyzed without subjectively categorizing responses. Development of the quantitative - descriptive questionnaire, and utility in improving management programs are described in Likert(1961), and Likert and Likert(1976).

Literature review and personal communication with wildlife managers helped identify issues to be addressed in the questionnaire. Statements were developed by the author, wildlife managers and practicum committee advisors using a process involving iterative critical inspection for validity. Also, some of the items were borrowed or developed in cooperation with a concurrent study by Rounds (1987). A pretest of the questionnaire was undertaken in the Swan River Area during May 1986. These interviews with key individuals were conducted to further refine the items of the questionnaire.

1.7.2 The Study Area

The study area was first generally delimited as an area along the northern interface of the Duck Mountain Forest Reserve and the agricultural interests in the Swan River Area; this area contained the two enclosures comprising the Swan Valley Elk Ranch. It was necessary to reduce the probability of obtaining a sample composed largely of farmers who could never expect to be inflicted with elk damage. The MDNR Regional Services Branch has operational procedures by which all instances of wildlife damage reported by farmers are recorded, and reports are maintained on file. These 'occurrence reports', as well as Swan River and Minitonas Rural Municipality Landowner Maps, were used to identify sections of land within the generally delimited study area where crops had been damaged by elk in the past. The resulting distribution of reported elk damage dating from 1981 to 1985 was used to help define the exact boundaries of the study area (Figure 1.2). The criteria used were: that the boundary be one section farther north of heavy concentrations of reported elk damage; that the boundary be within three sections of the Forest Reserve; that towns be avoided; and that the area in the vicinity of the Swan Valley Elk Ranch be expanded to increase the probability of randomly sampling farmers in this area.

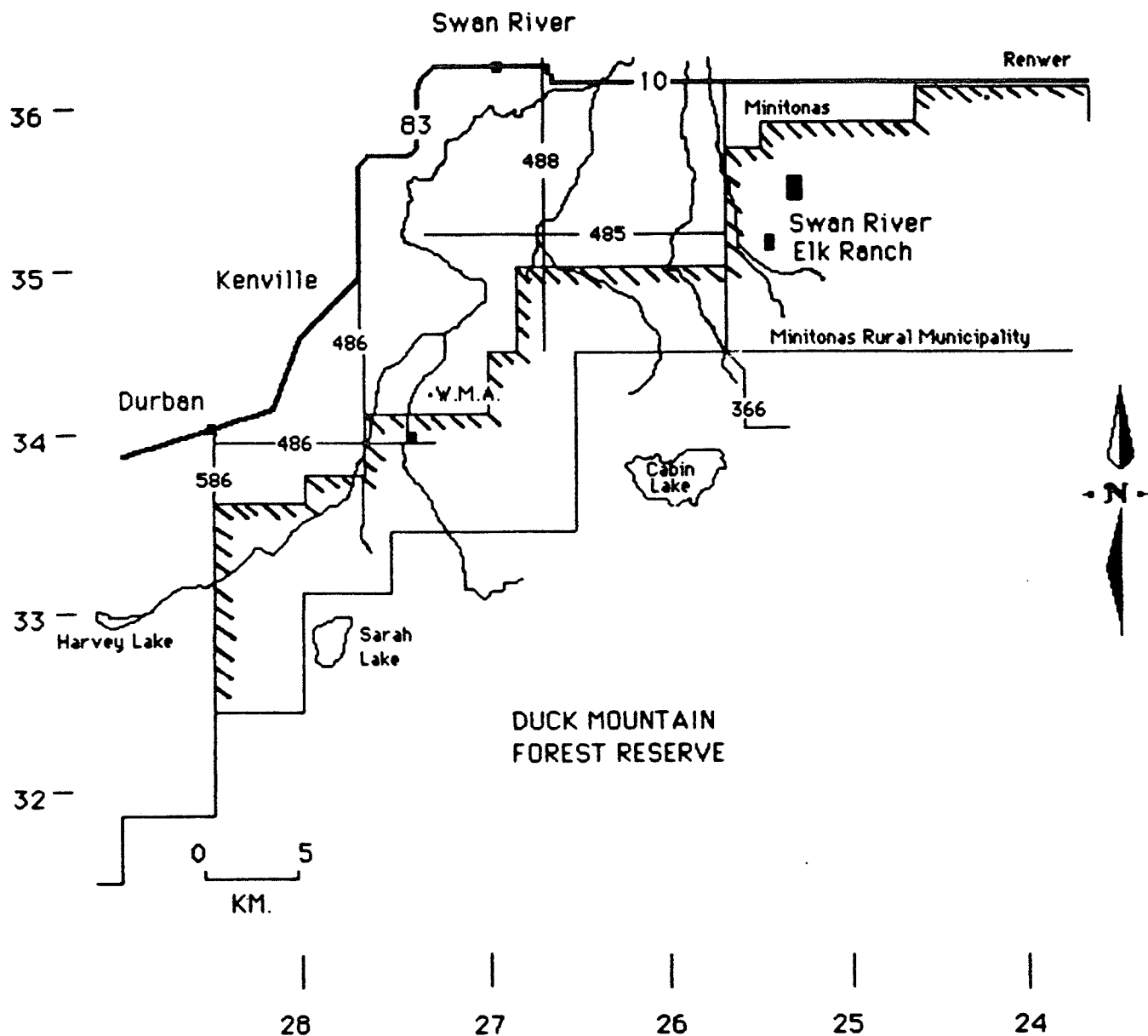


Figure 1.2: The Study Area and location of the Swan Valley Elk Ranch.

1.7.3 Sampling Techniques

A complete list of landowners within the study area was provided with the assistance of municipal council members and municipal land ownership maps. From a list of approximately 500 landowners, 100 were selected using random numbers tables. The 1986 Parkland telephone directory for this area was consulted to match landowners with phone numbers and home addresses. Councillors provided assistance when landowners in their respective wards could not be matched with telephone numbers or addresses. The 100 randomly selected landowners were each sent a letter describing the nature of the study and preparing them for a phone call which scheduled an interview at their convenience (Appendix A). Farmers were asked for an interview whether or not they experienced elk damage. However, those farmers that owned land not developed for agriculture were not interviewed. Also, if a landowner leased his land the address and phone number of the lessee was obtained and the lessee, not the landowner, was interviewed. A total of 82 farmers of the original 100 randomly selected farmers completed interviews. Since the views of farmers near the Swan Valley Elk Ranch were of particular interest, all farmers working land within a 2 or 3 mile radius of the elk ranch were approached for an interview. These additional 18 farmers brought the total number to 100 participants. Interviews were conducted at the farmers residence between June 14 to July 20, 1986. Transport in the study area was provided with a privately owned Mazda GLC. In total, only three of all farmers who met the criteria for the sample population refused. The author attributes the excellent response rate to the high level of interest for this

topic in the area and to the general approachable dispositions of Swan Valley farmers.

1.8 PRACTICUM FORMAT

This practicum consists of three chapters: Chapter 1 is the Introduction, and includes Background, Problem Statement, Objectives, and General Methods. Chapter 2 deals with farmer perceptions to elk damage management, and commences with the Methods Section. Chapter 3 deals with elk ranching implications, and also commences with the Methods Section. Pages were numbered consecutively throughout and there is a cumulative abstract and literature cited to satisfy practicum standards.

Chapter II

FARMER PERSPECTIVES TOWARDS ELK DAMAGE MANAGEMENT

"Now, more than ever, with increasing demands on all land resources, wildlife managers need support from an informed public and must work together with all who use the land and alter wildlife habitat" (Bailey 1984).

2.1 METHODS

The development of the questionnaire, study area identification, and sampling technique are described in Chapter 1. The complete sample of 100 surveys was used to assess elk damage management from the perspective of farmers.

The aspects of elk damage management addressed in the questionnaire were: elk damage prevention; elk damage compensation; responsibility for elk damage; options and supplements to present elk damage management; and implications of hunting to elk damage management (Appendix B).

Farmers responded to two items pertaining to elk damage prevention. The first asked the farmer whether Provincial involvement in elk damage prevention is necessary. The second asked whether control methods used by the Province are effective. Subsequently, farmers were asked about effectiveness of control methods for which they had personal experience, and for suggestions on methods the Province or farmer could implement to improve elk damage prevention.

Farmers also responded to statements related to elk damage compensation. The acceptability of the \$25 pre-assessment fee was solicited. Also, farmer perceptions to fence damage compensation was obtained.

Farmer attitudes on sharing of responsibility of elk damage between farmers and government was investigated. Also, farmer attitudes on responsibility for elk damage for different levels of government (Municipal, Provincial and Federal) and Provincial departments and branches (Wildlife, Parks and Agriculture) were solicited. Moreover, farmers were asked to respond to the statement that "all elk on private land should become the property of the farmer so that the farmer can deal with elk damage and benefits as he chooses". The statement addresses the alternative that wildlife ownership revert to the landowner. Increasingly, wildlife managers are recognizing the reality that due to lack of adequate funds for wildlife management, wildlife might revert to private ownership in areas of intense agriculture.

Farmer perceptions to several concepts that have the potential to supplement or replace present elk damage management were solicited. Each item in this section represents a strategy, some of which were proposed by Boag et al. (1980), while others are generally known by wildlife managers. The concepts are self evident except for the following:

1. Present crop quotas exclude 'undeveloped' areas (wildlife habitat) on agricultural land from the crop quota calculation. Including underdeveloped areas would reduce the incentive for

farmers to clear land as well as provides a greater quota for the farmers for cultivated land.

2. Easements are a form of property provided by an agreement. An example is that the Province would pay the farmer for the right for wildlife such as elk to make use of land frequently inflicted with high levels of wildlife damage.
3. The concept of charging hunters and the general public for access to private land is another strategy to allow farmers to realize some economic gain for supporting wildlife.

The perceptions of farmers towards aspects of hunting which have implications to elk damage management were solicited. These aspects included: the influence of hunting on elk damage including damage to fences; the desirability of the landowner elk hunting licence; and farmer attitudes towards hunting regulations and hunting including Treaty Indian hunting.

2.2 RESULTS

2.2.1 Farmer Profile

In each case for demographic questions, a few participants opted not to respond or were unable to respond. Most farmers (38%) were between 41 and 55 years of age, and the majority (62%) of farmers had greater than 21 years experience in farming. The majority of farmers surveyed (66%) were full time farmers. Almost all participants (97%) owned some land, and 54% rented land. Approximately one quarter of participants (26%) owned one quarter section, and another quarter (26%) owned half a section. The mean number of hectares owned by lan-

TABLE 2.1

Profile of study participants

CHARACTERISTICS	NUMBER OF FARMERS		NUMBER OF FARMERS
A. Age		D. Hunters	
< 25	2	Yes	57
26-40	29	No	41
41-55	38		
> 56	30		
TOTAL	99		98
B. Farming Status		E. Wildlife Club Members	
Full time	65	Yes	19
50% Farming	20	No	77
< 50% Farming	13		
TOTAL	98		96
C. Farming Experience (Yrs)		F. Prospective Game Ranchers	
< 5	5	Yes	12
6-10	10	No	85
11-20	22		
> 21	61		
TOTAL	98		97
G. HECTARES OF LAND OWNED, RENTED AND PRODUCING (OWNED & RENTED)			
Hectares	Owned	Rented	Producing
0	3	44	--
1-65	25	21	23
66-130	25	12	27
131-194	16	6	10
195-259	9	2	12
260-324	11	5	9
> 324	7	6	12
TOTAL	96	96	93
H. NUMBER OF CATTLE (OR DAIRY) AND HORSES			
Number	Cattle	Horses	
0	54	74	
1-10	8	18	
11-100	27	--	
> 100	6	3	
TOTAL	95	95	

downers was 175 hectares (2.7 quarter sections), and the mean hectares leased was 95 hectares (1.5 quarter sections). The mean number of hectares in production was 187 hectares (2.9 quarter sections).

The majority of participants (58%) considered themselves to be hunters, and 81% of farmers surveyed allowed elk hunters on their property. With regard to those farmers who allowed elk hunters on their property about half (51%) both restricted the number of hunters on their land and required that hunters obtain permission; 39% simply required that hunters ask permission, and 10% neither restricted numbers nor required that permission be obtained. None of the participants required that elk hunters pay a fee to hunt on their land, and only 5% of participants had considered charging hunters a fee for access to their land.

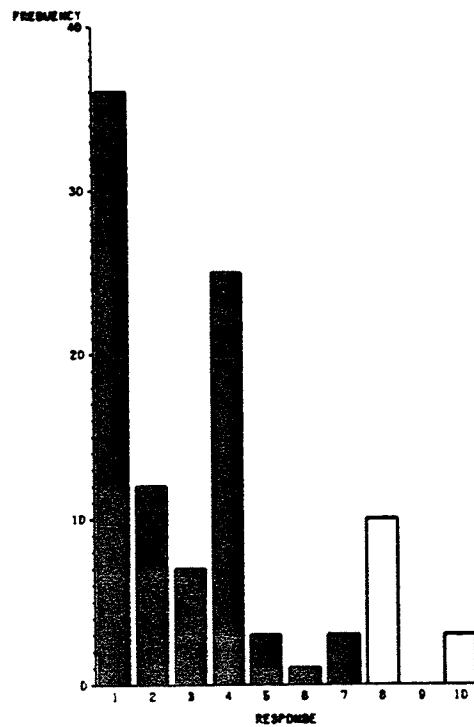
A minority of farmers (12%) surveyed had considered raising wildlife for profit on their land. A majority (92%) of these farmers considering game ranching identified an interest in elk ranching; 25% expressed interest in bison and 17% expressed interest in deer ranching (some respondents indicated an interest in more than one species). Also, 20% of participants indicated that they were members of a wildlife club. A clear majority of participants (85%) indicated that they would be willing to attend a workshop on elk damage prevention.

2.2.2 Elk Damage Prevention

The majority of farmers (57%) felt that Provincial Government involvement in elk damage prevention is a necessary part of elk damage

management (Figure 2.1). Despite the support, only 16% of participants felt that damage prevention methods are effective in controlling damage (Figure 2.2). However, the majority of participants (70%) had never received assistance with elk damage prevention: 27% indicated that they had been provided with propane bangers; 11% had received assistance with blood meal; and 5% had received assistance with the intercept feeding technique (some respondents indicated that they had experience with more than one technique).

Participants who had received Provincial assistance with elk damage prevention frequently gave comments regarding the effectiveness of damage prevention techniques which were recorded by the author. Most farmers commented that propane bangers were of limited utility after two or three days of use, despite the fact that wildlife personnel kept bangers with farmers for longer periods. Farmers receiving bloodmeal from the Province for elk damage prevention generally commented that fresh bloodmeal was effective for awhile. One farmer pointed out that bloodmeal becomes ineffective after a snowfall. Few participants indicated that they had experience with intercept feeding, however those that had experience felt this method was effective. One farmer commented on the practice of MDNR of buying the hay from farmers experiencing damage problems and leaving the hay on farmers land for the benefit of elk. The farmer pointed out that this practice might condition elk to return to the farmer's land to feed in successive years so that wildlife managers are committed to continually buying hay from the farmer. Farmers also commented on other elk damage control techniques such as cracker shells and pie plates. The former



KEY

The 7-point scale
 1=agree strongly
 4=neutral/about right
 7=disagree strongly
 Other (blank histograms)
 8=Unable to judge
 9=No damage
 10=Missing
 N=100

Figure 2.1: The elk damage prevention program is necessary.

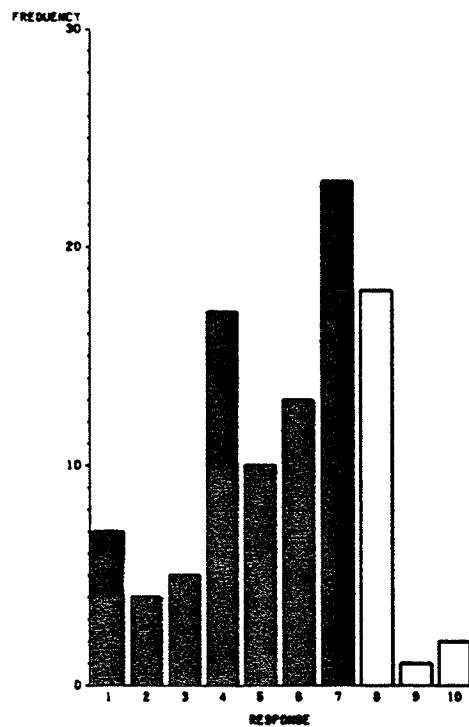


Figure 2.2: The elk damage prevention program is effective.

method is effective since the practice involves firing a charge into the vicinity of feeding elk. One farmer commented this technique might be cruel. Farmers commented that pie plates had some limited success in controlling damage.

Participants responded to the question "how can the farmer or Provincial Government improve elk damage prevention"? The responses are presented in 5 categories in declining order of frequency:

1. The Provincial Government should increase intercept feeding including lure crops within the Duck Mountain Forest Boundary;
2. The Provincial Government should assist in damage prevention using fences;
3. Farmers should change their farming patterns to reduce elk damage;
4. The Provincial Government should improve elk habitat in the Duck Mountain Forest Reserve;
5. The Provincial Government should modify existing hunting regulations.

Participants commented that certain farming patterns reduce the vulnerability of agricultural produce to elk damage:

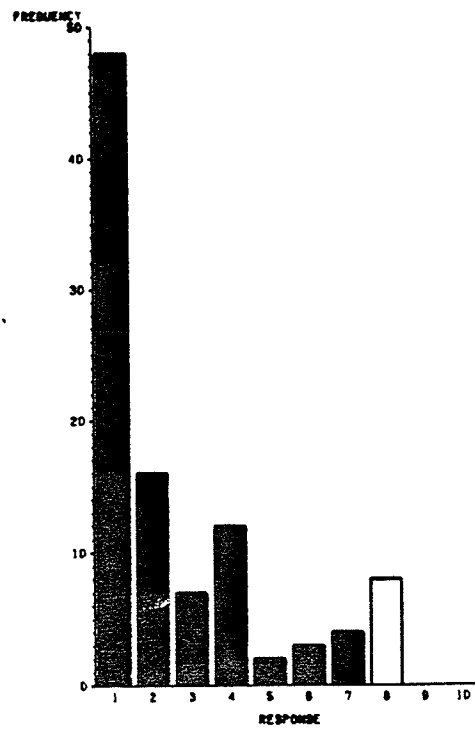
1. Unpalatable or unpreferred crops such as Bearded Wheat and Canola should be grown in areas subject to high elk damage.
2. Hay bales should not be left on fields adjacent to forested areas but should be moved to areas inaccessible to elk.
3. When feasible, crops interfacing with wildlife habitat should have a priority for harvest.

Some farmers advocated the landowner licence be modified to allow the landowner to take a cow as an alternative to a bull. Other farmers believed they should not have to pay for the landowner licence since their produce sustain elk. Also, several farmers expressed that the landowner licence should be modified to allowed the farmer to hunt on land adjacent to his own land. Also, farmers pointed out the landowner season was not conducive in allowing farmers to bag an elk as a result of elk being driven off private land during the preceding hunting period.

2.2.3 Elk Damage Compensation

A majority (71%) of participants agreed that the elk damage compensation program should be continued; 12% of participants were neutral and 9% disagreed (Figure 2.3). Despite the support, some farmers felt that there were weaknesses in the program.

Participants responded to five statements on aspects of the compensation program. In most cases, the response 'unable to judge' was the largest response category. Half of all farmers with an opinion (50%) responded that they disagreed that compensation for crop damage was fair (Figure 2.4). Most farmers with an opinion (42%) agreed that the pre-assessment fee of \$25 per quarter per crop was an acceptable part of the compensation program (Figure 2.5). Most farmers with an opinion (44%) disagreed that compensation for hay damage was adequate. The majority of farmers with an opinion (68%) disagreed with the statement that compensation for fence damage is not necessary; only 32% of respondents with an opinion did not disagree with this state-



KEY

The 7-point scale
 1=agree strongly
 4=neutral/about right
 7=disagree strongly
 Other (blank histograms)
 8=Unable to judge
 9=No damage
 10=Missing
 N=100

Figure 2.3: Elk damage compensation should continue.

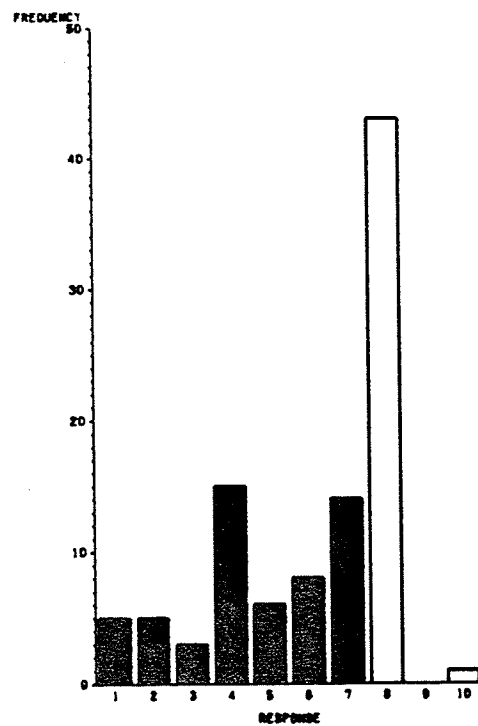
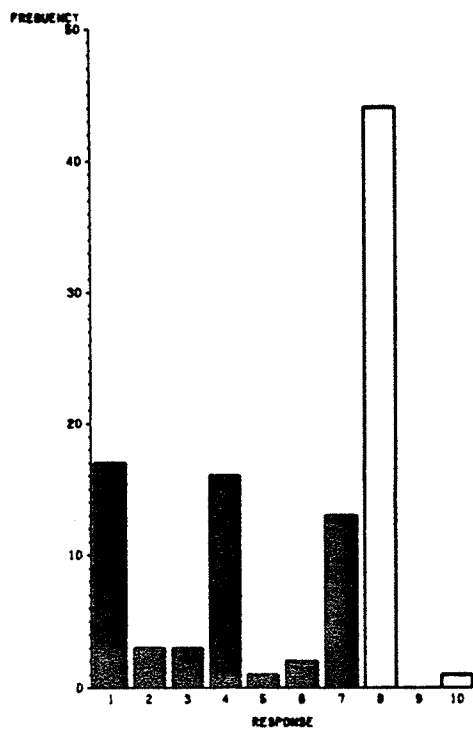


Figure 2.4: Compensation for crop damage is fair.



KEY

The 7-point scale
 1=agree strongly
 4=neutral/about right
 7=disagree strongly
 Other (blank histograms)
 8=Unable to judge
 9=No damage
 10=Missing
 N=100

Figure 2.5: The \$25 pre-assessment fee is fair.

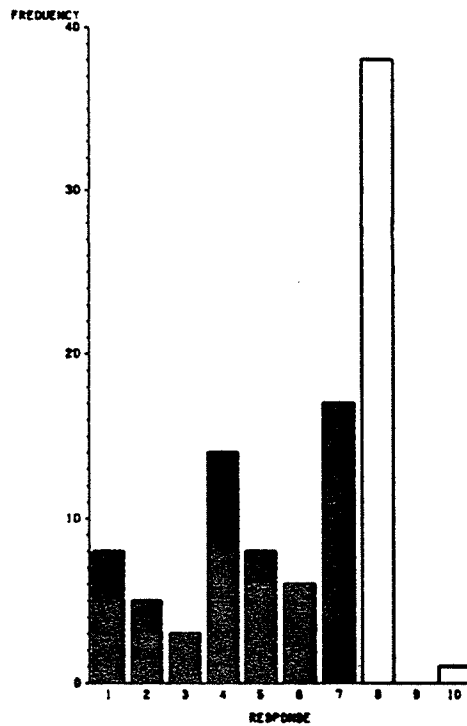


Figure 2.6: Overall, the compensation program is fair.



KEY

The 7-point scale
 1=agree strongly
 4=neutral/about right
 7=disagree strongly
 Other (blank histograms)
 8=Unable to judge
 9=No damage
 10=Missing
 N=100

Figure 2.7: All elk damage is intolerable without full compensation.



Figure 2.8: I would be better off with no elk on my land.

ment. Farmers also responded to the statement "Overall, the elk damage compensation program is fair"; 51% of farmers with an opinion disagreed while 23% were neutral and 26% agreed (Figure 2.6).

Farmers who felt that overall the program was unfair (N=31) were asked to indicate among six aspects of elk damage and elk damage compensation that represented their concerns. Inadequate crop damage assessment and damage to fences scored highest, followed by 'loss of my time', inadequate hay damage compensation, and, scoring lowest, was damage to growing crops and growing hay.

Participants responded to two statements designed to measure their tolerance to elk damage. Most farmers (39%) agreed that landowners should not have to tolerate any elk damage on their property without complete compensation (Figure 2.7). Also, approximately equal numbers of farmers with an opinion agreed (38%) and disagreed (41%) that they would be better off with no elk on their land; 21% were neutral (Figure 2.8).

2.2.4 Responsibility For Elk Damage

A clear majority (89%) disagreed that elk damage is a cost in farming and should be the sole responsibility of farmers (Figure 2.9). Also, half of the respondents (50%) disagreed that responsibility for elk damage should be shared by government and the farmer (Figure 2.10). However, the majority of farmers (67%) agreed that government should accept full responsibility for elk damage (Figure 2.11).

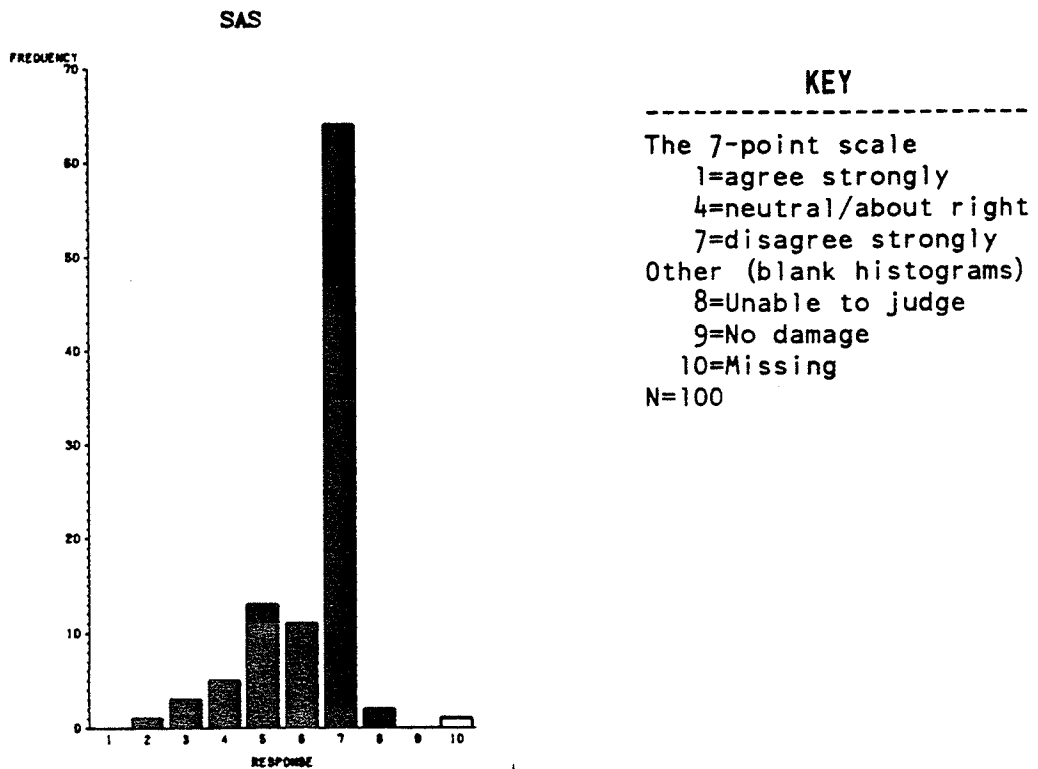


Figure 2.9: Elk damage should be the sole responsibility of the farmer.

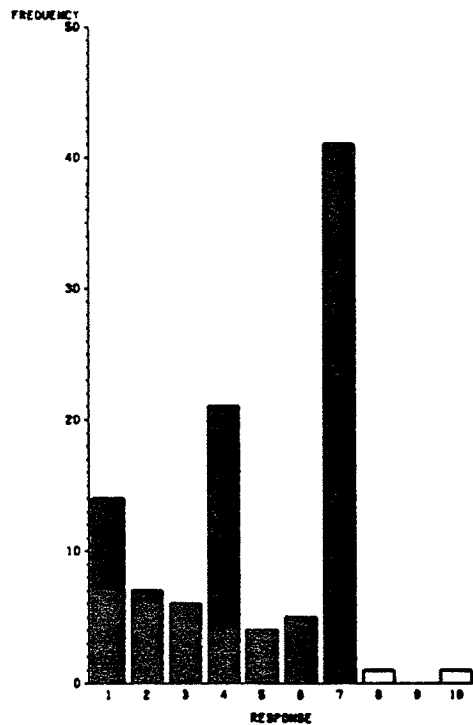
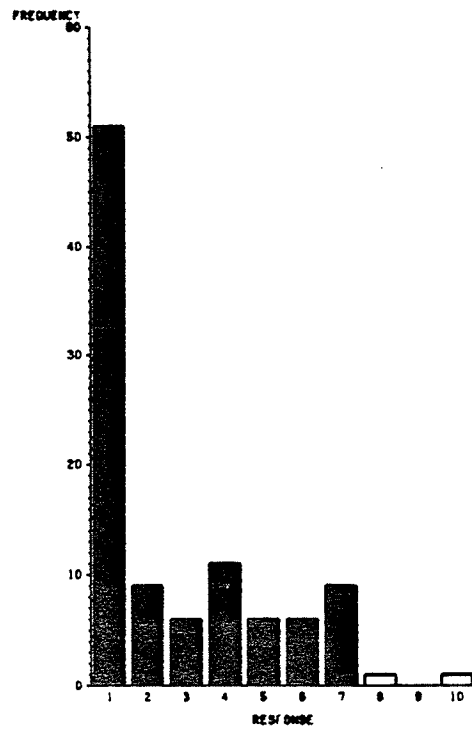


Figure 2.10: Responsibility for elk damage should be shared by government and the farmer.

Farmers clearly exempted the municipality of responsibility for elk damage; of those farmers with an opinion (N=92), only 16% agreed, 11% were neutral, and 73% disagreed that the municipal government should be responsible for elk damage compensation (Figure 2.12). The majority of participants (67%) delegated the Provincial Government to be solely responsible for elk damage compensation (Figure 2.13). Participants who did not disagree that the Province should be responsible for elk damage compensation were asked to indicate which of Agriculture, Parks or Wildlife should be responsible for elk damage compensation; Wildlife scored highest, followed by Agriculture and Parks. Most Farmers (33%) also exempted the Federal government from responsibility for elk damage compensation (Figure 2.14).

Participants responded to a final statement dealing with responsibility for elk damage which was that, "all elk on private land should become the property of the farmer so that the farmer can deal with elk damage and benefits as he chooses"; a clear majority (68%) disagreed with this statement (Figure 2.15).



KEY

The 7-point scale
 1=agree strongly
 4=neutral/about right
 7=disagree strongly
 Other (blank histograms)
 8=Unable to judge
 9=No damage
 10=Missing
 N=100

Figure 2.11: Government should be fully responsible for elk damage.

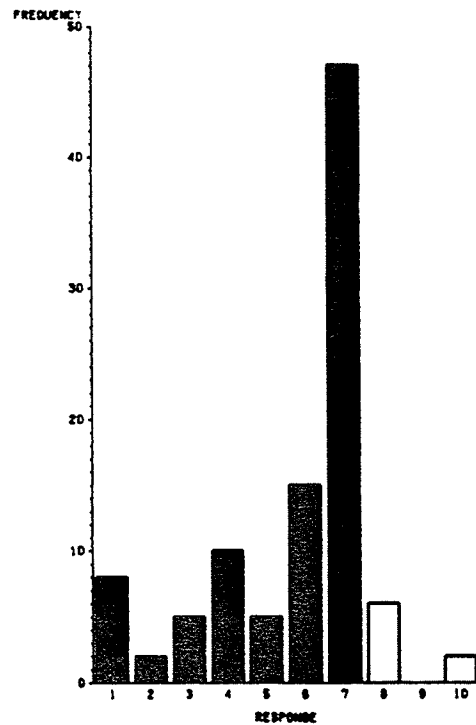


Figure 2.12: The Municipality should be responsible for damage compensation.

KEY

The 7-point scale
1=agree strongly
4=neutral/about right
7=disagree strongly
Other (blank histograms)
8=Unable to judge
9=No damage
10=Missing
N=100

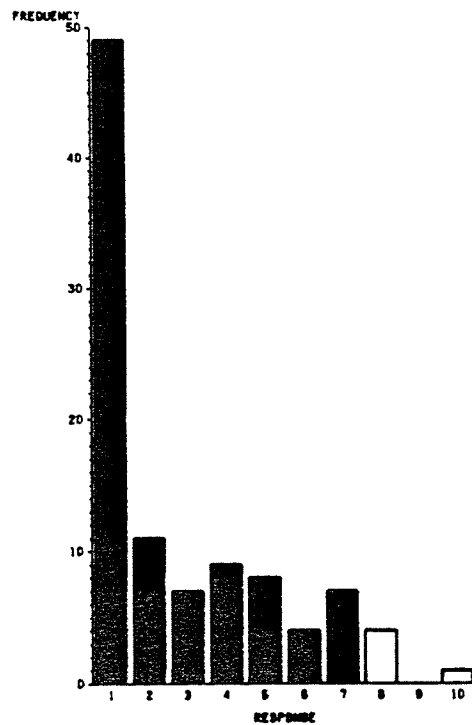
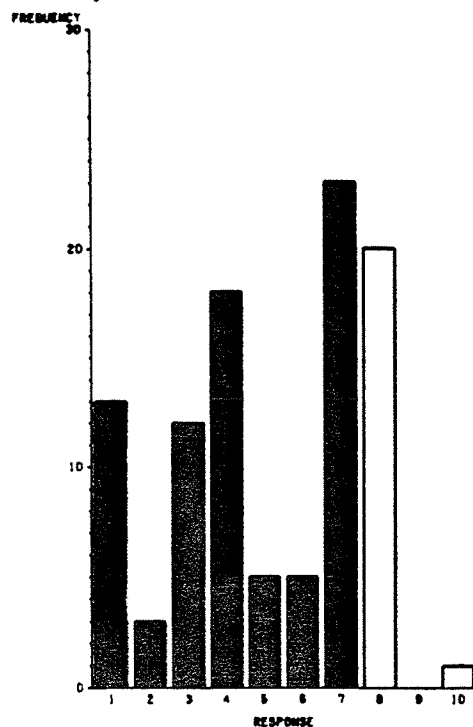


Figure 2.13: The Provincial Government should be responsible for elk damage compensation.



KEY

The 7-point scale
 1=agree strongly
 4=neutral/about right
 7=disagree strongly
 Other (blank histograms)
 8=Unable to judge
 9=No damage
 10=Missing
 N=100

Figure 2.14: The Federal Government should be responsible for elk damage compensation.

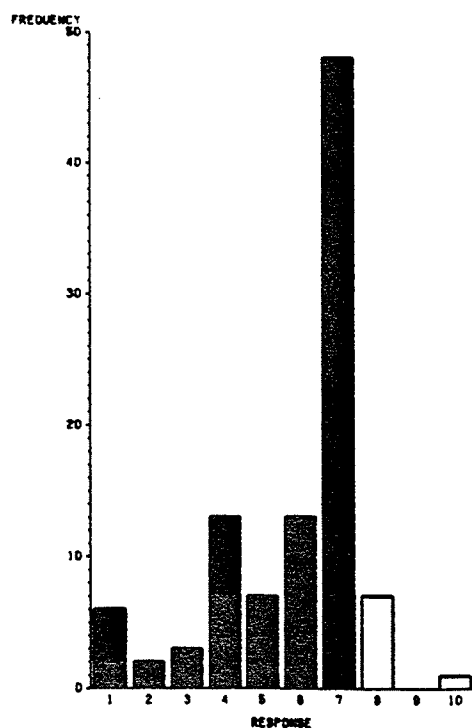


Figure 2.15: All elk on private land should become the property of the farmer so that the farmer can deal with elk damage and benefits as he chooses.

2.2.5 Alternatives And Supplements To Elk Damage Management

Participants indicated their opinion to nine alternatives and supplements to present elk damage management. Responses were categorized into the categories 'not disagreeing', 'disagreeing' and 'unable to judge' to facilitate identification of the most viable options or supplements.

1. Most farmers (44%) did not disagree that elk damage should be claimable on the farmers income tax return, while 29% disagreed and 27% were unable to judge. Some farmers commented that such a system may be difficult to regulate.
2. The majority of farmers (73%) did not disagree that elk habitat on private land should be taxed at a lower rate.
3. Some farmers (26%) disagreed that the crop quota system should be modified to include elk habitat into calculation of the crop quota, while 22% did not disagree and 52% of farmers were 'unable to judge'.
4. Some farmers (32%) disagreed that the government should purchase easements from the landowner on land inflicted with recurring elk damage, while 36% did not disagree and 43% were unable to judge. A few farmers indicated they were opposed with proposals where interests in land are given up by the farmer.
5. The majority of farmers (57%) disagreed that public land with herds of elk should be fenced in by Government if the land is near private land, however 36% did not disagree and 7% were unable to judge.

6. The majority (70%) disagreed that farmers should have the right to destroy any elk found damaging their property.
7. Most farmers (50%) disagreed that farmers should encourage hunters to hunt on their property to reduce elk damage, while 42% did not disagree and 8% were unable to judge.
8. The majority of farmers (54%) disagreed that farmers should charge hunters for access to their land since the fees would help compensate for elk damage, while 40% did not disagree and 6% were unable to judge.
9. The majority of farmers (58%) disagreed that farmers should charge the non-hunting public for access to their land since the fees would help compensate for elk damage, while 22% did not disagree and 20% were unable to judge.

2.2.6 Hunting And Elk Damage Management

Generally, results indicate that farmers perceived hunting as unbeneficial to their operations.

1. The majority of farmers judging the effect of hunting on fence damage (56%) agreed that hunting increases damage to fences (Figure 2.16). Farmers indicated that normally elk easily clear fences, however in the hunting season they sometimes become panicked and run through fences causing considerable damage. Fence mending is not only costly in terms of materials but also time consuming.
2. The majority of farmers judging the effect of hunters on their land (76%) agreed hunters were as much as a problem regarding



Figure 2.16: Hunting increases elk damage to fences.

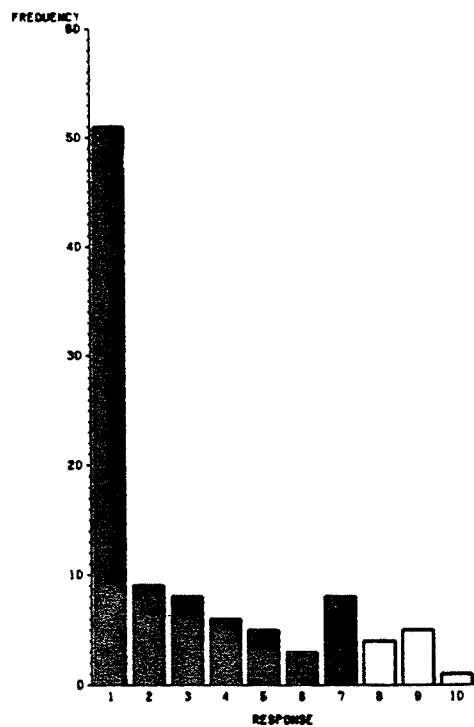


Figure 2.17: Hunters may be as much as a problem on my land as elk.

damage as elk (Figure 2.17). An example given of hunter abuse was hunters who drive over crops and fields instead of traveling along the periphery. Also, some farmers commented that hunting reduces the number of elk in the area temporarily but that elk return once seasons have closed.

3. A clear majority of farmers (93%) favoured the relatively recent legislation in the Wildlife Act requiring hunters to obtain permission to hunt from the landowner, while 7% did not disagree with this statement.
4. Most farmers judging the effectiveness of hunting in reducing elk damage (53%) disagreed that hunting was effective, while 32% agreed and 15% were neutral (N=66).
5. Most farmers judging the effectiveness of hunting regulations in controlling elk damage (44%) disagreed that regulations were effective, however 32% agreed and 24% were neutral.
6. The majority of farmers judging whether more liberal seasons and a greater number of licences are needed for elk (59%) disagreed (Figure 2.18).
7. Most farmers judging whether or not the practice of manipulating hunting regulations was a legitimate method of controlling elk damage (37%) disagreed, however 63% did not disagree. (Figure 2.19).

In general, farmers were very negative about Treaty Indians hunting on their land without permission. Almost all (99%) participants responding to the statement "treaty Indians should be allowed to hunt on private land even without permission from the farmer", disagreed



KEY

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 7=disagree strongly
 Other (blank histograms)
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 9=No damage
 10=Missing
 N=100

Figure 2.18: More liberal seasons and more licences are needed.

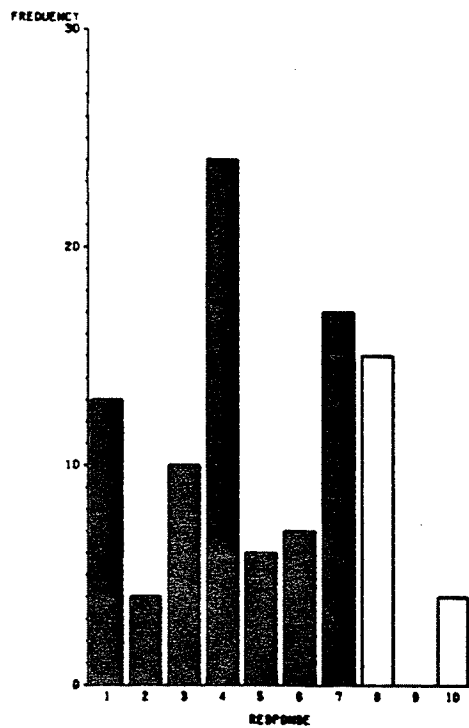
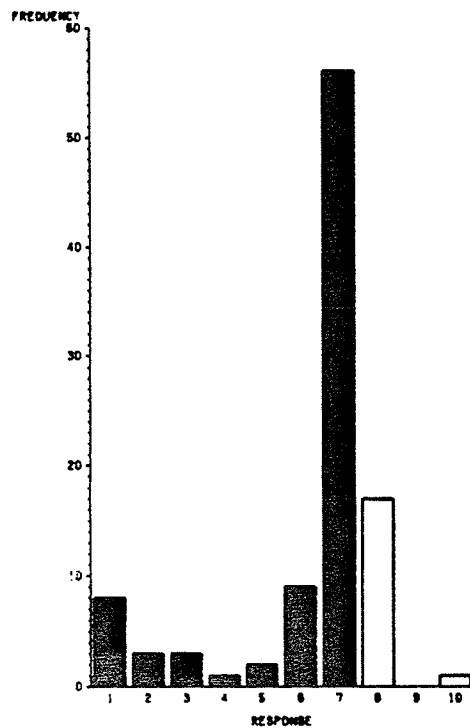


Figure 2.19: Hunting regulations are a legitimate method of controlling elk damage to farmers.

that this should be allowed, and 1% were unable to judge. The majority of farmers (67%) judging the effectiveness of treaty Indians in decreasing elk damage through hunting disagreed that they were effective, while 33% of these farmers did not disagree. Moreover, the majority (82%) of farmers judging the potential for Treaty Indians to effectively reduce elk damage disagreed a potential existed, however 18% were neutral or in agreement (Figure 2.20).

Most farmers with an opinion (49%) agreed that use of the landowner licence decreases elk damage, while 16% were neutral and 35% disagreed. Most farmers with an opinion (45%) disagreed that the landowner licence privileges for elk are compensation for damage, while 41% disagreed and 14% were neutral towards this statement (Figure 2.21).



KEY

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 1=agree strongly
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 7=disagree strongly
 Other (blank histograms)
 8=Unable to judge
 9=No damage
 10=Missing
 N=100

Figure 2.20: Hunting by treaty indians could be an effective control of elk damage.

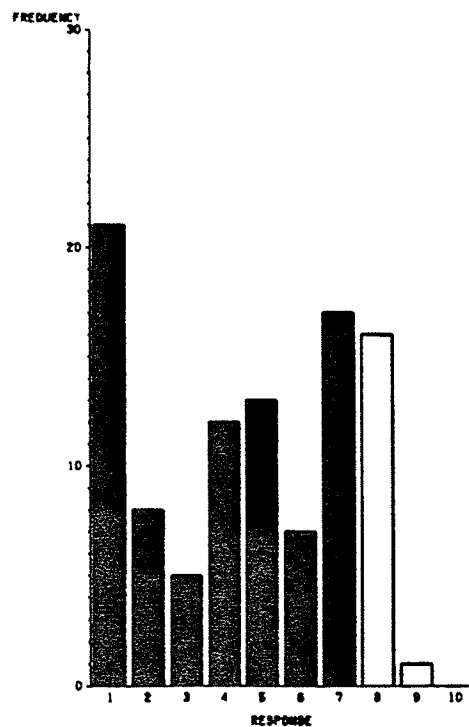


Figure 2.21: The landowner licence priveleges for elk are compensation for damage.

2.3 DISCUSSION

2.3.1 Equitable Elk Damage Management

The purpose of elk damage management is to ensure the costs of elk damage are shared equitably by all Manitobans.

From the Provincial perspective, some commitment to elk damage management by farmers is equitable. Farmers are soil managers, and modify what soil would naturally produce in favour of desired agricultural products. One of the natural products of land is wildlife, and some wildlife, such as elk, can substitute agricultural produce for natural forage. As a result, farmers have always been exposed to both the benefits and costs of elk and other wildlife.

Increasingly, MDNR has become involved in administering the elk resource for the benefit of all Manitobans. One aspect of MDNR's growing commitment is elk damage management. As a result, farmers in Manitoba no longer solely sustain the risk and cost of elk damage.

Elk damage management involves a cooperative relationship between farmers and MDNR. Farmers should make a reasonable commitment to solve elk damage problems with the advice and assistance of MDNR. There are three aspects of the MDNR commitment. First, the resources committed to elk damage management should reflect the value of the elk resource to Manitobans. If the value of the elk resource is underrated, resources available to elk damage management will be less than the potential allotment. Second, elk management should be coordinated with elk damage management, and wildlife managers should be prepared to increase the resource commitment to elk damage management if elk

damage levels increase due to bigger elk populations. For example, present elk habitat enhancement projects in the Duck Mountain Forest Reserve and Duck Mountain Provincial Park are being implemented with the objective of increasing elk populations, and this may effect elk damage levels in the vicinity. Third, the MDNR should ensure that elk damage management is efficient and equitable from the perspectives of Manitobans and farmers. The components of elk damage management are damage prevention, damage compensation, control, public education and extention, and program evaluation and research. Each component should be regarded as a tool, and the resources committed to each component should reflect their efficiency from the perspective of the people of Manitoba and the farmer. Hence, although development of new methods of elk damage prevention progresses slowly, a research component is efficient in the long term. In contrast, compensation payments, although sometimes necessary, do nothing to alleviate elk damage in the future.

An important point is that elk damage management is integrated with management of other types of big game damage such as white-tailed deer damage. Hence, an increased resource commitment to elk damage management would lead to an increased resource commitment to management of other types of wildlife damage.

2.3.2 Elk Damage Prevention

The finding that the majority of farmers with an opinion (63%) agreed that the Provincial Government should continue their involvement in elk damage prevention lends affirmation to the worth of the

Big Game Crop Damage Prevention Program. However, the fact that 58% of farmers with an opinion perceived that elk damage prevention is not effective, is evidence of both the difficulty in preventing elk damage and the inadequacies of the present program.

The challenge of preventing damage by elk provided the incentive for innovative ways of damage prevention, such as intercept feeding and lure crops. However, all damage prevention tools have inherent constraints and most have limited success (MDNR 1979, Hawthorn 1980, Aderhold 1985). In light of this reality, it is increasingly evident that the best strategy for the program is to foster the cooperative relationship with the farmer.

One of the advantages conferred by the cooperative relationship is that farmers and the Province are able to relate to one another's situations. Also, the Province becomes aware of what Farmers perceive as effective damage prevention efforts. For example, the practice of providing propane bangers to farmers for periods beyond their effective use may be contributing to a negative attitude of some farmers towards damage prevention methods. If conservation officers were provided with a flow chart describing damage prevention techniques and their uses, farmers could more easily understand the advantages and limitations of each technique. The cooperative relationship also enables the Province to solicit suggestions from farmers on how farmers and the Province can improve elk damage prevention. This ensures that Provincial efforts are accepted and supported by farmers. An important point from the perspective of the Province, is that an increased degree of interaction with farmers would require a larger commitment of resources.

The Province is presently involved in projects such as intercept feeding, establishment and maintenance of hay meadows for elk, and improving elk habitat in the Forestry Reserve. The fact that some farmers advocated these measures as methods of elk damage prevention indicates a degree of support for these efforts. Moreover, some farmers might be willing to assist in these projects. For example, one or more farmers may be willing to maintain a lure crop if compensated with a portion of the harvest. D. Davies (pers. comm.) emphasized the support of some members of the farming community in the Swan River Area in feeding deer and elk in the severe winter of 1985, and hence, some farmers might be willing to become more actively involved in elk management.

The proposition of some farmers that the Forest Reserve should be fenced to prevent elk damage is costly and unwarranted in light of the fact that some tolerance of elk damage by farmers is equitable. However, fencing wildlife habitat is efficient in circumstances when interference between wildlife and human endeavours would otherwise be intolerable; Alberta's Elk Island National Park is fenced, and many parks in east and central Africa are fenced to avoid conflict with big game such as elephants. Fencing on a limited scale, such as exclosures to protect hay bales, may be efficient in the long term when elk damage is severe.

The suggestion of farmers that the Province should modify present hunting regulations to benefit the landowner as compensation for supporting elk on his land, also warrants consideration. The landowner hunting season for the Swan River Area occurs between December 8 and

December 20, and has been limited to one bull elk (MDNR 1986). Landowners pay \$30 for an elk licence, which is identical to the resident elk licence fee. However, landowners need not enter a draw for a landowner licence, but may purchase a licence and hunt any elk within the boundaries of his property (MDNR 1986). Modifications to this system may have the potential to benefit both the Province and farmers.

Landowners would have a better chance of bagging an elk if the landowner hunting season extended over a longer period. The effect would be that elk conditioned to feeding on agricultural produce would be targeted while elk feeding on natural forage in the Forest Reserve could be managed separately with the resident elk season.

Similarly, a declared special elk hunting season has potential as a solution when elk damage is severe or has the potential to be severe. In such a system, landowner licences could be allocated to landowners in a designated area. In cases when many elk are involved, a draw for resident elk licences could be held in addition to allotment of landowner licences. The result would be that the elk doing the damage could be targeted, and landowners in the designated area, as well as resident hunters, could benefit from the declared season.

The cooperative relationship between farmers and the Province would benefit if the Province committed more resources to education and extension. One element of this component should promote an understanding of the adaptive ability of elk and awareness of realistic expectations for the effectiveness of elk damage prevention techniques. Farmers may not be aware that bearded crop varieties are

unpalatable to elk, so education and extension could be useful in promoting these crop varieties. The Province could also provide incentives encouraging farmers to adopt farming patterns less susceptible to elk damage. Another important point is that some farmers may not be aware of Provincial elk damage prevention projects such as lure crops, intercept feeding and elk habitat improvement. These efforts are commendable since elk are encouraged to remain in the Forest Reserve and not become dependent on the produce of private land. A lack of awareness of these projects may have contributed to the low esteem farmers held for damage prevention methods.

2.3.3 Elk Damage Compensation

The finding that 77% of farmers with an opinion agreed that the elk damage compensation program should be continued lends affirmation to the worth of the Big Game Crop Damage Compensation Program. However, 50% of farmers who judged the program indicated that the compensation program was unfair. Reasonably, the researcher expected that farmers experiencing a poor market for agricultural products (which was especially prevalent for farmers during the study period) would tend to be frustrated due to any losses suffered by elk. The fact that most farmers with an opinion (38%) agreed that landowners should not have to tolerate any elk damage on their property without complete compensation, bears this point out. Dorrance (1983), emphasizes that losses should be compensated at less than market value to encourage the use of preventative and control techniques and to discourage fraud and marketing through compensation programs. Nevertheless, the compensa-

tion rate of 75% of the assessed damage value is inadequate from the farmers perspective. Several farmers pointed to difficulties in entering the process of applying for compensation. The MCIC regulation specifies that claims must be filed "within 48 hours prior to harvesting, baling, removing or the doing of other acts which would destroy the evidence of crop damage in respect of which the claim is made". However, the farmer is faced with constraints so that in some cases harvesting and other activities should not be postponed. Hence, some farmers take on a risk when they choose to enter the compensation process. Another reason is that elk damage can involve costly time commitments. For example, if a farmer sustains hay damage for hay intended for stock, the farmer must incur expenses in replacing and transporting hay from another source. Finally, damage to growing crops and growing hay is difficult to measure in the early stages of growth. One possibility is that growth in early stages is not negatively affected by elk damage, however some farmers perceive setbacks in growth and density are merely concealed.

Another shortfall of the present compensation program is that compensation is limited to certain crops, and does not cover growing wild hay or fences damaged by elk.

On the positive side, the present compensation program meets the criteria of efficiency and equity. Many other compensation strategies would be either costly from the Government's perspective or unfair from the farmer's perspective. For example, a modification of the present compensation program which would not require a 25% refundable pre-assessment fee, could result in inefficiency since some farmers

might request crop damage assessments even if unwarranted. Also, the present research found that 71% of farmers with an opinion agreed or were neutral when asked if the fee is fair. Another commendable aspect of the compensation program is that farmers with elk damage are all compensated at the same rate. Delineating arbitrary or subjective boundaries where farmers are paid different compensation rates is not equitable even for areas where elk have been enhanced by management projects. One reason is that elk in one area might modify their forage patterns and damage agricultural interests outside the boundary. More importantly, farmers in a zone paying a lower compensation rate might perceive that elk damaging their property are the same elk that damage crops in the zone paying the higher compensation rate.

2.3.4 Responsibility For Elk Damage

Farmers clearly indicated that the Provincial Government, specifically the Wildlife Branch, should be responsible for elk damage compensation.

The fact that the majority of farmers (68%) disagreed that elk on private land should become the property of the farmer has implications for future wildlife damage management. Some wildlife managers have suggested that privatization of wildlife on private lands may be inevitable if current trends of high wildlife damage and low social priority for allocation of sufficient funds for wildlife damage compensation continues (Boag et al. 1980). However, privatization of wildlife on private lands may not have the support of farmers.

2.3.5 Alternative And Supplements To Elk Damage Management

Boag et al. (1980) addressed the paradox of private land and public wildlife by proposing strategies to provide farmers with incentives or less disincentives to maintain wildlife habitat on private land. One of the disincentives to farmers is wildlife damage to agricultural interests.

The first proposal was that the crop quota acreage regulations of the Canadian Wheat Board Act be modified to permit transfer of 'unimproved land' (wildlife habitat) into quota entitlement (Boag et al. 1980). The result would not only be the elimination of the present incentive imposed on farmers to clear wildlife habitat simply to increase the crop quota, but would also ensure that farmers benefited from wildlife habitat on their land. An additional benefit of this strategy would be that farmers with wildlife habitat on their land would be more tolerable of wildlife damage. Since 46% of farmers with an opinion agreed or were neutral to modification of the crop quota system to include elk habitat, the strategy has potential as a supplement to elk damage management. farmers will accept the strategy. An important point, however, is that elk damage can occur in the absence of wildlife habitat on private land if the land is adjacent to elk habitat. Also, some farmers would not be affected by the modification of the crop quota system if all their land is cultivated. Moreover, quality of wildlife habitat on private land may range from unproductive to productive, so crop quota entitlement should be graduated for levels of habitat quality.

The second proposal of Boag et al. was that the Canadian Income Tax Act (Section 30) be modified to allow deductions for land significantly improved for wildlife, and to provide that no taxes be levied or deductions allowed for land left untouched or on which no significant improvements for wildlife have been made. Boag et al. emphasized that under the present system farmers get tax breaks by clearing or draining land since such costs are tax deductible, and that farmers presently pay taxes on land not producing income for his operation. Since tax modification would reduce the cost of wildlife habitat to landowners, wildlife damage would also be more tolerable. The finding of the present research that most farmers with an opinion (49%) agreed that elk damage should be tax deductible, indicates a potential exists for tax related solutions to elk damage management. An important point is that only those farmers paying taxes could make use of a system where elk damage is tax deductible. Also, since quality of wildlife habitat ranges from unproductive to productive, tax incentives should be graduated with levels of wildlife habitat quality.

Boag et al. also proposed that Canadians adopt the concept of a Colorado system where farmers can sell an easement to the government. The farmer can be compensated with cash or through reduced taxes. This concept can be adapted so that interests in private land inflicted with exceptionally high levels of wildlife damage can be sold by the farmer to the Province. An example is that the landowner sells the right for elk to feed on his land to the Province. The value of the easement to the farmer would be equal to the present value of the discounted annual sum of average damages due to elk. Perhaps with

further development a few farmers would be favourable to this type of solution.

The final recommendation was that a legal fee schedule be established for both non-consumptive and consumptive uses of wildlife (Boag et al 1980). The present system is that most Provinces neither authorize, nor prohibit, landowners from fee hunting or other wildlife management practices for economic gain. Boag et al. pointed to novel approaches in New Jersey, Nebraska and California where the value of wildlife habitat on private land is recognized, and landowners can realize economic gain from maintaining wildlife habitat on their land. The present research found that the majority of farmers with an opinion (72%) were particularly opposed to the concept of charging viewers for access to their land, but since 43% did not disagree with charging hunters, the latter concept has potential as a supplement to present elk damage management. The increasing prevalence of farmers opting to close their land to all hunters, suggests that a fee structure is necessary to reverse this trend. Saskatchewan (1978) reported a doubling in the number of farmers posting land between 1969 and 1975. Saskatchewan (1978) also found that the least desirable habitat program among farmers involved charging access fees to hunters. However, if MDNR helped organize farmers, some might opt to allow hunting on their land if they could realize a profit. An important consideration is some farmers could benefit when they do not absorb the cost of elk damage. Nielson et al. (1985) noted that due to the migration patterns of elk and deer, some farmers bear the costs of wildlife damage, but do not receive the benefits due to fee hunting.

2.3.6 Hunting And Elk Damage Management

Managing recreational hunting for elk and other game is a complex administrative task. Considerations in game management include game populations, hunter demand, and concerns of hunters, landowners and non-hunters (Manitoba 1980). In managing recreational hunting for elk on private land an important consideration is that relations between hunters and landowners affect opportunities for recreational hunting on private land. Hunting which causes damage to agricultural interests can influence farmers to close their land to public access. The fact that the majority of farmers with an opinion (56%) agreed that hunting increases elk damage to fences is evidence that hunting on private land can cause costs to farmers. Also, the result that the majority of farmers with an opinion (76%) perceived that hunters were as much of a problem with regard to damage as elk is further evidence of the cost to farmers due to hunting. Saskatchewan (1978) reported that about 8% of farmers experienced some monetary loss due to hunters on their land in 1975. Gates left open was the most frequent complaint, followed by cut or damaged fences, trampled crops, and littering (Saskatchewan 1978). Hence, a factor responsible for poor relations between farmers and hunters is the unfortunate abuse of some hunters to the property of farmers.

In recognition of landowner rights, the Manitoba Wildlife Act includes legislation that the public (including Treaty Indians) must obtain permission to hunt on private land (Manitoba 1983). The present research affirms this legislation, since with regard to hunters and Treaty Indians, 93% and 99%, respectively, disagreed that

access should be unrestricted. In Saskatchewan, 80% of farmers felt that hunters had no right of access to private land (Saskatchewan 1978). Also, Saskatchewan (1978) reported that the most frequent suggestion by farmers for reducing problems caused by hunters was to require hunters to obtain permission to hunt on private land even if the land is not posted.

The effect of hunting regulations on elk damage levels in the Swan River Area is difficult to determine. Farmer attitudes to statements related to hunting and elk damage were probably influenced by the interest of farmers as hunters and (or) non-consumptive users of the elk resource. Hunting is perceived by farmers to increase elk damage to fences. Also, a lower elk population in the agricultural area caused by culling would translate into less elk damage. However, the elk population in Swan River Area is limited more by habitat than by amount of hunting (V. Crichton pers. comm.) Also, some elk move to higher levels in the adjacent Duck Mountain Provincial Park and Forest Reserve during the hunting season, and then return to lower levels in winter. For these reasons, farmers diverged widely in attitude with regard to statements related to the effect of hunting regulations on elk damage.

The landowner licence program was established primarily to encourage habitat retention on private land, and partly in recognition of the cost born by some farmers due to wildlife damage. The fact that all participants agreed or were neutral towards the idea of the landowner licence as compensation for elk damage, lends support to the program. Farmers would be more supportive of the program if the lan-

downer licence was provided free to farmers with high levels of elk damage. Although some farmers advocated modification of the program to more easily benefit farmers, an important consideration is that some farmers would benefit when they do not absorb the cost of elk damage. Nielson et al. (1985) noted that due to the migration patterns of elk and deer, some farmers bear the costs of wildlife damage, but do not receive the benefits due to fee hunting.

2.4 RECOMMENDATIONS

The purpose of elk damage management is to ensure the costs of elk damage are shared equitably by all Manitobans.

2.4.1 Equitable Elk Damage Management

1. Farmers should make a reasonable commitment to elk damage management making use of advice and assistance available from MDNR.
2. MDNR should implement a study to determine the material and aesthetic value of the elk resource to Manitobans. Elk management programs including elk damage management may be receiving inadequate funding due to undervaluing of the elk resource.
3. A mechanism should be implemented so that elk damage managers can communicate more effectively with other wildlife managers involved in the elk resource. The impact of elk management such as elk enhancement should be reflected in the resources allotted to elk damage management.

4. The resources committed to the components of elk damage management (damage prevention, damage compensation, control, public education and extension, program evaluation and research) should reflect the efficiency of the components from the perspective of the people of Manitoba and farmers with elk damage.

2.4.2 Elk Damage Prevention

5. The emphasis on elk damage prevention should be to promote the cooperative relationship between farmers and MDNR. This will require a greater commitment of resources since there are too few conservation officers at the present time.
6. A flow chart describing the purpose and limitations of damage prevention techniques should be developed to assist conservation officers in advising farmers.
7. Elk management projects which encourage elk to forage on public land, rather than private land, should be encouraged. These projects include habitat enhancement, lure crops and hay meadows to intercept elk from damaging agricultural interest.
8. Cost effectiveness of preventative techniques should be viewed in the long term to ensure equity to Manitobans. Hence, the use of fences to protect agricultural produce should be implemented in cases where elk damage is frequent and severe.
9. The landowner hunting season should be extended to give landowners a better chance of bagging elk. In cases when elk damage is severe or has the potential to be severe, an elk season should be declared. Landowners within the designated area

should receive a landowner licence. Also, in cases when many elk are involved, a draw for resident elk licences should be held.

10. Increased resource commitment to the education and extension component has potential to improve farmer attitudes towards elk damage prevention and reduce elk damage. The component should promote an understanding of realistic expectations for the effectiveness of damage prevention, encourage farming patterns less susceptible to elk damage and describe Provincial elk prevention projects such as lure crops, intercept feeding, and elk habitat improvement.
11. Incentives encouraging farmers to switch to crops less susceptible to elk damage should be examined.

2.4.3 Elk Damage Compensation

12. The compensation rate of 75% of assessed damage value is inadequate from the farmers perspective. Also, the rate paid to farmers for elk damage should not be based solely on market value. Market value of agricultural interests does not include the risk born by farmers in entering the compensation process, the time commitment due to elk damage, and potential set backs in growth and density due to elk damage during the early stages of produce growth. Hence, a compensation rate higher than 75% is required.
13. Compensation should be paid for fence damage.

2.4.4 Alternatives And Supplements To Elk Damage Management

14. Modifications to the crop quota system, tax related modifications and fee hunting have potential as supplements to present elk damage management. Also, a few farmers are favourable to the concept of entering into easement agreements,

2.4.5 Hunting and Elk Damage Management

15. The Hunter Education Program should allocate more resources into stressing landowner rights and emphasize courteous hunting practices on private land. Also, more resources should be allocated to enforcement to protect the rights of farmers.
16. The landowner licence should be modified so that landowners with high levels of elk damage have the option to make use of a free landowner licence.

Chapter III

FARMER PERSPECTIVES TOWARDS ELK RANCHING

"As they are at present, the most valuable agricultural soils of the continent are largely unavailable for the management and use of wildlife" (Committee On North American Wildlife Policy 1973).

3.1 METHODS

3.1.1 The Questionnaire

The development of the questionnaire and identification of the study area are described in Chapter 1. The complete sample of 100 surveys was used to assess the implications of elk ranching from the perspective of farmers.

The final form of the items related to elk ranching are presented in Figure 3.1 along with the 7-point Likert scale from which respondents selected responses. Items 1 to 5 are statements measuring farmer attitudes and perceptions with regard to elk ranches and elk damage. Item 6 stands apart since it measures desirability of elk ranches irrespective of elk damage. Figure 3.1 shows that farmers who agreed with item 1 were asked to explain the type of damage that elk inflicted on their property. Also, after responding to item 6, all farmers were asked to provide the main reason(s) they agreed or disagreed with elk ranching.

Criterion variables were also identified that were potentially relevant in characterizing respondents that held particular views with regard to elk ranching. Three of these criterion variables were: whether or not the farmer belonged to a wildlife oriented association; whether or not the farmer had considered raising wildlife for profit on their land; and the number of years involved in farming.

Figure 3.1: Items regarding elk ranching and elk damage and the scale from which farmers selected responses

1	2	3	4	5	6	7	8	9
Strongly agree			Neutral About right			Strongly Disagree	Unable To Judge	No Damage
<p>1. Elk damage on my land has increased because of the establishment of the Swan River elk ranch.</p> <p>If you agree, What type of damage do these elk cause? Feeding [], Trampling[].</p> <p>2. Elk ranching near my land would cause increased damage by wild elk on my land.</p> <p>3. Elk ranching development in Manitoba will increase wild elk damage to landowners in Manitoba.</p> <p>4. Elk ranching attracts wild elk on my land especially during the rutting season.</p> <p>5. Elk ranchers operating near my land should be liable for any increase in elk damage.</p> <p>6. Commercial elk ranching should be allowed in this area.</p> <p>What is the main reason(s) you agree or disagree?</p>								

3.1.2 Hypothesis

The author hypothesized that attitude towards the Swan Valley Elk Ranch would be related to distance from the elk ranch, distance from the continuous edge of the forest, and extent of past elk damage. These variables were measured using topographic maps of the area (62 N/15 edition 4, 63 C/2 edition 3, 62 N/14 edition 4 and 63 C/3 edition 4 produced from aerial photographs taken in 1977 and 1978 and published in 1982). Using land identification codes, each quarter section of land worked by each farmer interviewed was located on maps. Also, since the Swan Valley Elk Ranch consisted of two elk enclosures situated approximately 1.7 km apart the location of both enclosures were identified on maps. Measurements from each quarter section of land to the closest elk enclosure and from the center of the farmers land to the nearest continuous edge of the Duck Mountain Forest were scaled from maps. Since clearing and encroachment would have occurred since the aerial photographs were published, the criteria that the 'continuous edge of the forest' be no less than 500 meters wide was adopted. In testing hypothesis for cases when farmers owned more than one quarter section of land, the relevant quarter section(s) was the one closest to the elk ranch and the one closest to the continuous edge of the forest. 'Extent of past elk damage' was based on responses of farmers to questions on the level of elk damage sustained in the past 5 years (Appendix 1).

3.1.3 Data Analysis

All analysis was conducted using SAS statistical packages on the University of Manitoba main frame computer system. Responses were first analyzed on the basis of frequency of occurrence of each response and then the nature of respondents holding a particular attitude was analyzed. The procedure used to examine the relationship of respondent attitudes and perceptions to criterion variables follows Piazza (1980). Piazza emphasized that in analyzing attitudinal data, responses to closely related items must be examined to determine how respondents have related to statements. This simple process serves as a check to ensure respondents have interpreted statements as intended by the researcher.

The principal iterated factor extraction technique was used to reduce the items into subsets, and varimax rotation was used to clearly identify factors with items. The two criteria used to extract factors were that preliminary eigenvalues must be greater than one, and that factors must represent 80% of the covariance in the interitem correlation matrix. Once subsets of intercorrelated items were identified canonical correlation analysis employed in the next step provided information on the relationship of each subset of items to criterion variables. In the analysis, the two sets of variables (the items of a subset and criterion variables) share a relationship to the first variate (the principal linear relationship). The strength of this relationship is indicated by the coefficients, and the sign indicates if the relationship is positively or negatively correlated with the variate. Note that there are as many variates as variables in the

set containing the fewest variables, however usually only the first variate, if any, is significant. The eigenvalue, or squared canonical correlation, coefficient is the percent of variation in one set that is explained by the variation in the other set. A probability of $P < .1$ was considered significant for the purpose of this study. This is the probability of the relationship between the two sets of variables not existing in the population assuming adequate sampling techniques. Only those coefficients greater than 0.3 were interpreted. According to Pedhazur (1982), a coefficient of 0.7 is excellent, 0.6 is very good, 0.55 is good, 0.42 is fair, and 0.30 is marginal; coefficients of less than 0.3 should not be interpreted.

3.2 RESULTS

Visual examination of items in Figure 3.1 revealed that item 6 stands apart from items 1 to 5 since the latter deal with elk damage in relation to elk ranching, while the former addresses the acceptability of elk ranching. Factor analysis of responses to items 1 to 5 revealed that farmers responded differently to items 1 and 4 than to items 2, 3 and 5. Hence, the 6 items in Figure 3.1 form three subsets on the basis of how farmers interpreted each statement (Figure 3.2). Visual inspection revealed why subset 1 and subset 2 stand apart. Items in subset 1 addressed the effect of the Swan Valley Elk Ranch on the level of elk damage on the respondents land. Only those farmers who perceived an increase in elk damage on their land caused directly by the Swan Valley Elk Ranch should have responded in agreement with these items. Since, these two parallel worded items were decomposed

into the same subset, reliability of these two items is demonstrated. Conversely, items in subset 2 are hypothetical statements, and need not be related to distance to the elk ranch.

Figure 3.2: Items 1 to 6 divided into subsets on the basis of how farmers interpreted each statement

Subset 1	
Item 1	Elk damage on my land has increased because of the establishment of the Swan Valley Elk Ranch.
Item 4	Elk ranching attracts wild elk on my land especially during the rutting season.
Subset 2	
Item 2	Elk ranching near my land would cause increased damage by wild elk.
Item 3	Elk ranching development in Manitoba will increase wild elk damage to landowners in Manitoba.
Item 5	Elk ranchers operating near my land should be liable for any increase in elk damage.
Subset 3	
Item 6	Commercial elk ranching should be allowed in this area.

3.2.1 The Perceived Effect Of The Elk Ranch

Most farmers (48%) disagreed with the statement that the Swan Valley Elk Ranch has increased elk damage on their land (Figure 3.3). Of the 11% of farmers that agreed with this statement, 91% believed elk caused trampling damage and 73% believed elk caused feeding damage (participants could choose either or both responses). Most farmers

(33%) responded they were 'unable to judge' when responding to the statement "elk ranching increases elk damage on my land especially during the rutting season" (Figure 3.4). However, 29% agreed and 21% disagreed with this statement.

Frequencies of responses are interesting in themselves, however it is also instructive to examine the nature of farmers holding a particular response. Those respondents that agreed to items 1 and 4 tended¹ to be members of wildlife clubs, tended not to be considering elk ranching and tended to be working land closer to the elk ranch (Table 3.1). More precisely, farmers working land further than 2 km from the Swan Valley Elk Ranch tended to perceive the elk ranch to be too far away to influence elk damage levels.

The nature of farmers who responded 'unable to judge' or 'no damage' when responding to items 1 and 4 is also important, since these response categories together represented 32% and 41% of respondents, respectively. Those farmers responding 'unable to judge' in response to items 1 and 4 tended to be further from the Swan Valley Elk Ranch and further from the continuous edge of the forest. Those farmers responding 'no damage' in response to these two statements, tended to work land further from the elk ranch and further from the continuous edge of the forest (Table 3.2 and Table 3.3). More precisely, farmers responding 'unable to judge' or 'no damage' tended to work land further than 2 km from the elk ranch and further than 1.5 km from the

¹ The description of canonical correlation analysis is provided in the Methods section. For example, the variable distance from the elk ranch coefficient of 0.39 means that there is a 'fair' association such that farmers agreeing to items 1 and 4 tend to be closer to the elk ranch.

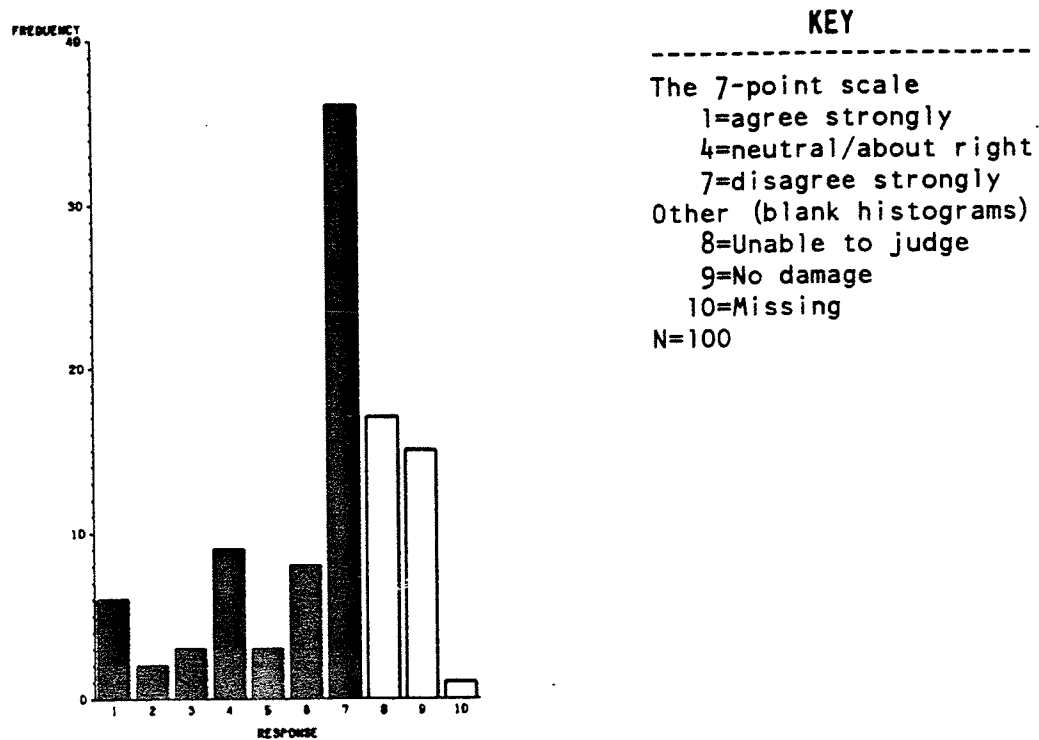


Figure 3.3: Elk damage on my land has increased because of the establishment of the Swan River elk ranch

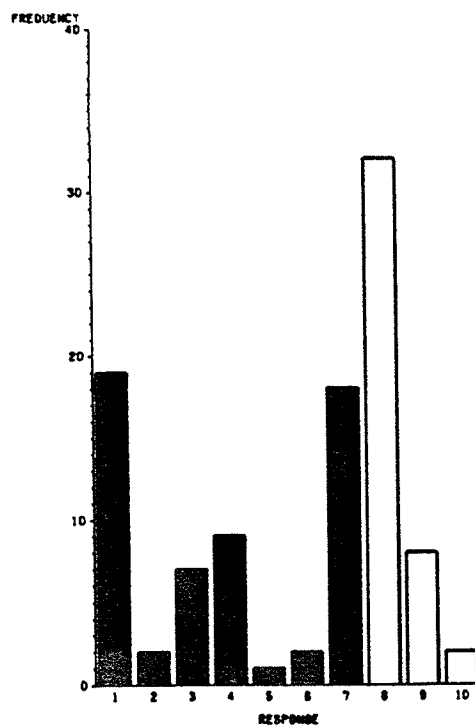


Figure 3.4: Elk ranching attracts wild elk on my land especially during the rutting season

continuous edge of the forest. This result reinforces the finding that farmers working land further than 2 km from the Swan Valley Elk Ranch perceived their land to be beyond the influence of the elk ranch.

TABLE 3.1

The linear relationship characterizing farmers agreeing or disagreeing with items 1 and 4.

Standardized Canonical Coefficients Subset 2		
Item 1	(agree)	Variate 1 0.4022 (disagree)
Item 4		0.7371
Age of Farmer	(Young)	0.2902 (Old)
Member of a Wildlife Club.	(yes)	0.6467 (no)
Prospective elk rancher	(yes)	-0.4182 (No)
Total past elk damage	(high)	-0.2443 (low)
Distance from Forest	(close)	0.0158 (far)
Distance from Elk Ranch	(close)	0.3891 (far)
Eigenvalue - 1st variate (%) = 47 P = 0.0126		
Eigenvalue - 2nd variate (%) = 2 P = 0.9778		

TABLE 3.2

The linear relationship characterizing farmers responding unable to judge in response to items 1 and 4.

Standardized Canonical Coefficients Subset 2			
Item 1	(opinion)	Variate 1	
Item 4		0.6222 (unable to judge)	
		0.5680	
Total past elk damage	(high)	-0.4175	(low)
Distance from Forest	(close)	0.3931	(far)
Distance from Elk Ranch	(close)	0.7594	(far)
Eigenvalue - 1st variate (%) = 0.15 P = 0.0496			
Eigenvalue - 1st variate (%) = 0.01 P = 0.7177			

TABLE 3.3

The linear relationship characterizing farmers responding no damage in response to items 1 and 4.

Standardized Canonical Coefficients Subset 2			
Item 1	(opinion)	Variate 1	
Item 4		0.4416 (no damage)	
		0.7185	
Total past elk damage	(high)	-0.6098	(low)
Distance from Forest	(close)	0.5190	(far)
Distance from Elk Ranch	(close)	0.4288	(far)
Eigenvalue - 1st variate (%) = 19 P = 0.0371			
Eigenvalue - 1st variate (%) = 5 P = 0.2727			

3.2.2 Perceptions Regarding The Effect Of Elk Ranching

Most farmers (46%) agreed with the statement 'elk ranches near my land would cause increased elk damage by wild elk on my land' (Figure 3.5). Similarly, half of the participants (50%) perceived that development of elk ranching in Manitoba will increase elk damage to landowners in Manitoba (Figure 3.6). Also, the majority (56%) of farmers agreed with the statement 'elk ranchers operating near my land should be liable for any increase in elk damage' (Figure 3.7).

The results from the canonical correlation analysis are helpful in understanding the nature of farmers holding certain responses (Table 3.4). Farmers agreeing with these items had the following general characteristics: tended not to be considering elk ranching; tended to be younger, and tended to work land further from the elk ranch. More precisely, farmers working land further than 2 km from the Swan River Elk Ranch tended to be more emphatic that an elk ranch could increase elk damage. Few farmers responded 'no damage' in response to these items, therefore this analysis was not undertaken. The response 'unable to judge' was not related to relevant criterion variables at the $p=0.1$ level.

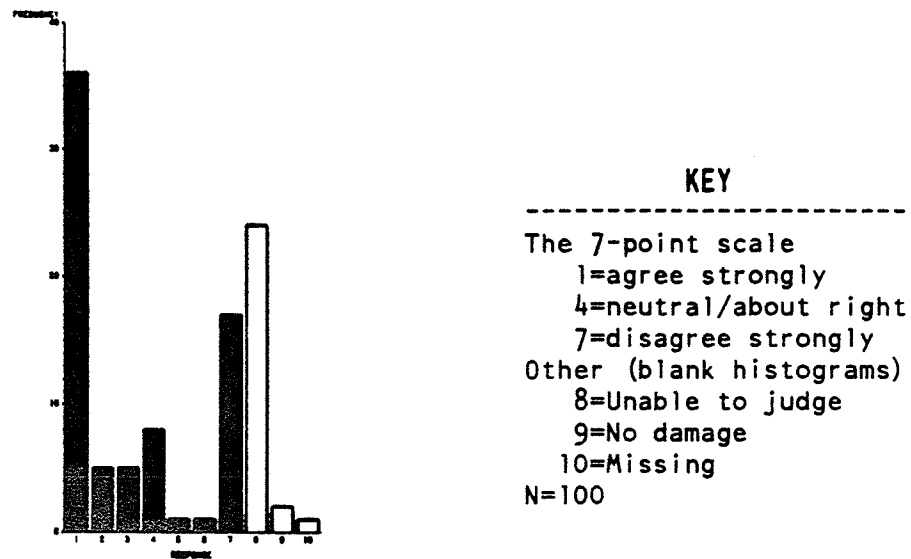


Figure 3.5: Elk ranching near my land will increase elk damage.

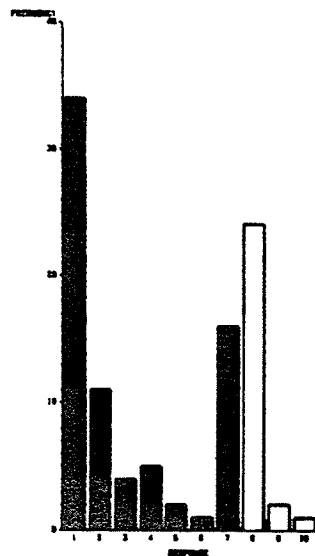


Figure 3.6: Elk ranching in Manitoba will increase elk damage.

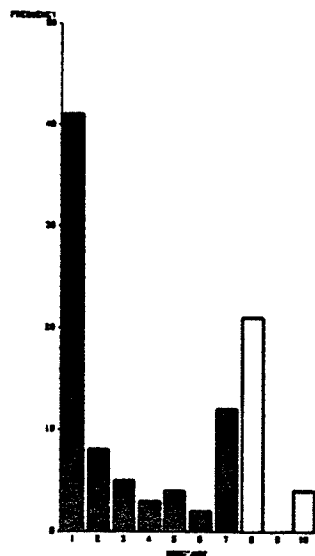


Figure 3.7: Elk ranchers operating near my land should be liable for any increase in elk damage.

TABLE 3.4

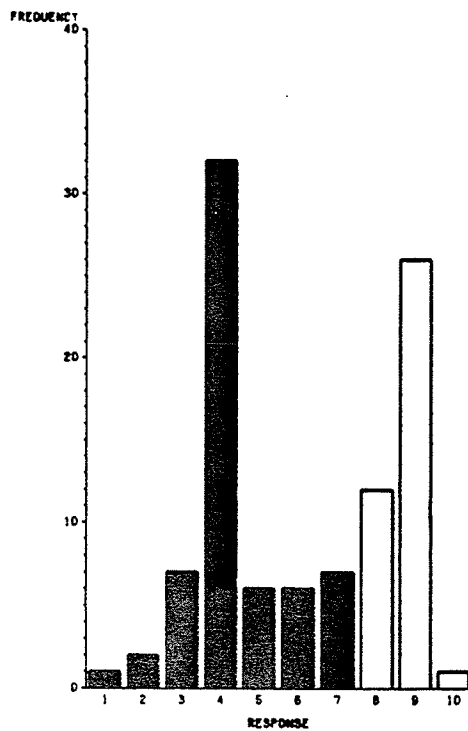
The linear relationship characterizing agreement or disagreement with items 2, 3 or 5.

Standardized Canonical Coefficients Subset 1		
Item 2	(agree)	Variate 1 0.4561 (disagree)
Item 3		0.2957
Item 5		0.3673
Age of Farmer	(Young)	0.4700 (Old)
Member of a Wildlife Club	(yes)	0.2340 (no)
Prospective elk rancher	(yes)	-0.6041 (No)
Total past elk damage	(high)	-0.3749 (low)
Distance from Forest	(close)	-0.0372 (far)
Distance from Elk Ranch	(close)	-0.2835 (far)
Eigenvalue - 1st variate (%) = 53 P = 0.0001		
Eigenvalue - 2nd variate (%) = 15 P = 0.2664		

3.2.3 Trends In Elk Damage

Participants responded to five questions on trends in elk numbers and trends in elk damage in their area and on their land. Farmers not in a position to judge a particular trend responded 'unable to judge' or 'no damage'. In general most farmers perceived elk numbers and elk damage levels had remained about the same in the past five years (1981 - 1985): Participant's perception of trends were analyzed by canonical correlation relative to criterion variables age, wildlife club member, prospective elk rancher, total past elk damage, distance from the continuous edge of the forest, and distance from the Swan Valley Elk Ranch.

1. The majority of farmers (53%) judging the trend in crop damage by elk in the past five years (N=61) perceived levels to have remained about the same; 31% felt crop damage had increased, and 16% felt crop damage had decreased (Figure 3.8). Farmers perceived crop damage levels to have decreased over this period tended to be older and tended to have experienced higher total elk damage.
2. Approximately half of farmers (49%) judging past hay damage by elk in the past five years (N=41) perceived hay damage had remained about the same and about half (46%) perceived hay damage levels to have increased; 5% felt that hay damage had decreased (Figure 3.9). Farmers who perceived hay damage to have decreased tended to be older and tended to have experienced higher past elk damage.
3. The majority (62%) of farmers judging the trend in levels of past elk damage to fences (N=24) perceived damage to fences were about the same, while 38% perceived fence damage to be increasing.
4. Most farmers surveyed (36%) felt the number of elk in their area had remained about the same; 31% felt that numbers had increased and 25% felt numbers had decreased (Figure 3.10).
5. The majority of farmers surveyed (52%) felt that they would like to see the number of elk in their area remain the same, while 27% felt that numbers should be decreased, and 20% felt the number of elk should be increased (Figure 3.11). Farmers advocating that elk numbers should be decreased tended to have experienced more crop damage.



KEY

The 7-point scale
 1=Decreased Greatly
 4=About same
 7=Increased Greatly
 Other (blank histograms)
 8=Unable to judge
 9=No damage
 10=Missing
 N=100

Figure 3.8:- The trend in past elk damage to crops.

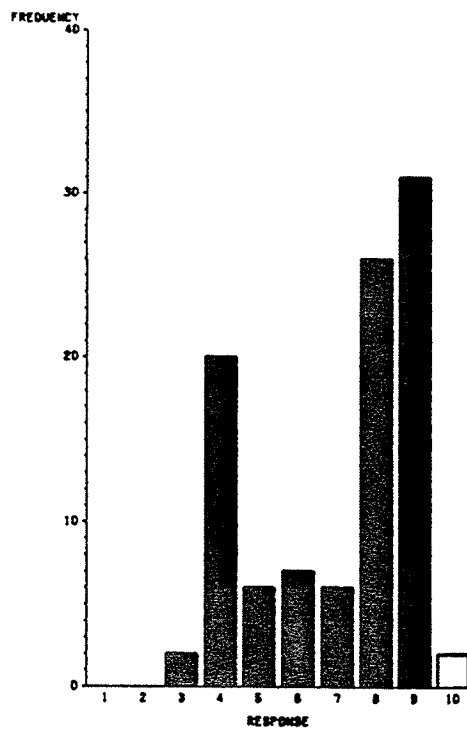
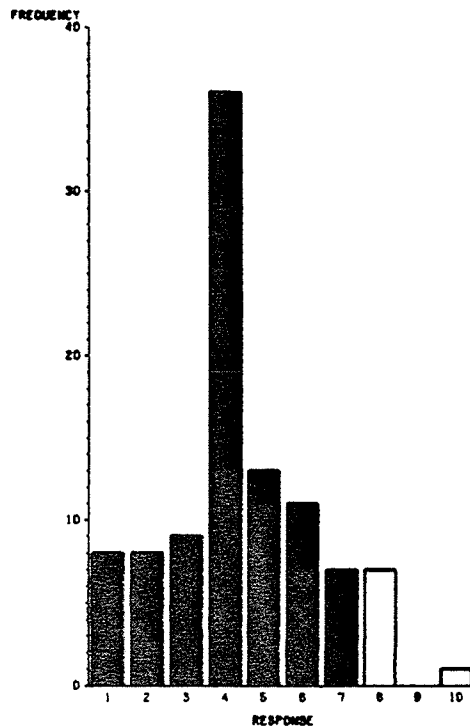


Figure 3.9: The trend in past elk damage to forage and hay.



KEY

The 7-point scale
 1=Decreased Greatly
 4=About same
 7=Increased Greatly
 Other (blank histograms)
 8=Unable to judge
 9=No damage
 10=Missing
 N=100

Figure 3.10: The trend in the number of elk.

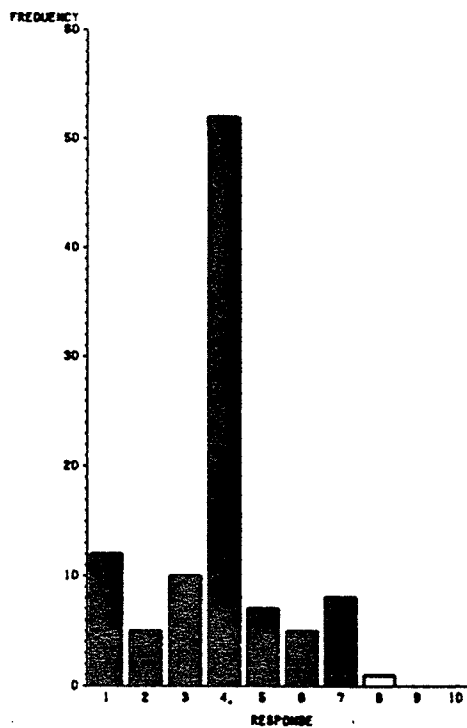


Figure 3.11: Farmer's policy with regard to the number of elk in their area.

3.2.4 The Acceptability of Elk Ranching Development

A clear majority of respondents (63%) were opposed to elk ranching development in their area, while 27% of the total were not opposed to elk ranching and 10% were 'unable to judge' (Figure 3.12). The perception that elk ranches increased elk damage was not the only concern of farmers in the study area. Other concerns included poaching, disease transfer to wild stocks, and competition for domestic meats (Figure 3.13). Figure 3.13 presents responses in descending order of frequency; responses 1 to 5 and response 7 are reasons why elk ranches should not be allowed, while responses 6 and 8 are reasons why elk ranches should be allowed.

As expected, farmers agreeing with item 6 tended to be considering elk ranching themselves. Also, there was a tendency for farmers with more experience to be more favourable towards elk ranching (Table 3.5). Farmers who responded 'unable to judge' tended not to be considering elk ranching and tended to have farmed fewer years (Table 3.5). Those farmers disagreed that elk ranching should not be allowed in the area tended to be considering elk ranching themselves. The variation of demographic variables 'distance from the elk ranch', 'extent of past elk damage', and 'distance from the forest reserve' were not related to attitude to elk ranching development. The response 'unable to judge' was not significantly related to criterion variables ($P=0.1$).

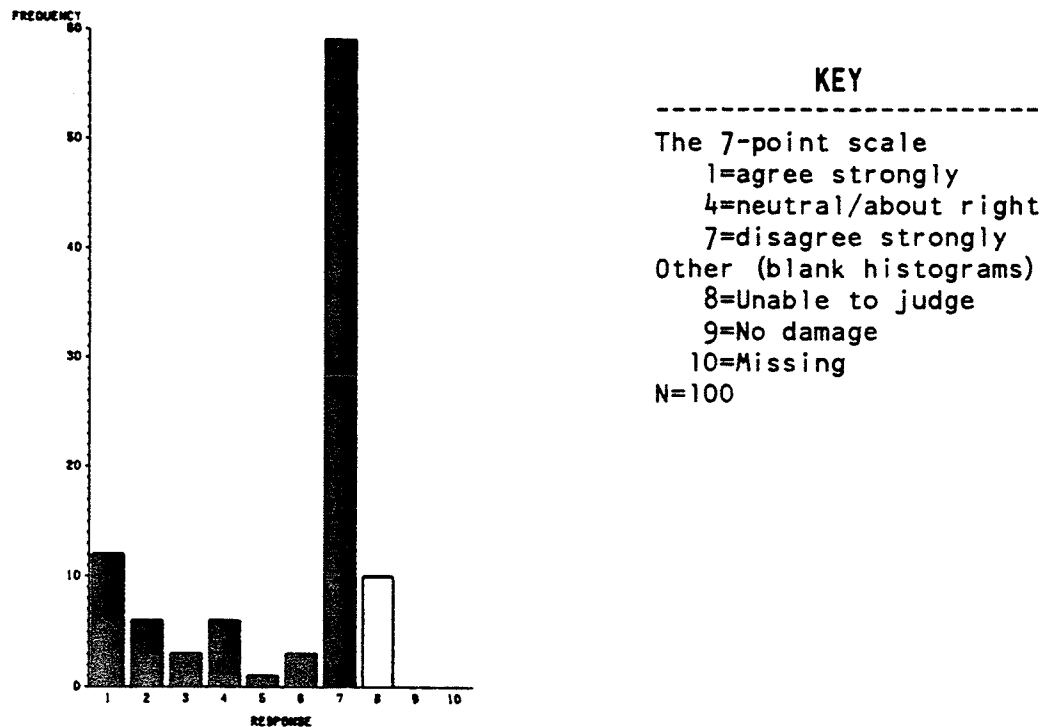


Figure 3.12: Commercial elk ranching should be allowed in this area.

Figure 3.13: The main reasons farmers gave for their stand for or against elk ranching development in their area presented in descending order of frequency.

1. Elk should not be confined in elk ranches;
2. Elk ranches will increase elk damage to farmers;
3. Elk ranching will lead to harmful effects to wild elk due to disease transfer and poaching;
4. Elk ranches should not release previously ranched elk to the wild;
5. Elk are a public resource and should not benefit a minority;
6. Elk ranching is a legitimate enterprise;
7. Elk ranching will increase competition for domestic meats;
8. Elk ranching will conserve elk as a species.

TABLE 3.5

The linear relationship characterizing farmers agreeing or disagreeing with elk ranching development in their area.

Standardized Canonical Coefficients Subset 1		
Item 6	Variate 1 (agree) 1.0000 (disagree)	
Age of Farmer	(Young)	-0.2360 (Old)
Member of a Wildlife Club	(yes)	-0.2512 (no)
Prospective elk rancher	(yes)	0.8716 (No)
Total past elk damage	(high)	0.0670 (low)
Distance from Forest	(close)	0.0345 (far)
Distance from Elk Ranch	(close)	0.0376 (far)

Eigenvalue - 1st variate (%) = 39 P = 0.0001

3.3 DISCUSSION

3.3.1 The Effect Of An Elk Ranch On Local Wild Elk

Present day knowledge of elk behaviour, specifically social cohesiveness and rutting behaviour, can be used to provide insight on the assertion that an elk ranch attracts wild elk. An advantage to this approach is that although elk are widely distributed over North America, all populations exhibit remarkably similar behaviours, and therefore knowledge of different subspecies can be pooled to some extent. Geist (1982) explains this by pointing to the fact that elk are the most recently evolved of existing Old World deer, and have recently colonized a continent void of other Old World deer, and hence, have retained a colonization type phenology, and have not yet evolved a close fit between environment and adaptive strategies.

In considering a hypothetical elk ranch established within the periphery of the range of an existing elk population, it is important to admit from the outset that some elk are expected to be seen in the vicinity simply by chance, and not because the elk ranch acted as an attractant. The degree of chance occurrence of elk in the vicinity of the elk ranch should reflect the foraging strategy of elk.

Green (1933) reported observations of forage strategy in Manitoban elk (manitobensis) in Riding Mountain National Park. During winter, elk occurred in "herds of 500 or more" composed of loose groups of both sexes. In spring, these herds broke up into "little" bull and cow groups which moved off to separate ranges such that the sexes tended to be separate throughout spring and summer. "Bull groups" consisted mainly of mature bulls and some yearling bulls while "cow groups" consisted of yearlings of both sexes and cows. Green reported that during parturition cows left groups temporarily and returned shortly with their calf. Just prior to the rut, dominant males, followed by sub dominant and yearling males, moved to cow ranges and remained after the rut till the following spring.

Other investigators have broadened knowledge of elk foraging strategies with the observation that elk limit their activity to home ranges. In a study of a migratory population of Rocky Mountain Elk (nelsoni) Craighead et al. (1972) reported that mixing between home ranges was limited to 1-2% of tagged animals, and that although elk foraged more widely on summer ranges, they only occupied a fraction of the area available to them. Further, Craighead et al. (1973) found that cows of a population of non-migratory Rocky Mountain elk similarly

exhibited a tendency to use only a portion of the area available to them. Home range size is probably a function of the trade off between habitat requirements such as forage and cover, and the necessity for elk to conserve energy for reproduction, and reduce risk of predation and injury due to lack of familiarity with their environment (Geist 1982).

Several investigators reported that elk tended to reoccupy the same home range in successive years (Knight 1970, Craighead 1973, Edge 1985). For example, Edge (1985) reported that over a three year period, the home ranges of individual cow elk remained in the same general areas in consecutive years. Edge also found that home range fidelity remained high despite peripheral logging activities.

The findings of these investigators suggests that those elk whose home ranges encompass the elk ranch are expected to occur near the ranch some of the time solely by chance. Also, other elk with more distant home ranges should normally maintain home range fidelity.

Despite the fact that investigators have been able to measure a degree of home range fidelity for elk, it is important to note that a change in environmental conditions could cause elk to adjust their home ranges. Geist (1982) explains that the selection forces shaping the forage strategies of the sexes differ. The strongest selection force acting on cows is to provide security from predators for their calves. Hence, cows form groups to share vigilance and reduce the chances of a predator taking any particular calf. The result is that cows choose forage areas primarily on the basis of security, and sec-

ondarily on the basis of forage quality. The bulls strategy differs in that his objective is to maximize body fat for reserves during the rut and winter. Geist predicts that bulls must also refrain from directly competing with their offspring or the mothers of their future offspring by feeding among them. The result is that bulls tend to occur in small all male groups on different ranges than females, and that many bulls choose to be solitary and seek out pockets of high quality food (Geist 1982). Consequently, bulls exhibit greater wandering than cows and pioneer dispersal.

Geist's synthesis of elk forage strategy suggests that elk deviate at times from their normal home range especially to meet security and forage needs. For this reason, changes in home ranges of elk concurrent with the establishment of an elk ranch may be only coincidence. Also, bull elk normally occupying areas distant from an elk ranch might be observed in it's vicinity simply because of the dispersal and wide ranging forage strategy of bulls.

3.3.1.1 Social Cohesiveness

It is possible to use the argument that elk compete passively to show that an elk ranch may act to attract wild elk to some degree. Geist (1982) rationalizes that since elk evolved in northern areas where productivity is low and forage indefensible, they now exhibit a degree of passive competition. A forage strategy based on passive competition implies that elk are independent and use behavioural cues of competitors to locate pockets of high quality forage (Geist 1982). The greater the intensity of passive competition the less individuals

must be influenced by social bonds even though they must live gregariously (Geist 1982). Therefore, if an elk ranch is established within the range of an elk population that exhibits strong passive competition, then some elk may occur in the vicinity because the behavioural cues of ranched elk might be taken by wild elk as an indication of high quality forage. Further, wild elk might cue on to the elk ranch as offering protection from predators and hunting. The ability of elk to locate areas of security has been noted by Squibb (1985), who reported high concentrations of elk on a 400 hectare hunting refuge within an area of heavy annual harvest.

The degree of passive competition in elk reported by investigators varies. Investigators studying populations of Rocky Mountain elk have reported a low degree of group constancy (Knight 1970, Craighead 1973, Houston 1982). Houston (1982) postulated that levels of agonistic interactions are higher in such elk groups of low group constancy especially in winter when forage is scarce. However, Geist (1982) cited Franklin and Lieb whose findings indicated high group constancy for Roosevelt elk (roosevelti). Geist explains that the disparity between different investigators' findings on elk social cohesiveness is due to factors that select for independence in elk, such as recent colonization, deep snow, and habitats of low productive forage with poor visibility, while open habitats with homogenous and highly productive forage are conducive to social bonding. Hence, although the northern areas where elk evolved selected for a forage strategy based on passive competition, elk that were later exposed to more homogenous open habitats such as some west coast populations dropped a degree of

independence in favour of the advantages of social bonding (Geist 1982).

Although there have been no studies on the extent of social bonding in Manitoban elk, they are exposed to environmental factors identified by Geist (1982) as conducive to passive competition; diverse transitional habitat and heavy annual snowfall. Further, the fact that Shilo and Duck Mountain elk populations have been recently established suggests that Manitoban elk have retained a degree of dispersal tendency. However, it is possible that abundance of agriculture adjacent to these areas may allow elk to drop a degree of independence and develop social bonding.

3.3.1.2 The Rut

The rut is well known for the spectacular behaviour of bulls competing for estrous cows, and one might infer that if elk ranches attract wild elk, this is the time when attraction is greatest. The author visited the Swan Valley Elk Ranch on 27 August 1986 and was treated to the sight of the dominant bull of the herd exhibiting rut behaviours. Geist's (1982) synthesis of the polygamous mating system helps in interpreting the bulls behaviour. Geist states that the cow's strategy is to choose the best male and the bull's strategy is to breed as many females as possible. The female achieves competition among males to her estrous condition. The bull can achieve his goal by either searching out a female and staying with her till she is estrous or by advertising his presence and dominance to attract females. Geist believes that bulls combine these tactics by first moving to the

general proximity of cow groups and then advertising to attract them. As part of this strategy the bull must demonstrate his dominance which he does through urine spraying, bugling, wallowing in mud, and horning bushes and ground with his antlers. The bull must also seek to advertise better than his competitors and attempt to silence them by seeking each out and challenging them. Giest also predicts that bulls guarding harems should bugle more frequently than lone bulls in order to hold the harem, except in the case when cows have been positively conditioned to the bull so that they do not want to leave him. Since it is in the females best interest to investigate as many males as possible, the female should only be willing to be held by a harem herding bull as long as she is satisfied that he is the best bull around (Giest 1982).

It follows, that the bull the author observed at the Swan Valley Elk Ranch was advertising his dominance to any cow within hearing, and was defying any challenger who would attempt to take his harem. Such behaviour exhibited by a wild bull would have the effect of drawing in estrous cows and rival bulls, and it follows that local wild elk might respond in the same way to the bull in the elk ranch.

3.3.1.3 In Context To The Swan Valley Elk Ranch

The review has established that elk ranches have the potential to attract wild elk. Elk forage strategy indicates that elk whose home ranges contain the Swan Valley Elk Ranch are expected to be seen in the vicinity simply by chance. D. Davies (pers. comm.) stated that just prior to the establishment of the Swan Valley Elk Ranch a herd of

45 elk were known to be in the vicinity. Also, the 1987 winter elk survey located a herd of 59 animals 3.2 km. (2 miles) from the elk ranch (D. Davies pers. comm.). Also, any changes in the home ranges of elk concurrent with the establishment of the Swan Valley Elk Ranch may be a coincidence, and actually due to changes in environmental factors such as forage and security. Bulls, in particular, are expected to range widely and may occur in the vicinity of the Swan Valley Elk Ranch on isolated occasions solely by chance. The possibility of a direct attraction to the Swan Valley Elk Ranch can be attributed to elk social cohesiveness and rutting behaviour. Elk exhibiting a high degree of passive competition might cue onto the behaviour of ranched elk as indicating preferred forage or security. High tendency for passive competition in elk is related to winter severity, low habitat quality, and migratory tendency (Geist 1984). Therefore, elk in the Swan River Area probably compete passively unless proximity of high quality agricultural produce has facilitated high group fidelity. Also, since rut behavior of wild bulls has the effect of drawing estrous cows and rival bulls, it follows that such behaviour exhibited by a ranched bull could have a similar effect on local wild elk in the Swan River Area.

3.3.2 Implications To Elk Damage Management

The implications of elk ranching to elk damage management depends on the additional elk damage attributed to the elk ranch. One method to determine the influence of an elk ranch on elk damage levels is to compare elk damage 'before and after' the establishment of an elk

ranch. Information on elk damage in the Swan River Area is available only from 1980 to the present. Also, occurrence reports on wildlife damage previous to 1980 were not specific on the species of big game that caused damage. Hence, damage levels in the Swan River Area are available for two years prior to the establishment of the Swan Valley Elk Ranch in 1980, so a statistical comparison of damage levels before and after establishment of the ranch is not feasible based on the variation of damage levels over short periods. According to observations of some farmers and wildlife managers, the level of elk damage has increased in the vicinity of the Swan Valley Elk Ranch. However, the present research found that farmer perceptions towards elk damage and elk population trends were not related to distance to the elk ranch. Also, any increase in elk damage may be coincidental and due to a change in elk foraging patterns due to environmental effects such as forage and security. For these reasons, a potential increase in elk damage attributable to the Swan Valley Elk Ranch has not been quantified in the present research.

More importantly to wildlife managers, the present research showed that farmers in the Swan River Area perceived that elk ranches do increase elk damage in the vicinity.

The finding that farmers who agreed that the Swan Valley Elk Ranch has increased elk damage on their land tended to work land closer to the ranch, is evidence that farmers were generally objective in responding to statements. Logically, the potential effect of the ranch on wild elk is finite, and based on farmer perceptions the ranches influence on wild elk is reduced at distances beyond 2 km.

The tendency that respondents considering game ranching (N=12) disagreed elk ranches attract wild elk, is a legitimate stand since the potential of elk ranches to attract wild elk has never been documented previous to the present research. The tendency that wildlife club members (N=19) perceived elk ranches have the potential to increase elk damage levels, may be partly due to a bias against elk ranching development. Nichols (1984) noted that the hunting fraternity has concerns towards game farming development due to the possibility of trophy production from game farms or ranches. An important point is that some wildlife club members may have perceived that the Swan Valley Elk Ranch has increased damage levels based on an objective interpretation of elk movements and damage in their area.

The finding that farmers working land further from the Swan Valley Elk Ranch tended to be more emphatic that elk ranches increase elk damage, may be due to the high level of publicity the issue has received in the Swan River Area. The publicity may have led farmers who perceived they are beyond influence of the elk ranch to overrate the effect of elk ranches on elk damage, relative to farmers close enough to the elk ranch to judge the effect for themselves.

The tendency that younger participants agreed more strongly than older farmers that elk ranching has an adverse effect on elk damage may be partly related to differential experience with elk damage and age related personality differences.

Farmer perceptions on elk damage levels and elk numbers reflect their experience with elk in the vicinity of their land. Since elk

damage can change locally even over small periods, of several years farmers differ in their response to statements about elk damage trends and trends in elk numbers. As expected, farmers experiencing more past elk damage tended to perceive elk damage trends and elk numbers as increasing over this period. Older participants tended to perceive elk damage trends as decreasing possibly since older participants may be drawing on a longer history of experience with elk damage and do not perceive the same increase in elk damage as younger participants. The fact that distance between respondent's land and the Swan Valley Elk Ranch was not related significantly with farmer perceptions towards trends in elk damage and elk numbers, indicates that these levels may not be influenced significantly by the Swan Valley Elk Ranch.

3.3.3 Desirability Of Elk Ranching Development

Irrespective of perceived influence of elk ranches on elk damage a clear majority of farmers (63%) were opposed to elk ranching development, while 27% were not opposed. The reasons 'for and against' elk ranching in Alberta has been documented by Lynch (1985) from public responses to the 1984 Big Game Ranching Discussion Paper produced by the Alberta Energy and Natural Resources. In general, the reasons documented 'for or against' elk ranching are similar to the responses of participants of the present research with three exceptions. First, the responses documented by Lynch (1985) were collected from all types of Albertan citizens, while the present research reports responses of farmers in the study area. Also, Lynch (1985) did not quantify propo-

nents and opponents, while this study quantifies these results. Finally, the concern that elk ranches would draw in wild elk and increase damage to farmers was not documented by Lynch (1985).

Clearly, opposition to elk ranching development reflects concern for the welfare of wild elk and concern that elk ranches will adversely affect farming operations.

Farmers felt that wild elk in the vicinity of elk ranches could contract disease from ranched elk. Bailey (1984) emphasizes that wildlife populations may exhibit stress due to overcrowding, which lowers the animals resistance to diseases, and that disease tends to be more prevalent when animals are confined from ranging. The concern that disease might spread to wild elk, could be placated if elk ranches are located in areas without local wild elk. Also, regulations restricting stocking density and requiring disease certification would reduce the incidents of disease in ranched elk.

Farmers also believed poaching of wild elk might increase due to the open market in elk products associated with elk ranching development. Alberta is proposing record requirements, animal marking requirements, and computer cross-checking of animal registration numbers to reduce the potential for illegal game products to enter the legalized commercial system (Lynch 1985). The Province should be prepared to allocate more resources to enforcement if elk ranching development is pursued.

Farmers were also concerned that elk ranches should not release previously ranched elk to the wild. In Manitoba, prospective elk

ranchers were informed that elk ranchers would return two animals to the wild for every elk given by the Province to the operator as broodstock. Payne (1986) viewed this system as Provincial insurance against possible reduction of wild elk herds due to hunting, predation or other agents. Some farmers, however, expressed concern that this policy might facilitate disease transfer to wild stocks or result in inferior animals being returned to the wild. Prospective elk ranchers in Manitoba were also informed that elk could not be transferred into the Province for ranching. The effect would be to reduce the potential spread of foreign diseases and possible genetic mixing should ranched elk escape or be released to the wild.

Another view held by some participants was that elk are a public resource and should not benefit a minority. In Manitoba and elsewhere in Canada, private use of wildlife, especially furbearers, is prevalent. However, the importance of wildlife to all Canadians has been well documented. For example, the 1981 National Survey by the Canadian Wildlife Service on the Importance of Wildlife to Canadians found that 82.8 % of Canadians expressed some or great interest in non-consumptive wildlife uses. Some farmers will continue to oppose elk ranching development in which substantive benefits accrue only to the elk rancher.

The final concern voiced by farmers was that elk ranching would increase competition for domestic meats. Hudson (1984a) emphasized the economic attraction of elk ranching based partly on the fact that natural pasture can sustain elk, moose and bison through the winter, while cattle require winter feeding. Also, elk produce additional rev-

venues over cattle from sale of velvet and live elk as breeding stock (Hudson 1984a). Hudson (1984a) calculated the break-even price for an elk ranching operation catering to a venison market to have a 27% lower break-even meat price relative to a comparable beef cattle operation. Further, the Alberta Government Big Game Ranching Discussion Paper specifically points to the production of game meats for public consumption as a benefit of game ranching. Elk ranching would have less of an impact on cattle producers if elk products were initially restricted to an export market.

3.3.4 Development Of An Industry In Canada

Successful development of an industry in Canada will depend on how effectively concerns can be addressed.

There are three main reasons why elk ranching has evoked opposition in Canada. First, "elk ranching" is a new idea and the form the industry will take in Canada is still unclear, and this promotes confusion. The options available for the industry can be conceived on a spectrum from game parks to elk farms. Second, the idea of wildlife as a public trust inherently connotes wildlife in the pristine state. Also, the benefits of wildlife are conceived to accrue to the public and not selectively to individuals. Thirdly, elk ranching has potentially detrimental effects on farmers and wildlife elk.

3.3.4.1 A New Zealand Style Industry

One option for an industry in Canada is to template the New Zealand style of deer farming. Elk production could be viewed as any other commodity with the appropriate infrastructure including controls for disease and poaching. However, a New Zealand style of elk production would be subject to intense public opposition since concern of wildlife as a public resource is not effectively addressed.

3.3.4.2 A Canadian Style Industry

A Canadian style industry would address the North American situation where wildlife is viewed as a public trust. Opposition to elk ranching would be reduced if benefits of ranching accrued to the public wildlife resource. For example, a fee could be levied annually to entrepreneurs making use of the public elk resource, and revenues could be allocated directly or indirectly from general revenues to wildlife management.

3.3.4.3 A Canadian Conservation Style Industry

A Canadian conservation style industry is essentially the counterpart of the conservation motive for game ranching in Africa (Dasmann 1964). In Canada, conservation of the original prairie flora and fauna is impaired by traditional agriculture which has procured most high quality soil. Markets in game provide a unique opportunity to make wildlife an economically viable alternative on productive soils. Hence, game parks modeled after game parks in East and South Africa are an alternative form of elk production. Revenues from sale of elk could be used to help make a game park economically viable.

3.4 CONCLUSIONS

The literature clearly indicates that elk ranches located in the vicinity of wild elk could act as an attractant to wild elk. Elk foraging strategy suggests that some elk might be seen in the vicinity of an elk ranch simply by chance. The possibility of a direct attraction is based on passive competition and rutting behaviours of elk. Some farmers in the vicinity of the Swan Valley Elk Ranch perceived that the ranch has increased elk damage levels on their land. This perception is reduced among farmers working land 2 km from the elk ranch and beyond 1.5 km from the continuous edge of the forest. Farmers working land further than 2 km from the Swan River Elk Ranch tend to be more emphatic that an elk ranch located near their land would increase elk damage on their land. This result is most likely due to the high level of elk ranching publicity in the Swan River Area. Finally, irrespective of perceived influence of elk ranches on elk damage, a clear majority (63%) of respondents were opposed to elk ranching development in their area. Expressed concerns related to the welfare of wild elk such as poaching and disease, and to impacts on farmer's operations such as elk damage and competition for domestic meats.

Successful development of an industry in Canada will depend on how effectively concerns can be addressed. The three main concerns are: "elk ranching" is a new idea and confusion is promoted since a specific form of elk production in Canada has not been defined; the ideology of wildlife as a public trust in a pristine environment conflicts with elk ranching development; and there are potentially detrimental effects to farmers and wild elk populations due to elk ranching.

3.5 RECOMMENDATIONS

1. A committee should be established to investigate alternative methods of elk production development. There are three general styles.
 - a) A New Zealand style industry would view elk production as any other commodity. However, opposition would be intense since the North American situation of wildlife as a public trust is not addressed.
 - b) A Canadian style industry would address the North American situation of wildlife as a public trust. For example, a fee could be levied annually to entrepreneurs making use of the elk resource, and revenues allocated directly or indirectly from public revenues to wildlife management.
 - c) A Canadian conservation style industry makes use of the economic value of wildlife such as elk so that wildlife production is a viable alternative on productive soils.
2. The Province should identify which style of elk production development should be implemented. A survey should be conducted to determine which style is most preferred by Manitobans.
3. Once a style has been adopted, development should be initially limited to a small scale so that necessary infrastructure can be established.
4. Where possible, elk ranches should be sited in agricultural areas not adjacent to wild elk populations or natural predator populations.

5. A strategy should be developed to deal with potential increase in poaching of wild elk due to development of a legal market for elk products.
6. The Province should not adopt a policy where all elk ranchers return elk to the wild in exchange for elk provided by the Province to establish ranches. Rather, prospective elk ranchers should pay cash for the market value of the wild elk. Revenues should be allocated directly or indirectly through general revenues to wildlife management such as elk enhancement.
7. A wildlife use fee system should be developed so that benefits of elk ranching accrue to Manitobans in a tangible manner.
8. Marketing of elk for public consumption should be limited initially to an export market to allow cattle producers to adjust to potential competition.

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Appendix A

LETTER OF INTRODUCTION

To _____.
Swan River Area

Subject: Elk damage management

I am sure you share an interest with other farmers in the district with regard to elk damage management. The Natural Resources Institute at the University of Manitoba is conducting a study to assess elk damage management in the district. We believe it is important that farmers have the chance to evaluate elk damage management, and to determine if elk ranching has related implications.

I am a graduate student with the Institute and will be conducting the study with the assistance of my advisors. If you are interested in elk management, I would like to talk with you whether or not you have had elk damage. Because only a limited number of farmers can be interviewed the core of the study and it's success relies on you. I will attempt to contact you by phone to set up the interview.

I know you are busy during the spring and summer seasons. This, however, is also the only time I have to do field interviews. I will need no more than 1/2 hour of your time and will do my best to match your schedule. The questionnaire is standardized, confidential, and painless. The information, however, will be important in assessing a problem of direct concern to your operation.

Thank you,

Robert Purdy
Natural Resources Institute

Appendix B
THE QUESTIONNAIRE

ELK DAMAGE HISTORY ON YOUR LAND (BY 1/4 SECTION)

CROP(S) DAMAGED _____ LOCATION _____ SEC. _____ TWP. _____

Distance from damaged crop to bush where elk accessed the crop _____.

YOUR assessment of your losses per crop \$_____.

How do you rate this damage (check one)

No damage ☐, Negligible ☐, Tolerable ☐, Intolerable ☐.

Year(s) damage occurred ☐ '80 ☐ '81 ☐ '82 ☐ '83 ☐ '84 ☐ '85 ☐ '86

Month(s) damage occurred (circle) J F M A M J J A S O N D

Estimated number of elk doing the damage _____.

Are you aware of present compensation programs? ☐ Yes ☐ No

Did you file a complaint ☐ In writing ☐ Verbally ☐ No

If Yes, with whom ☐ Municipality ☐ Provincial government
☐ Federal government ☐ MCIC

Approximate date of complaint _____.

Did you get a response ☐ Yes ☐ No, from whom _____.

Was a damage assessment made ☐ Yes ☐ No, BY _____.

Approximately what date was damage assessed _____.

Was compensation received ☐ Yes ☐ No, Amount \$_____.

Approximately what date was compensation received _____.

Were you satisfied with the level of compensation ☐ Yes ☐ No

Has ELK damage changed your farming patterns ☐ Yes ☐ No

If yes, explain _____.

TRENDS IN DEPREDAATION

We would like to have your views on the trends in amount of damage by elk during the last 5 years (1980 - 1985).

1. Please indicate your assessment of each of the following statements by selecting from the scale below, the number that best applies. For example, if you think that the amount of elk damage on your property or leased land has not changed, mark a 4 in the space.

	1	2	3	4	5	6	7		8	9
Decreased				About			Increased	Unable	No	
Greatly				same			Greatly	To Judge	Damage	

- a) The amount of crop damage by elk on my land has _____.
What crops are affected _____.
- b) Damage to forage or hay by elk on my land has _____.
- c) Damage to fences by elk on my land has _____.
- d) The number of elk in my area has _____.
- e) You would like to see the number of Elk in the area _____.

THE ELK DAMAGE PROGRAM

The Provincial Wildlife Branch is responsible for elk damage management. Part of management involves the elk damage prevention program and the elk damage compensation program.

2) We want your opinion and ideas on the elk damage prevention program. Please use the following scale for your answers.

	1	2	3	4	5	6	7		8
Strongly				Neutral			Strongly	Unable	
agree				About right			Disagree	To Judge	

- a) Provincial Government involvement in Elk damage prevention is a necessary part of elk damage management _____.
- b) Present elk damage control methods used by the Provincial Government are effective in controlling damage _____.

What efforts have you witnessed on your land

_____.

How can the farmer or Provincial Government improve elk damage prevention _____.

_____.

3) We want your opinion on the elk damage compensation program. Please respond to each of the following statements. Use the following rating scale for your answers.

1 2 3 4 5 6 7 8

Strongly Neutral Strongly Unable
agree About right Disagree To Judge

- a) I would like to see the elk damage compensation program continued ____.
- b) The compensation program for crop damage is fair _____.
- c) The pre-assessment fee of \$25.00 per quarter per crop is an acceptable part of the compensation program ____.
- d) Compensation for hay damage is adequate _____.
- e) Compensation for fence damage is not necessary ____.
- f) Overall, the elk damage compensation program is fair _____.

If not, why (check if applicable)

- [[Crop damage assessment inadequate
[[hay damage assessment inadequate
[[damage to growing crop
[[damage to growing hay or forage
[[damage to fences
[[loss of my time
[[other

- g) Landowners should not have to tolerate any elk damage on their property without complete compensation _____.
- h) I would be better off with no elk on my land _____.

Comments:

4) We want your opinion on who should be responsible for elk damage. Please read all options before answering.

	1	2	3	4	5	6	7	8
Strongly				Neutral				
agree						Strongly		Unable
						Disagree		To Judge

- a) Elk damage is a cost in farming and should be the sole responsibility of the farmer ____.
- b) Responsibility for elk damage should be shared by government and the farmer ____.
- c) Government should accept full responsibility for elk damage to farmers ____.
- d) Municipal Governments should be responsible for elk damage compensation _____.
- e) The Provincial Government should be solely responsible for elk damage compensation _____.
- f) Specific Provincial Government Departments should be responsible for elk damage compensation _____. (check if applicable) [☐ Agriculture, [☐ Parks, [☐ Wildlife.
- g) The Federal Government should accept full responsibility for elk damage compensation ____.
- h) All elk on private land should become the property of the farmer so that the farmer can deal with elk damage and benefits as he chooses _____.
- i) Elk that damage my property come from [☐ Duck Mountain Provincial Park, [☐ Duck Mountain Forest Reserve, [☐ Local areas on or near my land, Wildlife Management Areas [☐, No elk damage [☐].

5) We are exploring options and supplements to elk damage management.
Please indicate your response to the following statements.

	1	2	3	4	5	6	7	8
Strongly								
agree				Neutral			Strongly	Unable
			About right			Disagree		To Judge

- a) Elk damage should be claimable on the farmer's income tax return ____.
- b) Elk habitat on private land should be taxed at a lower rate ____.
- c) The Crop Quota System should be modified to include elk habitat into calculation of the crop quota ____.
- d) The Government should purchase easements from the landowner on land inflicted with reoccurring elk damage ____.
- e) Public land with herds of elk should be fenced in by Government if the land is near private land ____.
- f) Farmers should have the right to destroy any elk found damaging their property ____.
- g) Farmers should encourage hunters to hunt on their property to reduce elk damage ____.
- h) Farmers should charge hunters for access to their land since the fees would help compensate for elk damage ____.
- i) Farmers should charge the non-hunting public for access to their land since the fees would help compensate for elk damage ____.

Comments:

6) We want your opinion and ideas on present hunting regulations and their effect on elk damage. Please use the following scale for your answers:

	1	2	3	4	5	6	7	8	9
Strongly									
agree								Strongly	No
				About right				Disagree	Judge Damage

a) Damage to fences increases on my land when the hunting season is open ____.

b) Hunting in fall decreases elk damage on my land ____.

c) Hunting regulations are a legitimate method of controlling elk damage to Farmers ____.

d) Hunters should be allowed unrestricted access to the farmer's property ____.

e) Hunters may be as much of a problem on my land with regard to damage as elk ____.

f) The landowner licence, and its use, decreases elk damage ____.

g) The landowner's licence privileges for elk are compensation for damage ____.

h) Overall, more liberal seasons and a greater number of licences are needed for elk ____.

i) Hunting regulations are an effective control of elk damage ____.

j) Hunting by Treaty Indians decreases elk damage ____.

k) Hunting by Treaty Indians could be an effective control of elk damage ____.

l) Treaty Indians should be allowed to hunt on private land even without permission from the farmer ____.

Comments:

IMPLICATIONS OF ELK RANCHING

7) We want your opinion on whether or not elk ranching has implications for elk damage management. Please respond to each of the following statements. Use the following rating scale for your answers.

	1	2	3	4	5	6	7	8	9
Strongly									
agree				Neutral				Strongly	
				About right				Disagree	
								Unable	No
								To Judge	Damage

- a) Elk damage on my land has increased because of the establishment of the Swan River Elk Ranch _____.

If you agree,

What type of damage do these elk cause
Feeding []; Trampling []; Other _____.

- b) Elk ranching near my land would cause increased damage by wild elk on my land _____.
- c) Elk ranching development in Manitoba will increase wild elk damage to landowners in Manitoba _____.
- d) Elk ranching attracts wild elk on my land especially during the rutting season _____.
- e) Elk ranchers operating near my land should be liable for any increase in elk damage _____.
- f) Commercial elk ranching should be allowed in this area _____.

What is the main reason(s) you agree or disagree

_____.

Comments:

DEMOGRAPHIC DATA - PROPERTY CHARACTERISTICS

Mark your appropriate age category «» <25 Years
 «» 26-40 Years
 «» 41-55 Years
 «» >56 Years

What is your situation as a Farmer «» Full-time farming
 «» Mainly farming,
 seasonal off-farm work
 (50% farming)
 «» <50% Farming

How long have you been farming «» <5 Years
 «» 6-10 Years
 «» 11-20 Years
 «» >21 Years

How many acres do you own and farm _____.

How many acres do you lease and farm _____.

Approximately how many acres are cropped _____.

How many head of stock do you run Cattle _____.

 Horses _____.

 Dairy _____.

 Other _____.

Do you hunt «» Yes «» NO

Do you allow elk hunters on your property [] Yes [] No

If Yes, [] No restriction on numbers

 [] Restricted numbers (CHECK WHERE APPLICABLE)

 [] Require permission

 [] Do not Require permission

 [] hunting fee payment required

DEMOGRAPHIC DATA - PROPERTY CHARACTERISTICS CONTINUED

Have you considered raising wildlife for profit on your land
Yes « » No « ».

If yes, what species _____.

Have you considered charging hunters a fee for access
on your land

Yes « » No « ».

Do you belong to a wildlife oriented association, group or club
Yes « » No « ».

Please specify _____.

Would you be willing to attend a workshop on elk damage
prevention

Yes [] No [].

THANK YOU