SUPPLEMENTAL WINTER FEEDING OF WHITETAILED DEER IN SOUTHERN MANITOBA

by

Ian James Menzies

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

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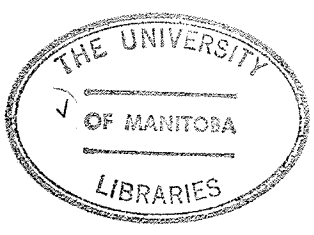

ABSTRACT

The general public in Manitoba believe that winter mortality of whitetailed deer (Odocoileus virginianus) could be prevented with supplemental feeding. Until recently, provincial wildlife managers have resisted any involvement in feeding programs. Is supplemental feeding a wise use of wildlife program resources? The ecological, socio-political and economic aspects of supplemental feedings are assessed in this practicum.

The literature was reviewed, personal interviews with wildlife managers and farmers were conducted and views of selected game and fish associations in Manitoba were obtained from a questionaire. Details of feeding experiences in Minnesota, North Dakota, and Saskatchewan were collected and compared to those in Manitoba.

Ecologically, supplemental feeding would not disrupt the stability of deer populations in Manitoba. Under normal winter conditions, feeding programs are not required; however, the effect of severe winters could be stabilized to some degree with supplemental feeding. The use of feeding proved effective in preventing deer depredation damage to agricultural crops in winter storage. Application of this approach in emergency situations would have definite political benefits. Public participation is the key element of a successful program. Planning an emergency feeding program for Manitoba would have economic benefits by reducing overall costs and would speed delivery of program support.

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CHAPTER 1

THE STUDY OUTLINE

1.1 Introduction

The whitetailed deer (Odocoileus virginianus) is an important wildlife resource in Manitoba. Hunters recognize the whitetail as the most important big game species that can still be hunted; non-hunters appreciate any opportunity to see the animals in their natural habitat. As deer numbers decrease, all of these recreational experiences become rarer and more costly. Therefore, any circumstance that threatens the deer population becomes a focus for public concern. The impact of severe winter weather is an example of a situation that can attract public attention.

Winter is a period of stress for deer. Cold temperatures and snow depth reduce mobility and access to food. Deer die-offs from starvation are common during severe winters, and newspapers are quick to focus on this particular aspect of the life cycle of the deer.

> Deer in Saskatchewan are finding heavy snows this winter are making it difficult to find food. Farmers have been putting out food. Conservation officers counted 224 deer in one group in late February. Manitoba deer are having a hard winter too but if there is no extreme cold or blizzards before spring thaw, the herds should escape a heavy winterkill. Winnipeg Tribune (78/3/4:72)

> People in Clearwater, Manitoba, about 120 miles southwest of Winnipeg, have been told the herd of deer they are feeding may be the only deer left in the province if there are two more severe

> storms this winter. For the past four or five winters, McBrien has been feeding deer -- as many as 110 a day -- on dust sweepings from the elevator. He said he started feeding after he was told the government had no allocation to provide winter feed. Winnipeg Free Press (78/2/20:1).

Local attitudes towards management efforts are often critical of government policy.

> We've been fighting like hell to keep this a bucks only area but the stupid government don't see it that way. It's been a doe season too long around here. Winnipeg Free Press (74/4/4:32).

Other stories provide a more accurate balance for the public information.

> This has been a hard winter in the West, and the game herds are having a hard time to find enough browse. Deer have been raiding haystacks in Saskatchewan and sportsmen in Alberta have launched a program to feed antelope.
>
> It's just a reminder of the basic lesson that all wildlife managers are familiar with -- you can't stockpile game. The habitat and food supply in winter -- and famine time for wild things -- determines the amount of any non-migratory wild creatures the land can support. Winnipeg Tribune (78/2/18:80).

> Late February is the crisis time, when blizzards or cold snaps can bring death to animals already weakened by malnutrition. No matter how bad the situation becomes it is not practical to attempt a provincial feeding program. Winnipeg Tribune (78/2/24:1).

Accurate information is important for maintaining public support of deer management programs and for allowing constructive debate to occur. A public with knowledge of the winter ecology of whitetailed deer can be valuable in facilitating management approaches in the field; without that knowledge, they can lobby to have policy changed and enact programs that may not be appropriate to the requirements.

There are many attitudes towards the effectiveness of supplemental feeding. An investigation into the elements of feeding could assist the wildlife managers and the interested public to decide if this is an appropriate management response to winter malnutrition of deer.

1.2 The Problem

The general public in Manitoba become concerned over winter mortality of whitetailed deer because the primary cause, starvation, could be solved with supplemental feeding. Wildlife agencies in Canada and the United States have sponsored feeding programs for big game species including elk and bison. Whitetailed deer have been fed successfully in many areas. Even in Manitoba, organizations and individuals regularly feed deer each winter. Many of these people want the wildlife managers of the Manitoba Department of Mines, Natural Resources and Environment involved in these private efforts as a show of support. Is a supplemental feeding program in Manitoba a wise use of public funds and staff time? The purpose of this practicum is to assess the information available on feeding and the effect of winter conditions on deer in terms of the current deer management strategy.

1.3 The Objectives

The study has three objectives:

1. To assess the feasibility of a supplemental feeding program for whitetailed deer in Manitoba;

2. To recommend adjustments in the deer management practices used in Manitoba, allowing for the application of supplemental feeding, and to suggest conditions for their use; and

3. To provide the basis for an extension and reference resource on the winter ecology of whitetailed deer.

1.4 The Hypotheses

1. A supplemental feeding program reduces the stability of deer

populations.

2. The cost involved in a supplemental feeding program places unwarranted emphasis on this approach, to the exclusion of other deer management programs.

1.5 The Assumptions

The general public is concerned about winter mortality of whitetailed deer especially when caused by starvation. A study of the elements of supplemental feeding can be used by game managers and by the public to understand and to assess the deer management approach.

1.6 The Importance of the Study

During the winter of 1973-74 an estimated 25% of the whitetailed deer herd in Manitoba died as a result of malnutrition, leaving a prefawning population in the spring of about 30,000 animals (H. Goulden personal communication). One result was the closure of the sport hunting season for three years. Provincial wildlife managers received considerable criticism, from sportsmen and farmers, for their approach to deer management.

Supplemental feeding during the winter of 1977-78 was common in North Dakota, Minnesota and Saskatchewan. Assessing local conditions in Manitoba, relative to the conditions elsewhere, places winter mortality in a better perspective.

1.7 The Research Methods

The study had three investigative approaches: (1) review of related literature, (2) interviews with wildlife managers and individuals involved in supplemental feeding projects, and (3) distribution of a

questionaire to members of the Manitoba Wildlife Federation. The information was collected from March 1978 until September 1978 with additional material added in February 1979.

Theoretical and practical data on the winter ecology of white-tailed deer, on the principles of wildlife management, and on supplemental feeding were obtained from the literature. Manitoba government interim and annual reports were reviewed.

Interviews with wildlife managers provided data specific to Manitoba and general background on policy, programs, and budget that affect deer management in Manitoba. These data were augmented with field trips to the deer range.

Field trips were made to Minnesota, North Dakota, and Saskatchewan to interview wildlife managers involved with the supplemental feeding programs during the winter, 1977-78. This information provided an outline of the motives, methods, and costs involved with emergency deer assistance programs.

A survey was distributed to members of the Manitoba Wildlife Federation in an attempt to determine the level of public support for supplemental feeding. The Federation was chosen because it is the major lobbying group for wildlife in the province. The survey was distributed at the 1978 annual convention with a request to return questionaires by mail. Field trips were made to the southwest region of the province to interview farmers who fed deer or who had depredation problems. In addition, three Fish and Game associations were contacted and asked to participate in a discussion workshop. One group was chosen from each of the major deer areas. These groups represented a variety of opinions and included a number of hardcore supporters of supplemental feeding.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

At the Resources for Tomorrow Conference in 1961, habitat loss was considered a major factor affecting wildlife populations (Clarke 1961). Dietz (1965:274) suggested additional attention towards habitat quality was required because "competition for land use will intensify as demands for space for our growing human population multiply." The human factor is characterized by changing land use, but any policy that slows this pattern of change will have a negative effect on employment and income benefits gained from using the land (Capel 1974).

What makes habitat critical for the survival of whitetailed deer? Large herbivores, like deer, are primary energy consumers in the land ecosystem. They depend on plants for food but provide little input towards maintenance of the system other than returning certain elements to the soil. Land forms, soil characteristics and climate determine the plant diversity of the ecosystem and, as the habitat is a part of the ecosystem, these same characteristics limit habitat quality and capability to support deer. Changes in land use cause adjustments in the component plant communities within the habitat and may improve or reduce the habitat carrying capacity (Billings 1970, Odum 1971).

2.2 Effects of Weather on Deer

2.2.1 Density Dependent and Independent Factors

Populations of animals tend to fluctuate around some level of stability rather than increasing exponentially or decreasing to extinction. What are the factors determining the conditions for this stability? Are the limits the result of chance environmental changes? Are there density dependent factors at work which limit population growth?

Density dependent factors, like disease, food quality, and niche competition, exhibit more severe limiting effects as a population increases. Density independent factors, like climate, and weather, have a limiting effect despite population size, although they often operate in a manner similar to density dependent factors (McLaren 1971).

Solomon (1971:43) recognized weather as a factor independent of density but attributed population control to density dependent factors.

> ... density dependent regulation must occur in all populations that persist for any number of generations. And since weather factors are generally not themselves responsive to population density, they cannot exercise such regulation alone, but only in conjunction with density dependent processes.

The carrying capacity of the range was considered a density limit on populations of hoofed animals. Actual limits would not be uniform as the quality of the range would be different according to location (Leopold 1961). Leopold *et al.* (1947) have clearly described the effect that an overpopulated deer herd has on the range carrying capacity. The sequence of events follows a predictable pattern.

1. Palatable browse species are heavily overgrazed.

2. Primary deer food is exhausted and inferior foods show signs of overbrowsing.

3. Fawns starve during winter and predation on the weak fawns increases along with scavenging on starved carcasses.

4. Exhaustion of inferior browse results in consumption of worthless browse. Increased malnutrition, disease and parasites begin to affect all deer. The age-classes are distorted according to fawn deaths.

5. Adult deer starve during hard winters with associated predation and scavenging.

6. The deer establish a new equilibrium with the reduced carrying capacity of the range.

Lack (1967) considered this pattern to be an example of density dependent regulation. Winter mortality occurred in conjunction with the actual density limitation.

When climatic changes are severe, mortality rates for animals will increase at all population levels because of the effect of density independent factors (Horn 1971). Schwerdtfeger (1971:31-32) suggested weather factors could have an important regulatory effect on population.

> Only density dependent factors . . . are able to cause a balance. Influences which are independent of abundance, e.g.: components of the weather, can considerably increase or decrease the density, but not in a determined manner; occasionally they may become effective regulators and assist or even replace density dependent factors. Weather cannot be influenced by the population or its abundance . . . therefore an influence of weather has to be considered in regard to population as a random factor.

Leopold et al. (1947) differentiated winter mortality due to overpopulated conditions and ordinary winter die-offs. Although malnutrition causes mortality in both cases, ordinary die-offs occur at all population sizes. They cause little or no range depletion and are caused by severe weather.

2.2.2 Deer Population Regulation

Weather factors do limit populations and are independent of density because they are not responsive to population numbers. Weather factors have been noted as critical controls for regulating the provincial deer herd in Manitoba.

Ransom (1967) pointed out the importance of winter weather as a density control mechanism. Compared to the deer range of the upper peninsula of Michigan, the Manitoba range supported about one third the population density. The one significant difference between the ranges was the severity of winter weather. Food was a primary limiting factor in Michigan when snow depth prevented adequate mobility for the deer. This was discounted for Manitoba where snow depths were less than Michigan, allowing the deer to move over a large portion of the summer range. Colder temperatures in Manitoba kept deer in a negative energy state for prolonged periods causing a greater condition loss. This loss in physical condition affected reproductive potential and reduced the overall annual increment, accounting for lower densities. While deer die-offs did occur in Manitoba during severe winters, the provincial deer herd had not exhibited characteristics of overpopulation.

Kucera (1976) noted a direct relationship between winter weather and reproductive success of the deer herd in Delta Marsh, Manitoba. While not disputing the importance of temperature, especially in combination with wind, the conclusion was that lower productivity, caused by malnutrition, occurred after winters with deep snow. The snow prevented access to nutritious grasses and forbs; malnutrition occurred without depletion of the range. Harsh winter weather was considered an important limiting factor for ungulate populations living at the northern edge of their distribution.

Density independent factors, like the weather, may be effective in population control. While not excluding any density dependent process in operation, weather may actually replace the controlling aspects of these factors.

2.2.3 Food Quality and Availability

Winter weather aggravates food shortages and results in deer die-offs due to starvation (Fowle 1948). More specific observations were made by Severinghaus (1947) in the Adirondack Mountains of New York. Snow depth was considered the critical factor because: it reduced access to the most nutritious foods; it prevented deer from moving to new areas when established yards were overbrowsed. Cold temperatures were significant only when maintaining snow depths over prolonged periods. Access to the highly nutritious ground foods, like grasses and forbs, was considered an important determinant for maintenance of the winter condition of deer. Snow depth affects the availability of these foods with a direct impact on physical condition (Kucera 1976, Karns 1978).

Cheatum and Severinghaus (1950) noted that deer mortality was negligible in logged areas where hardwood toppings and increased sprout growth provided good quality winter foods. Clearcutting mature forest was recommended as an effective method for regenerating browse species (Wetzel *et al.* 1975). Planning these areas in close proximity to known wintering areas could be useful during critical periods of the winter (Ozoga 1972). Deer concentrate in wintering areas as the temperature becomes colder in order to take advantage of available cover. Die-offs occur when snow depths prevent the deer from leaving these areas to search for new browse. These areas become quickly overbrowsed and the

deer must rely on stored nutrients to meet energy demands (Ozoga and Gysel 1972).

Monitoring the diameter of shrub branches at the point of browsing was a useful indication of feeding conditions in the wintering areas. Large diameters indicated the deer were limited to the less nutritious portions of the available foods (Crete 1975). Alkon (1961) noted a tendency of deer to accept fresh cut browse more readily than browse cut before freeze-up. Although the nutrient content was similar in both samples, the browse cut after leaf fall was more succulent. However, browse cutting was considered to have minimal short term benefits for starving deer because the food does not have the nutritional quality required for maintaining physical condition of weakened deer (Karns 1978).

For deer, woody browse is considered the primary source of winter food. When compared with the foods available in the summer and fall, the browse has a lower nutritional quality and a lower rate of digestibility. The digestion rates for browse was estimated at 30% whereas for the summer foods the rates increased to as much as 80% (Dietz 1968, Mautz 1978). These findings have developed some questions on the importance of winter foods for deer survival.

Mautz (1978) and Karns (1978) both suggested the survival of deer over the winter depends on the quality of the deer range in the spring, summer and fall. During these seasons, the deer store the important nutrients required for the winter with special emphasis on storage in the fall. The nutrients include fat, protein, vitamins, and minerals. Over the winter, the available food is a margin of safety for the deer, but maintenance of body condition depends on the availability of nutrients stored in the animal. The nutritional quality of

the deer range throughout the year also has an effect on the reproductive success within a deer herd. If the does have quality range over the summer and fall, they can maintain condition over the winter, giving the fawns born in the spring a better chance for survival (Verme 1967). Short (1972) made similar suggestions about herd productivity and concluded that deer managers must consider year round range quality as an important management consideration.

The factors complicating food selection for deer were noted by Willms et al. (1976:531).

> Selection of food by deer is determined by many factors, particularly availability, animal preference and plant quality. Availability and quality are influenced by season and geographical distribution. Availability is further affected by snow cover. Superimposed on all these factors is the mobility of the animal.

Despite the problems whitetailed deer contend with during the winter, the species exhibits a remarkable ability to adapt to local conditions. Shoesmith and Koonz (1977) reported high deer populations in the immediate vicinity of Winnipeg, Manitoba, even though major traffic routes and general urban sprawl have reduced the amount of available habitat. Browse availability is not sufficient to support present deer numbers in winter; but other foods, mainly agricultural residues including sugar beets, alfalfa, hay and grain provide alternate supplies. These foods tend to be in close proximity to good cover providing near optimum winter conditions for survival.

2.2.4 Activity

Winter activity for deer is governed by available energy. Snow cover and temperature combine to interrupt the energy balance but deer exhibit behavioral changes to adjust to the new environmental conditions. Snow depth has a double edged effect because it increases the

energy cost of mobility and reduces the access to foods. Cold temperature in combination with wind increases the radiant heat loss from the animal to the atmosphere.

Huot (1974) observed deer using open spaces for browsing and resting. The deer appeared to be making maximum use of available sunlight, but, once snow depth reduced mobility, the deer began using conifer cover for resting. Deer movement to cover, when temperatures became colder, was recorded by Ozoga and Gysel (1972). Snow depth complicated this shelter seeking activity by trapping the deer in a confined space where food ultimately became a limiting factor. Although this behavior will replace a certain level of nutritional deficiency, a total tradeoff of food for shelter is not possible during prolonged periods of cold temperature (Karns 1978).

Deer will tolerate cold temperatures if there are adequate foods available. Moen (1968) observed deer feeding and resting in an open corn field where adequate supplies of high energy food, but no shelter, were available. Despite very cold temperatures, the deer did not exhibit any adverse stress. A similar behavior was noted near the Cypress Hills in Alberta, where whitetailed deer remained on the open prairie instead of seeking shelter in the hills (Kramer 1971). Foraging opportunities appeared to be adequate to meet energy requirements.

Deer also seek out areas with less snow and areas with a relatively flat landscape to reduce overall energy consumption. From January to April, deer in Minnesota remain as inactive as possible; after April, their activity increases indicating reduced energy requirements during the mid-winter period (Moen 1976).

2.2.5 Physiology

Deer losing 30% to 50% of the fat content of the femur marrow are considered in poor physical condition (Verme 1963). These findings were determined from observations of penned deer. Because mobility and food availability were not a problem in the pens, this condition loss was attributed to cold temperatures rather than to snow depths. Ransom (1967) used this guideline for deer in Manitoba and found a high percentage had femur fat contents within the critical loss range. The loss of condition in Manitoba deer was considered the main factor in lower deer densities in the province.

The physiological condition associated with a body weight loss of 30% prevented deer from recovering from malnutrition. Death was not related to the period of starvation but to the rate at which deer lost condition. Analysis of the starvation process showed that the weight loss resulted from the steady use of fat reserves. Fawns showed a faster rate of weight loss, attributed to the loss of body fluids, and showed a higher mortality rate. Once the deer had exhausted their fat reserves, they began to catabolize muscle protein. At this stage the deer entered a hypoglycemic condition resulting in death (deCalesta et al. 1975, 1977).

What are the energy demands for deer? Energy is required to maintain basic metabolism (biological processes within the body). Weather factors place an additional energy load on each deer because of heat transfer and mobility.

Winter foods provide some margin of safety for deer, but the critical period, in energy terms, occurs during the summer and fall when deer have a variety of nutritious and digestible plants available. When these foods are of good quality, and sufficient quantity, the deer are

able to store all the nutrients they require for the winter season. Stored nutrients are critical as they are the primary source of energy for deer during the winter months (Karns 1978, Mautz 1978).

Moen (1976), Karns (1978) and Mautz (1978) all noted that the metabolic rates of deer vary from season to season with a noticeable shift downwards during the transition from fall to winter. The mid-winter energy requirements for basic metabolism are minimal when compared to other times during the year. Karns (1978) emphasized the importance of this physiological change to the winter survival of deer.

For each individual deer, basic metabolism is determined by heredity and age (Karns 1978). It also establishes the rate at which stored nutrients are utilized. Some deer do not have the storage capacity, and are vulnerable to starvation, especially when they have a high metabolism. These combined factors cause some winter mortality each year.

The impact of mid-winter weather on deer was discounted by Karns (1978), because, at this point, the deer have made the metabolic transition and have assumed energy saving behavior. The critical weather periods for management assessment were during the transition phases (fall to winter, winter to spring). During these times, severe snow storms will effectively reduce access to nutritious foods although the metabolism remains high. The deer are forced to rely on stored nutrients which increases the rate of use early in the winter. In the spring, the deer will have already depleted this source of nutrients. Many more deer will be vulnerable in these circumstances.

2.2.6 Summary

The assumptions made about the effect of weather on whitetailed

deer in Manitoba have been based on management principles developed in southern deer ranges. Kucera (1976) and Ransom (1967) both suggested conditions in Manitoba may be different and that weather does have an important role for population regulation. Goulden (1979:82) has outlined some factors indicating that provincial managers have reassessed their thinking on this management question.

> Winter mortality of deer in Manitoba is a recurring and natural event. Even the mildest of winters here at the northern limit of the deer range will claim up to 5 percent of the herd and moderate to severe conditions may see 30 percent or more die.
>
> Probably the most noteworthy difference in deer management principles between northern deer ranges and those in the south is the fact that deer starvation losses in the north are not dependent on the density of the herd.
>
> After the Manitoba deer season of 1973, deer numbers were lower than at any other time in the previous decade yet the rate of loss in the severe winter of 1973-74 remained very high (30 to 40 percent died).
>
> Winter weather keeps the maximum density of deer in Manitoba at a level below that which the range can withstand and following an average Manitoba winter net productivity is reduced below that realized by deer in the southern ranges. These two phenomena invalidate the application of many well-known southern management principles. We in Manitoba must resist the temptation to take as gospel the "carved in stone" philosophies on deer management that have been developed on deer ranges with environments so different from ours.

2.3 Supplemental Feeding

Can supplemental feeding reduce winter mortality of whitetailed deer? Kelsey (1973) outlined some of the complications which result from feeding deer. Over the long term, feeding maintains deer populations at artificial levels which cannot be supported by the existing range carrying capacity. Continued browsing by an overpopulated deer herd will increase the viability of unpalatable deer foods. As this cycle continues, the management responsibility for maintaining ever increasing herds grows. A population kept large by supplemental feeding has energy demands higher than the productive capacity of the range

(Short 1972). Managers have not, as yet, maximized the use of available energy through manipulation of sex and age characteristics (Short op. cit.).

Hesselton (1975) focused on the type of food used for feeding and the behavior of deer at feeding sites. Hay was not considered a suitable food because the deer tend to waste more than they actually eat. Managers would have to place additional food at the sites to insure adequate quantities for all the deer. Another factor was the aggressive behavior of the large deer towards fawns and sick animals which would exclude them from having access to the food.

Ozoga (1972) observed deer wintering on a cutting site where additional food (browse from the tree tops) was available. Conflict between deer was apparent and decreased as winter progressed. But, despite this behavior, winter mortality in this area was less than in another winter yard where the deer had heavily overbrowsed.

In Saskatchewan, rumenitis and rumen overload caused deer deaths near stored grains and feedlots (Wobeser and Runge 1974). Although these deer losses represented a small portion of winter mortality, grain and other carbohydrate rich foods may not be appropriate for supplemental programs. These findings were supported by Goulden (1978) and Karns (1978). The concern has been that deer cannot shift diets too rapidly because the nature of their digestive systems requires a gradual change. The rumen bacteria need time to adjust. Rumen overload occurs when the bacteria cannot digest the newly introduced food.

The effect of starvation on rumen bacteria was examined by deCalesta et al. (1974). Despite significant differences between starved mule deer and the ones fed, the starved deer did retain high quantities

of rumen bacteria with no evidence to show an impaired ability to digest food.

Further study showed that deer could be successfully refed after varying periods of starvation (deCalesta et al. 1975). The deaths that did occur were not the result of feeding but were directly related to the physiological condition of the deer. Recovery was not likely for a deer losing 30% total body weight. In another approach, deCalesta et al. (1977) demonstrated that deer starved for a short period showed a greater rate of survival than did deer starved close to death. Although three deer from the latter group did succomb, they did so over a 12-day period showing that starvation cannot be synchronized. No deaths occurred after refeeding was begun.

When deer have utilized all available fat reserves and have begun to catabolize muscle protein, they are not likely to respond to feeding (deCalesta op. cit.). Supplemental feeding can save that portion of the deer population which has not reached the critical physiological state. Synchronized starvation for wild deer is less likely than for penned deer because wild deer often have some foods available (browse, agricultural residues). Since fawns are most vulnerable to starvation, deer managers must recognize that fawns cannot compete effectively with the adults for the food and may not benefit from a feeding program (deCalesta et al. 1977).

Deer usually respond to feeding within a week if the food has adequate nutritional content (Karns 1978). In 1978, hay and browse used as supplemental feed in Minnesota was generally inferior in nutritional quality and was of little use to starving deer. Deer require a minimum of 6% protein content in their winter ration if they are to survive, but they also require other nutrients (especially minerals which affect

metabolic processes) and the one sure way of providing the right combination is to feed a prepared pelleted ration. This type of food was developed for use in Minnesota.

Anderson et al. (1975) reported feeding success with manufactured alfalfa blocks. These blocks were portable and weather resistant making them ideal for emergency use. The deer did concentrate at the feeding sites, resulting in overbrowsing. A wide distribution of the blocks was recommended for any feeding program. These observations confirmed those of Leopold et al. (1947) where deer were noted to continue browsing at the supplemental feeding sites. The one exception occurred in an agricultural region, where deer preferred to feed on field crops.

Supplemental feeding programs ordered by legislators in states with irruptive deer herds were generally ineffective. They only succeeded in postponing serious damage to the range and an overall reduction of the deer population (Leopold et al.).

2.4 Herd Management

Leopold et al. (1947) concluded that herd reduction through a deer harvest of either sex was the principle method of maintaining herd stability on deer ranges in the United States. This approach, combined with habitat development, has been the traditional management technique. For the wildlife manager, winter mortality is important because of its impact on the annual increment which, in turn, affects the number of deer available to hunters (Severinghaus 1947).

Holter (1974) and Short (1972) both emphasized the management of habitat. This approach required an adequate knowledge of the nutritional needs of the deer and the plants that provide these nutrients and was

considered the basis for deer management. Actual management methods would be determined by the overall policy objectives governing the harvest.

Recent thinking on the conditions in the northern deer areas has made reassessment of traditional management practises necessary (see 2.2.6).

Goulden (1979:82) has outlined the management dilemma in Manitoba.

> The traditional philosophy of southern range deer managers has been to promote at least 20 percent harvest of their herds on the theory that the rate of winter deer losses decreases as the herd gets smaller. The implications of reversing that theory whereby the winter mortality rate in deer is independent of density are obvious; the more deer you have at the beginning of the winter (within reason) the more you will have at winter's end.
>
> Manitoba deer managers have learned through the bitter experience of declining deer populations of the late 1960's and early 1970's followed by three years of closed seasons that deer cannot be harvested at the rates recommended for southern deer ranges.
>
> We must keep an open mind on new management techniques.

CHAPTER 3

STATUS OF THE DEER RESOURCE AND MANAGEMENT IN MANITOBA

3.1 The Deer Resource

3.1.1 The Manitoba Deer Range

Deer inhabit about 180,000 km^2 of the province of Manitoba (Figure 1). Much of this area has been identified as Agro-Manitoba, a planning zone that encompasses the main portion of the deer range (137,950 km^2). Beyond the northern boundary of Agro-Manitoba, deer do not occur in viable populations or in sufficient numbers to allow hunting.

Agro-Manitoba has three physiographic divisions (Figure 2) which provide a variety of habitat types within the deer range. The Precambrian Shield is a small portion located in the eastern section of the range. This area is similar to the northern areas with rock outcroppings, coniferous forests and wetlands which support few deer.

The Manitoba Lowlands covers much of the southern and central portion of the province and has large numbers of deer. It is primarily flat or undulating land with a wide variety of vegetation. The southeast portion of this area is characterized by cropland, mixed woods, wooded cropland, and coniferous forest. In the south, the landscape was tall grass prairie now used as cropland. The northern portion of this

Figure 1.

The Geographical Range of

Whitetailed Deer in Manitoba and

the Agro-Manitoba Planning Region.

(Ransom 1967, Barto and Vogel 1978).

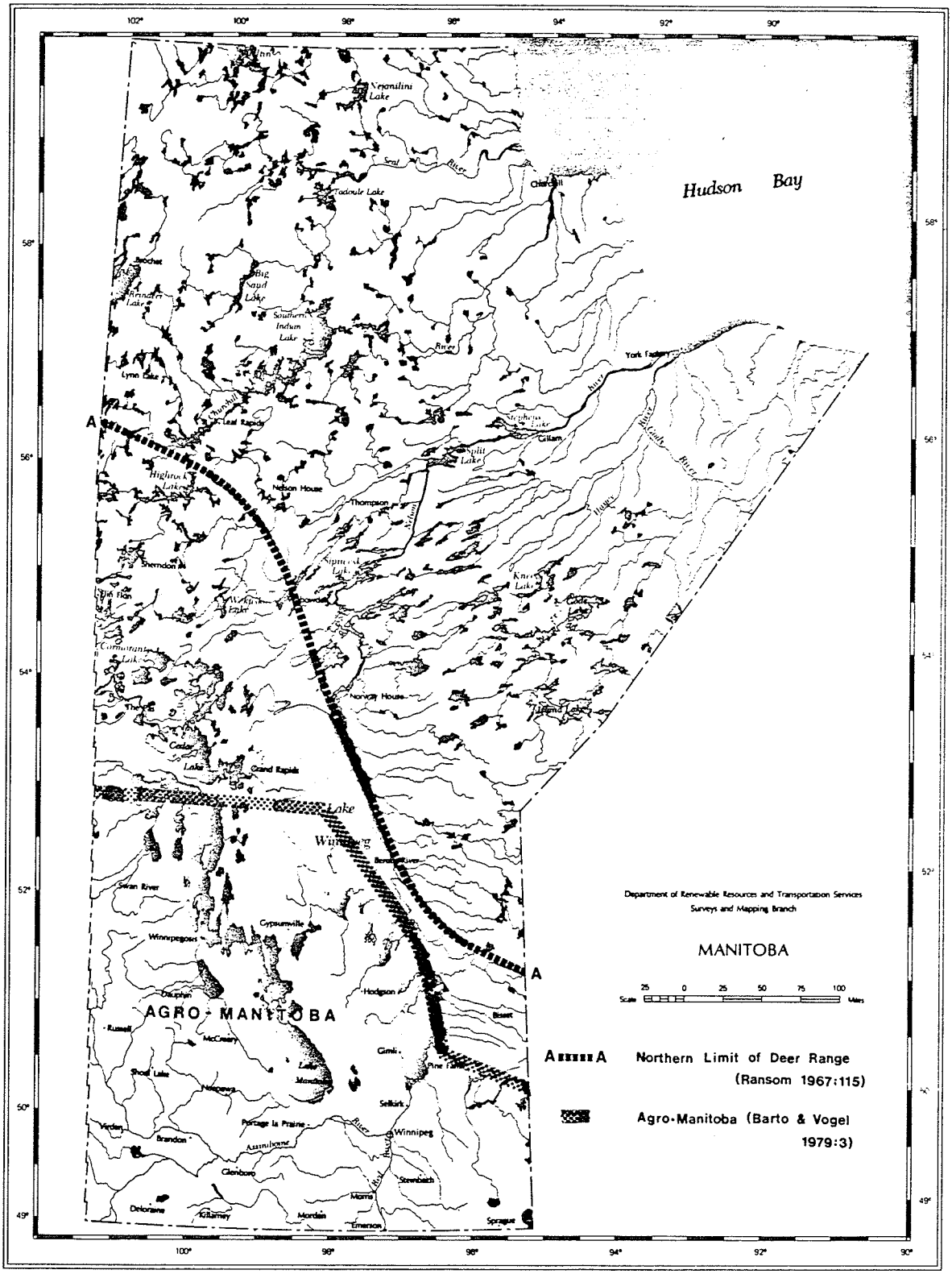
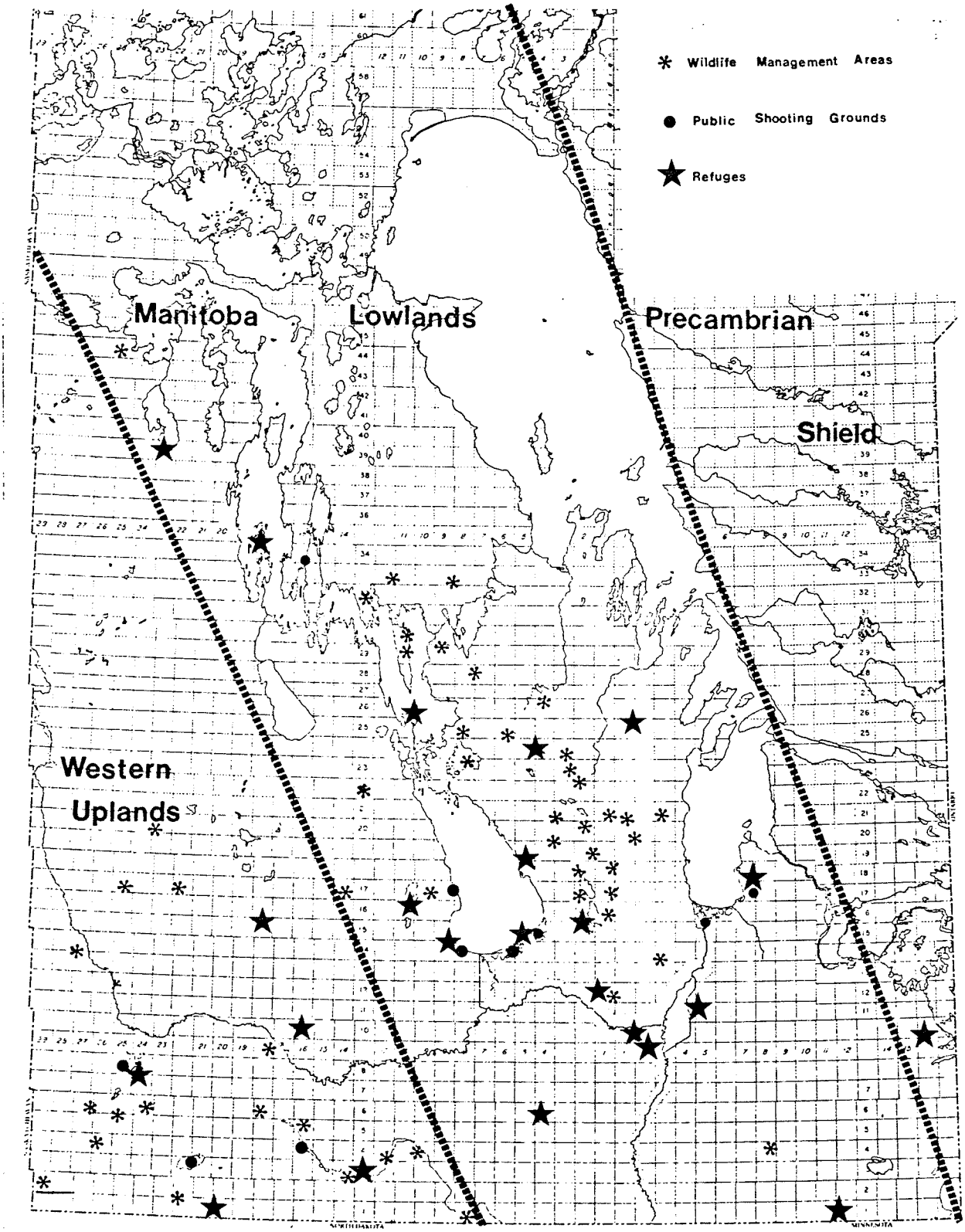

Hudson Bay
AGRO-MANITOBA
A A
Department of Renewable Resources and Transportation Services
Surveys and Mapping Branch
MANITOBA
Scale
Miles
A A Northern Limit of Deer Range
(Ransom 1967:115)
Agro-Manitoba (Barto & Vogel
1979:3)

Figure 2.

Approximate Boundaries of the Three Physiographic Divisions of Agro-Manitoba and the Distribution of Wildlife Lands.

(Barto and Vogel 1978:28 and 183).


* Wildlife Management Areas
● Public Shooting Grounds
★ Refuges
Manitoba Lowlands
Precambrian Shield
Western Uplands

division has mixed woods, wooded cropland, aspen-oak forest, and wooded grassland which is interspersed with large lakes.

The Western Uplands of the southwest have the largest concentrations of deer in the province. The dominant land features are the Manitoba escarpment which forms the area's eastern boundary, the Turtle Mountains located in the southwest, and the deep river valleys of the Assiniboine, Pembina, and Souris Rivers. The vegetation is similar, with species common to marshes, to prairie, and to mixed and coniferous forests (Barto and Vogel 1978).

Much of the deer range is used for agriculture, primarily dryland cultivation and livestock grazing. Land ownership in Agro-Manitoba is divided between private holdings (83,700 km^2) and crown holdings (54,250 km^2). The crown land is distributed on the eastern and northern edges of the range where its suitability for agricultural use is marginal (Figure 2). Within the prime agricultural areas in the south there are an estimated 11,005 km^2 of crown land (H. Goulden personal communication).

Although agriculture is the primary use for private land, it is also an important use on crown land, particularly in the southwest. Leases for crops, grazing and hay account for 7,440 km^2. This use compares to 5,580 km^2 of crown land that have been set aside for conservation and wildlife uses. These wildlife lands have been designated as public shooting grounds, wildlife refuges, and wildlife management areas (Figure 2).

The deer population contends with a wide variation in climatic characteristics. The region has moderate precipitation, with the average snowfall ranging from 114 cm to 152 cm depending on location. Snow

accumulation tends to be offset by wind action. The temperature is below 0°C from November to March with wide variation during the winter; the coldest months are January and February when periods of - 30°C are common. Spring breakup occurs rapidly from late March to late April (Barto and Vogel 1978).

3.1.2 The Manitoba Deer Population

The quantity of deer habitat increased during a period beginning in the 1880s and ending in the 1920s. This time span marked the development of the farming communities in Manitoba. Ideal deer habitat was created as the settlers cleared croplands within the natural woodlands and forests. Although deer hunting was common over this period, the first harvest administered by the province was held in 1933, when 840 whitetail kills were recorded (Barto and Vogel 1978:182).

From the 1930s to the early 1950s, the habitat remained relatively static but the deer population increased to a peak estimated at 200,000 animals (H. Goulden personal communication). The highest recorded harvest, a total of 30,950 deer, occurred in 1951 (Doan 1968). This period was the beginning of a noticeable decrease in habitat and a decline in deer numbers. A high level of winter mortality during 1954-55 was attributed to deep snow and habitat deterioration (Doan op. cit.).

By 1970, deer numbers in Agro-Manitoba had declined by 7% (Table 1), although the North Central area of the range showed an increase (Figure 3). Major mortality occurred over the winter, 1973-74, leaving a spring population of 30,000 animals. Despite the loss of habitat over the two previous decades, the herd showed excellent

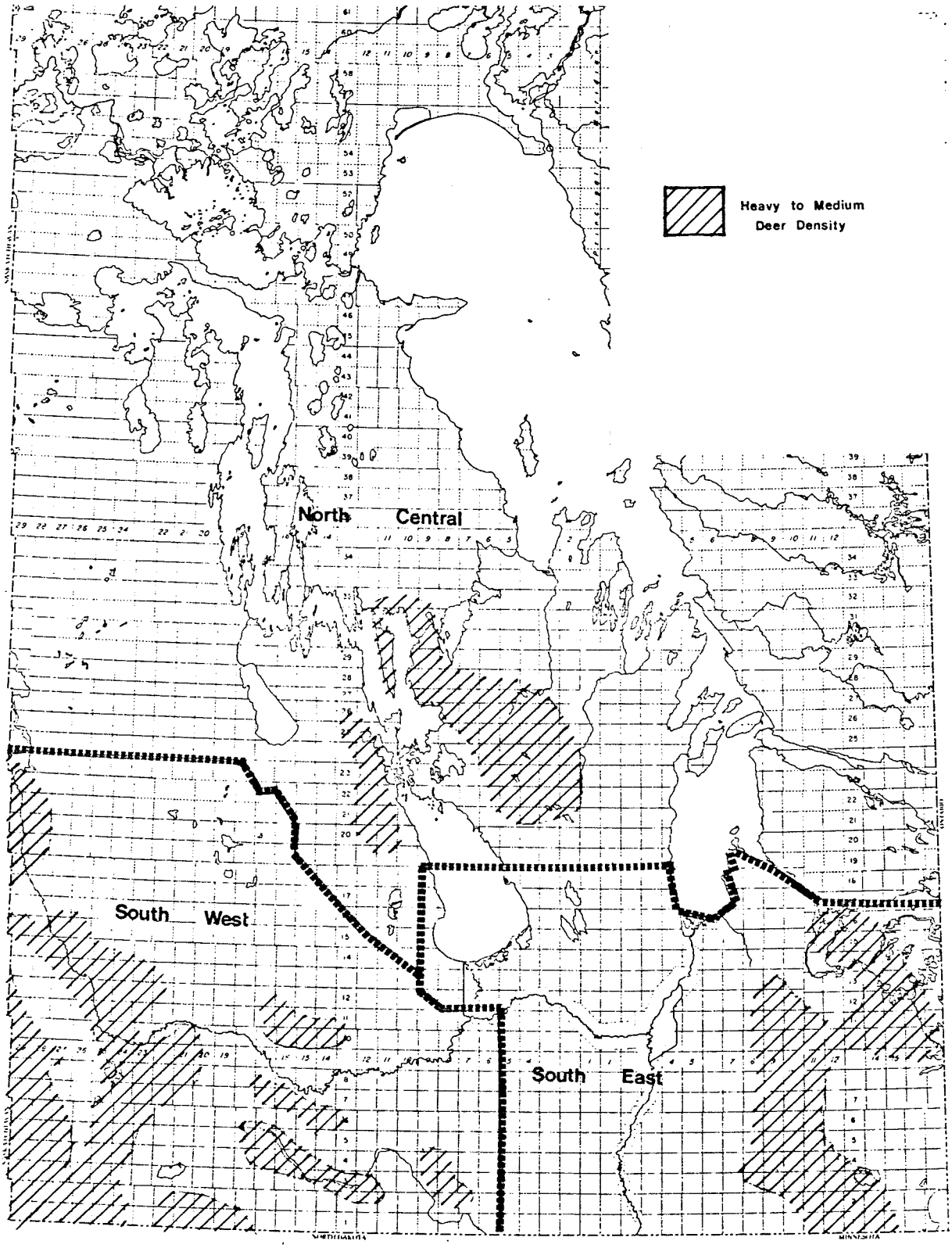
Figure 3.

Density of Whitetailed Deer in

Relation to the Three Main Deer Areas

of Agro-Manitoba.

(Modified Barto and Vogel 1978:55 and 184).


Heavy to Medium
Deer Density
North Central
South West
South East

recovery from 1974 to 1977 when a ban a sport hunting was in effect. In 1977, the pre-harvest deer herd was estimated to be up to 120,000 animals (Goulden op. cit.).

Since the recovery of the herd from the low level of 1974, wildlife managers estimate that up to 70% of the deer are located in the southwest portion of the province. This large concentration of deer on one portion of the range is attributed to the moderate climate (compared to other areas of the province) and to the variety of landscapes in the region. Despite ongoing agricultural land development, the area continues to provide quality habitat for deer production.

Table 1

Deer Population Estimates and Population Changes in Agro-Manitoba: 1955 to 1970 *

Deer Planning Area (modified)	Deer Population 1955	1970	Size of Area (km^2)	Deer/km^2 (1970)
Southwest	56,012	46,040	45,340.6	1.0
Southeast	16,150	14,027	35,673.3	.4
North Central	21,914	27,334	57,784.0	.5
Agro-Manitoba	94,076	87,401	138,797.9	1.9

*Source: Barto and Vogel (1978:184).

In the winter, whitetailed deer tend to concentrate in areas where wooded cover is available. Manitoba wildlife managers have recorded deer densities of 39 per km^2 on land with 50% or more cover; in areas where the wooded cover is less than 12%, the densities are less than one deer per km^2. These are general observations made from aerial surveys with a common exception being large herds wintering

in fields or near farm feed lots where there is often no cover available. At spring breakup, the deer quickly disperse as movement becomes easier and food diversity increases. Some spring migrations in excess of 80 km have been recorded whereas other deer remain relatively sedentary (Shoesmith and Bidlake 1978).

Whitetailed deer rely on a variety of food sources including shrubs, trees, herbaceous plants, and agricultural products. Browse, consisting of leaves, buds, twigs, and bark of trees and shrubs, is considered the primary food source for deer. Dogwood (Cornus stolonifera), Saskatoon (Amelanchier alnifolia), and Snowberry (Symphoricarpos albus) are the favorite browse species. Agricultural grain and hay were found in 45 of 85 rumen samples taken from road killed deer (Howe et al. 1974). Deer feeding on agricultural products is common the year round but most noticeable in the fall and in the winter when depredation to grain and hay becomes more frequent.

The reproductive potential of deer in Manitoba is as high or higher than on many deer ranges in the United States (Ransom 1967). Present estimates of the reproductive rate is 1.5 fawns per breeding doe. Older does have 2.0 fawns per doe ratios. The capability of the herd was demonstrated between 1974 and 1977 when the herd more than tripled in size.

3.1.3 Factors Limiting the Manitoba Deer Herd

Sport hunting. Twenty percent of the total deer population is annually taken by sport hunting (H. Goulden personal communication). From 1965 to 1978, the number of hunting licences fluctuated around 40,000 with an annual success rate over 50% (Table 2). Eyler (1976) suggested that the demand for sport hunting will probably remain stable

in the future as the provincial population is not expected to increase dramatically. Sport hunting is subject to direct management control as shown by the season closure in 1974.

Table 2

Resident Hunting Licences Sold; Estimated Deer Harvest and Success Rate in Manitoba: 1965 to 1978.*

Year	Number of Licences	Estimated Harvest	Success Rate (%)
1965	30,414	18,322	61
1966	31,106	20,492	62
1967	37,890	22,358	60
1968	44,001	23,102	54
1969	41,245	21,352	52
1970	36,904	19,030	47
1971	41,407	25,834	63
1972	41,163	19,986	54
1973	39,149	15,821	41
1974			
1975	(No Deer Hunting Seasons)		
1976			
1977 **	38,000	24,700	65
1978 **	38,127	20,000	60

* Source: Chekay (1976).
** Estimates provided by H. Goulden, Manitoba Department of Mines, Natural Resources and Environment.

Winter weather. Wildlife managers expect a winter mortality each year. A normal loss is less than 15% of the deer population and any loss above that percentage is considered a severe winter die-off. The indicators used to predict the effect of weather include a snow accumulation of 30 cm and prolonged periods of temperatures of - 30°C. Severe mortality is expected 1 year in 3 for the northern portions of the range and 1 in every 4 over the southern areas of the range. The last serious winter die-off happened during the winter of 1973-74. In the winter 1977-78, wildlife managers were again concerned, but the

weather moderated in February; there was no significant mortality (Goulden, op. cit).

Indian Harvest. A common concern expressed by sport hunters is about the number of deer taken by native hunters according to their treaty rights. Eyler (1976) estimated native demand for deer at 3 animals per year for a family of 5. As the native population in Manitoba increases, the demand will rise from 8,124 deer in 1970 to 14,622 by 1985. This projection was made on the assumptions that native population distribution and hunting traditions remained the same. The special hunting rights accorded to natives combined with a population rise (of natives) will increase the pressure on the deer herd in the future. The estimates of the present native harvest have been difficult to determine but have been assessed as high as 12%.

Disease and Parasites. The severity of the winter weather in the northern deer areas controls the effect these factors have on deer (P. Karns personal communication). Managers in Manitoba monitor the herd for these factors but do not consider them as important limiting constraints on deer.

Predation. Deer are most vulnerable to predators in late winter when they are yarded into wintering areas and weakened. Deer loss due to predators in Southwestern Manitoba was estimated at 2% (Lees 1975). A common problem throughout the province has been the harassment of deer by domestic dogs. This loss is more serious from the public relations viewpoint than from actual reduction of the deer herd.

Accidents. Up to 5% of the deer herd is killed in accidents either on the roads or the railways. The incidence of accidents

increases in the fall and winter (McKinney 1975). Reports from the Rock Lake area of the Pembina Valley indicate that road kills increase in frequency whenever depredation is a problem. The deer are vulnerable because they cross main traffic routes as they concentrate near farmsteads (D. Robertson personal communication).

Illegal Deer Kill. There are few facts known about this limiting factor. McIvor (1975) concluded that the illegal harvest was not a significant concern for the provincial wildlife managers although it does present a difficult enforcement problem. This view was supported by Ransom (1968), who outlined a larger question (hunter-landowner conflicts) which reflected, in part, a concern about illegal deer harvest.

Unretrieved Deer. One factor that has an implication for the deer population is the number of animals shot but not retrieved by hunters during the sport hunting season (H. Goulden personal communication). A study during the 1977 hunting season found that 57% of the deer killed on a section of crown land went unretrieved by the hunters (McKinnon 1977). A similar study conducted in the Southern Region (Figure 4) during the 1978 season indicated an unretrieved rate of 17% (Menzies 1978). With the usual monitoring techniques this data would not be recorded. If the practice is widespread throughout the province, then estimates of annual hunter kill rates would be low (Goulden op. cit.).

3.1.4 Summary

The deer range in Manitoba shows considerable diversity in landscape and vegetation which, in combination with climate, creates a variety of habitat types. The majority of the deer herd is supported on the portion of the range located in southwestern Manitoba. Considering

the limiting factors, the pre-harvest deer population is reduced by half each year but succeeds in recovering much of the loss through the annual increment.

3.2 Deer Management

3.2.1 Policy Guidelines

The recognition of recreational hunting as a valuable outdoor experience, offering the opportunity for hunters to increase their knowledge and appreciation for the natural environment, has been the policy guideline for deer management in the province. Two management objectives have evolved from this policy. They are to maintain the breeding stock of the deer herd at an optimum level, and to harvest deer that are surplus to the breeding requirements. This approach is described as sustained yield herd management and it is designed to provide annual hunting opportunity on the condition of there being an available surplus (H. Goulden personal communication).

Ransom (1968) reviewed the deer problem in southwestern Manitoba and outlined four critical components.

1. An expansion of agricultural land use, primarily clearing and grazing, has decreased available habitat. Deer production has been directly affected by this trend.

2. Hunter-landowner conflicts have reduced the opportunities for hunting as more and more land becomes posted.

3. There was a lack of information available about the deer and the deer range. Planning intensive management was hampered as a result.

4. Hunting quality had decreased because of the incidence of hunting regulation infraction.

The present management strategy has developed from these observations, with particular emphasis on a system to monitor the population, and on habitat development.

3.2.2 Sport Harvest Management

After a long tradition of minimal harvest regulation, managers in Manitoba began to adjust the seasons to reduce overall harvest impact and still offer hunting opportunity. The 1978 deer season reflects the type of adjustments that have been tried. Agro-Manitoba was divided into 2 deer hunting units (Figure 4). In the northern unit, the season was open for 3 weeks. A hunter could hunt throughout the area all season. Non-resident hunters from outside of Canada were restricted to this hunting unit. A hunter who chose to hunt in the southern unit had to choose 1 of 3 time periods within a 2-week season. The first week was divided into 2 3-day seasons and the last week was a 6-day season. The system provided a variety of choices for the hunter. It also distributed the pressure over a larger portion of the province and limited the number of hunters in the field at any one time. Based on experience, a majority of hunters were expected to concentrate on the southwest section of the province. Given a full two week season, the hunting pressure would be too heavy for a quality hunt.

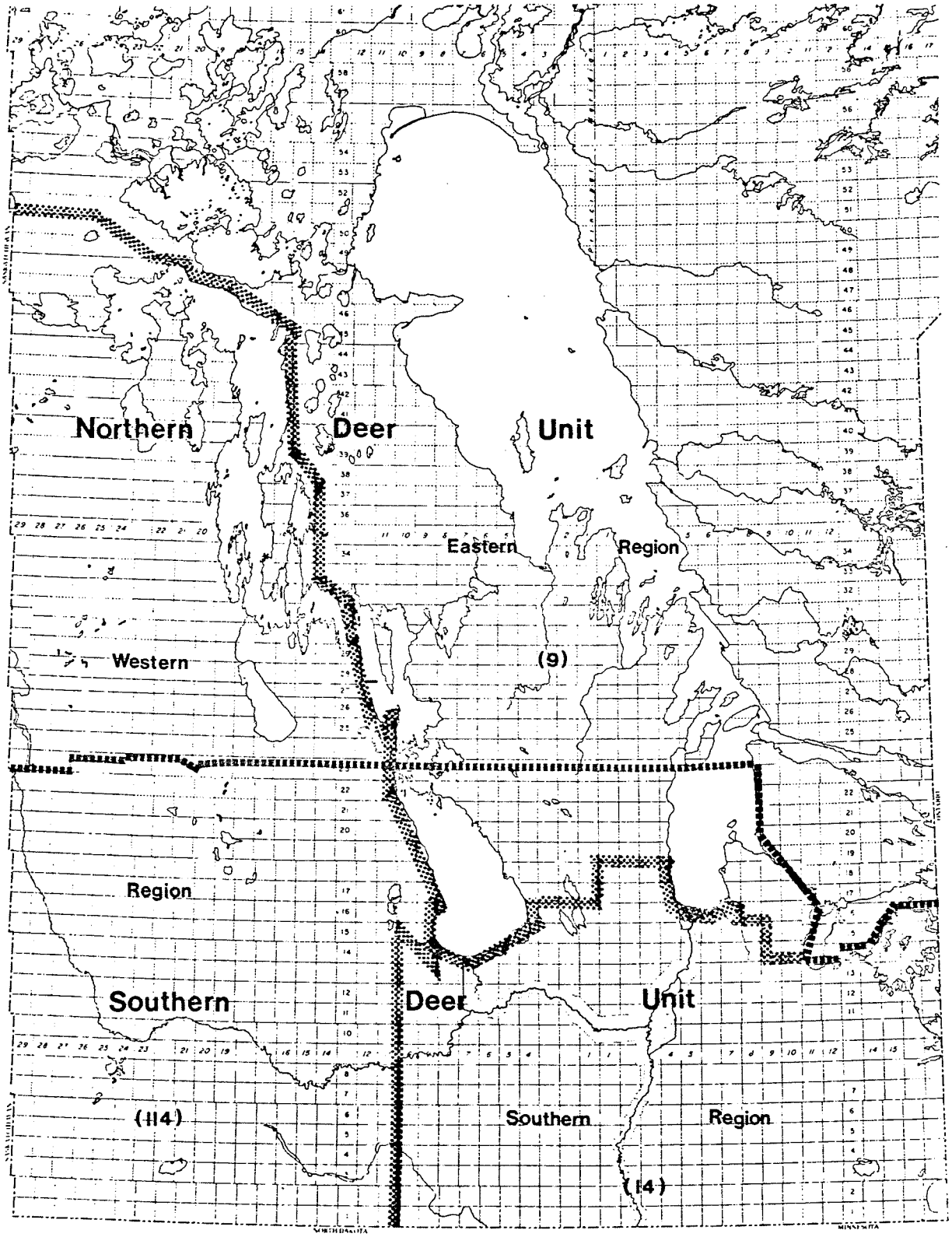
A regulation allowing only 2 persons per party was in effect to remove successful hunters from the field. Once a hunter and his partner had shot their limit, they could no longer continue to hunt for other persons. The season allowed deer of either sex to be taken.

Manitoba hunters paid $8.50 for a deer licence plus $2.25 for a wildlife certificate. Out-of-province hunters paid $48.00 while hunters from outside Canada paid a licence fee of $60.00.

Figure 4.

Deer Hunting Units, Regional Boundaries of the Manitoba Department of Mines, Natural Resources, and Environment and the Number of Regional Depredation Compensation Claims (August 1976 to January 1979).

(Manitoba Department of Mines, Natural Resources, and Environment).


Northern
Deer
Unit
Eastern
Region
(9)
Western
Region
Southern
Deer
Unit
(114)
Southern
Region
(14)

3.2.3 Habitat Management

Within the present management approach the rate of habitat loss is considered a critical factor affecting continued deer production. Barto and Vogel (1978) reported an estimate of the amount of land cleared in Agro-Manitoba from 1951 to 1975 (Table 3). The largest impact occurred in the southwest, where most of the land is suitable for some type of agricultural use.

Table 3

Breaking of Land for Agriculture in Agro-Manitoba: 1951-1975 * (km^2)

Years	Southwest	Southeast	North Central	Total
1951-55	440.2	441.8	347.2	1,229.2
1956-60	536.3	274.4	204.6	1,015.3
1961-65	1,061.8	297.6	286.8	1,646.1
1966-70	1,263.3	604.5	926.9	2,794.7
1971-75	666.5	665.0	1,111.4	2,442.8
Totals	3,967.1	2,283.3	2,876.9	9,128.1

* Barto and Vogel (1978).

Milliken et al. (1975) noted the relationship between land clearing and the loss of winter habitat in 6 wintering areas of southwest Manitoba. Over a 27-year period an estimated 42% of the area was cleared (Table 4).

Another aspect of the habitat crisis has been the increase in the quantity of land used for livestock grazing. Barto and Vogel (1978: 184) estimated that, from 1961 to 1971, an average of 16.3 km^2 of unimproved land was added to existing pasture each year.

All these factors are indicators of the steady loss of deer

Table 4

The Amount of Land Cleared in Six Whitetailed Deer Winter Ranges in Southwest Manitoba from 1947 to 1973 *

Area Location	Area Size (km^2)	Winter Habitat 1947 (km^2)	Land Cleard (km^2)	% Loss
Sinclair Bush	29.5	20.2	8.7	43
Pipestone Creek	22.5	7.8	2.5	32
Pendennis Hills	37.2	20.2	11.3	56
South Brandon Hills	40.3	27.4	8.7	32
Tiger Hills	40.3	17.2	7.0	41
Rock Lake	32.6	14.9	7.3	48
Total	202.4	107.7	45.5	48

* Milliken et al. (1975).

habitat. In the southwest about 90% of the land area (26,300 km^2) is privately owned. This complicates the implementation of habitat development projects because the cooperation of the landowner is a prerequisite. The development programs to date have been limited to crown land.

For deer, critical wintering areas have been identified through the habitat projects, wildlife benefits from the use of crown land have been promoted and habitat quality has been improved in a number of locations.

During the winter, 1977-78, a total of $66,000 was spent on habitat improvement in selected wildlife managment areas (L. Colpitts personal communication). The projects were designed to clear mature woodland in known wintering areas to promote longterm browse regeneration. The work was done with heavy equipment at varying costs of up to $150 per acre. At the work site in the Lauder sandhills, handcutting

was tried but proved costly ($700 per acre). A total of 700 acres were cleared during these projects. Another approach, used with some success in the Agassiz Provincial Forest, was the development of an agreement with a small timber operator to clearcut areas. A permit to cut the wood was granted, on the condition that wildlife use was to be considered.

In February, 1978 trails were cleared on a crown land section near Zhoda, Manitoba to assist a large concentration of deer in the deep snow. Browse and hay were trucked into the area by a local game and fish association (R. Thompson personal communication).

Despite the efforts made, two problems remain. How can the deer management effort be transferred to private land? How can wildlife interests best fit into a multi-use policy for crown land?

3.2.4 Population Monitoring

A monitoring system that provides reliable estimates of the deer population throughout the year is a major part of the management program. However, it is also difficult to achieve. Ideally, estimates from three periods during the year are required: mid-winter, pre-fawning, and pre-harvest. Monitoring techniques do not provide the level of precision required for the latter two periods because the nature of the habitat makes deer sightings difficult. The mid-winter estimates are less of a problem and are the primary population data collected in Manitoba.

Aerial surveys are done each winter in Manitoba using a stratified random sample technique described by Goulden (1975). Estimates obtained by this method have been the most precise used by managers in the province. The important aspect of this technique has been the

confidence deer managers have shown in using this information. Aerial surveys also provide some indication of winter severity as it affects the deer. Goulden (op. cit.) discounted the value of the survey as a method for determining data on sex and age characteristics.

After the hunting season, questionaires sent to hunters provide some data on sex and age of deer harvested. Enforcement patrols during the hunting season also provide an indication of annual deer harvest. Examination of road kills provides important biological information but to date, has not been implemented on a large scale.

3.2.5 Big Game Damage Compensation

A Wildlife Control Fund was created with the fees collected from the sale of wildlife certificates. The legislation allows wildlife managers to purchase land, to purchase crops, to pay compensation, and operate feeding stations to reduce the economic loss caused by wildlife to agricultural enterprises.

Although the fund was established in 1972, claims for compensation for deer damage were not significant until a period from August 1977 to June 1978. The type of damage caused and the compensation paid to farmers is shown in Table 5. There is no indication of the percentage of the total amount of deer damage the compensation claims represent (V. McNabb personal communication). A total of 19 claims were made for the same period, 1976-77. This increased to 99 claims the next winter. The legume hays, clover, and alfalfa were the most frequently damaged. A shortage of on-farm storage bins resulted in many farmers using older wooden bins or simply piling the grain on the ground. Grain stored in these circumstances was particularly vulnerable as the deer could kick an opening in the bins. In most cases damage was located in isolated

areas in relation to the actual farm residence.

The compensation paid on each claim represents 75% of the cash value of that particular agricultural product. The farmer paid a fee of $25.00 to have his problem assessed by a crop insurance adjuster. This was refunded if the claim was approved.

A total of $78,558.57 was paid in compensation from August 1976 to January 1979, which represents an actual value of crop and hay of $104,744.76. There were 114 claims in the Western Region, 9 in the Eastern Region and 14 in the Southern Region (Figure 4). An estimated 912 deer were reported on 19 of the claims. This average of 48 deer per claim provides an indication of the scale of problems a deer herd can cause.

3.2.6 Other Management Roles

Enforcement work is involved in each of the other management roles. The major portion of the duties are enforcement of regulations and extension. In addition, the Department of Mines, Natural Resources and Environment has a research section involved in work related to deer management.

3.3 Deer Management Inputs

Agro-Manitoba has been divided into three management regions (Figure 4). Each region has a staff of wildlife biologists and technicians responsible for the development and implementation of programs in the regions. Specialists in the areas of planning, research, extension, programming, and policy are located in Winnipeg. The overall responsibility for deer management has been assigned to a provincial deer manager. Regional staff annually spend up to 20% of its time

Table 5

Summary of the Deer Depredation Damage Claims Made in Manitoba
August, 1976 to January, 1979 *

	Type of Damage	Time Period	Number of Claims	Metric Tonnes	Cost
1.	Grain piles	76/8 - 77/7	1	5.6	$ 578.67
		77/8 - 78/7	21	294.2	$21,037.81
		78/8 - 79/1	3	9.0	$ 768.00
2.	Grain bins	76/8 - 77/7	3	9.7	$ 679.73
		77/8 - 78/7	16	107.0	$ 7,746.96
		78/8 - 79/1	-	-	-
3.	Grain swaths	76/8 - 77/7	-	-	-
		77/8 - 78/7	11	197.5	$14,918.06
		78/8 - 79/1	7	28.3	$ 2,036.17
4.	Grain sprouts	76/8 - 77/7	1	2.3	$ 138.75
		77/8 - 78/7	7	97.4	$ 5,131.91
		78/8 - 79/1	1	4.2	$ 374.40
5.	Flax Swaths	76/8 - 77/7	4	11.1	$ 1,644.00
		77/8 - 78/7	10	40.1	$ 6,024.39
		78/8 - 79/1	1	.8	$ 177.42
6.	Sunflowers	78/8 - 79/1	4	30.6	$ 3,990.04
7.	Hay	76/8 - 77/7	13	178.4	$ 4,729.08
		77/8 - 78/7	34	475.7	$ 8,583.18
		78/8 - 79/1	-	-	-
8.	Totals	76/8 - 77/7	19	207.1	$ 6,303.65
		77/8 - 78/7	99	1,015.3	$63,442.31
		78/8 - 79/1	19	72.9	$ 8,812.61
Totals			137	1,295.3	$78,558.57

* Source: Depredation claims filed with Department of Mines, Natural Resources and Environment.

on duties related to deer management. Recent reductions in staff have created some manpower problems for certain aspects of the management effort.

Revenues for the deer management program are provided from the provincial government's general revenue fund. All fees and licences collected from wildlife users are passed on to this fund. The Department of Mines, Natural Resources and Environment must estimate revenue requirements for each year and provide an annual operating budget. Certain funds, such as the Wildlife Control Fund, are earmarked for a specific purpose.

Much of the budget allocated for deer work is used to meet annual costs: manpower, administration, printing, and equipment. There is little flexibility in the ways that funds can be used.

CHAPTER 4

THE STUDY RESULTS

4.1 Introduction

Emergency assistance for whitetailed deer was made available in Manitoba, Minnesota, North Dakota, and Saskatchewan during the winter, 1977-78. Unusual winter weather (freezing rain and heavy wet snow) effectively sealed off the natural foods and reduced deer mobility. Deer depredation was widespread in each area and the possibility of a major winter die-off could not be ruled out by wildlife managers. Many approaches were used to remedy the problems, but supplemental feeding proved to be the most successful approach.

An accepted principle, among wildlife managers, is that supplemental feeding is unwise because it maintains the deer population above the carrying capacity of the range. Range depletion will occur and cause eventual reduction of the deer population. In addition, managers maintained that feeding sites attract unusually large concentrations of deer with three associated negative effects.

1. Deer overbrowse the wintering areas which has long term implications for the quality of winter habitat.

2. Aggressive behavior at the feeding sites excludes the smaller deer from having access to the food.

3. Large concentrations of deer are more vulnerable to predators.

Another common concern was that feeding deer will actually do more harm than good and kill deer. This problem is physiological. A change in diet, for deer, must be introduced slowly to allow sufficient time for the rumen bacteria to adjust to the new food. A rapid transition could result in rumen overload, or rumenitis, which can cause death.

Apart from the biological concerns, most wildlife managers cited costs as a prohibitive factor against the implementation of supplemental feeding. The socio-political interactions associated with feeding are also an important consideration.

Despite disagreement between managers and the public, slow response from legislators, and uncertainty about implementation, supplemental feeding was the one approach that prevented deer depredation and reduced the incidence of winter mortality.

4.2 Deer Assistance Programs

4.2.1 Minnesota

The problem in Minnesota became evident in November, 1977 and was centered in the northwest section of the state. Severe winter weather (snow and freezing rain) early in November interrupted the deer in the middle of the annual eastward migration to traditional wintering areas. Large concentrations of deer were forced to winter in an agricultural area where cover was limited, browse availability was poor, and the only accessable food supply was agricultural products. Initially the response was to use traditional scare tactics (propane bangers, scarecrows, dogs and bloodmeal) to reduce depredation damage to corn and hay. State-owned equipment was used to assist farmers to move their agricultural products from isolated areas to locations where better

protection was available. Many farmers started to feed immediately and found they could reduce damage. In some cases, corn grown on state-owned lands was used for intercept feeding. By the end of January, 1978, the problems continued, but wildlife managers were utilizing all available resources and volunteers were maintaining feeding sites at locations where the depredation damage was most severe. Deer remained in fields of unharvested corn, causing considerable damage and loss: isolated herds remained out of reach of feeding assistance because the snow depts made access difficult.

The second phase of the response started in early February, 1978, when the legislative advisory committee passed a special warrant to make funds available, on an emergency basis, to support deer assistance projects. These funds were used to purchase food, to hire heavy equipment, and to purchase unharvested crops as food plots. Bulldozers were used to clear access trails to isolated herds allowing volunteers to provide food and to assist deer mobility. The equipment was also used to clear-cut areas of mature bush in order to make browse available to the deer. In locations where the deer were using standing crops arrangements were made to pay some level of compensation. Intercept feeding was the strategy developed to protect stored hay and grain. Ear corn was piled on the snow in locations close by the resting areas. Other foods used included prepared deer rations, hay, grain screenings, and sugar beet residues.

Food plots planted on state-owned land were not effective because few deer were located near the areas. As an alternative, compensation was paid to farmers for depredation damage to unharvested corn. Payments were based on a percentage of the base yield for corn in this area of the state, but farmers noted that the corn crop was above

average yield. This made the compensation less than adequate from the farmers' viewpoints.

4.2.2 North Dakota

The problem was evident shortly after a freezing rain storm in mid-December, 1977. Depredation complaints were common and the State Game and Fish Department responded with traditional scare tactics and a trapping program. These proved ineffective, and a special hunting season was organized to start in January, 1978. The hunting season was never declared, because the North Dakota Wildlife Federation was not prepared to accept a solution at the expense of the deer population.

Despite strong misgivings on the part of the State Wildlife managers, an agreement was made between the State Department and the Wildlife Federation to feed the deer. The feeding program was a joint effort; the state would provide the administrative support, and the federation would provide the funds to purchase the food. Guidelines for the program included a number of conditions.

1. No compensation payments were to be made for depredation damage.

2. Feed grains (barley, oats, corn) were to be used as the supplemental feed.

3. Feeding sites would be located at points of depredation.

4. Farmers would be responsible for maintaining the feeding site.

The grain was purchased from the farmers or from the nearest grain handling facility. Arrangements were made with the farmers to transport the food from storage to the site. The recommended ration was 1 kg of feed grain per deer for each day. A total of 259 feeding sites

were supported by the program, and 11,894 deer were fed over a period starting January 15, 1978 until March 31, 1978.

4.2.3 Saskatchewan

The program in Saskatchewan was viewed, by wildlife managers, as an emergency food purchase program for wildlife. Funds were used to compensate farmers for depredation damage. Most of the claims were for hay damage. The number of claims increased to about 340 from 58 made in 1976. This increase in claims and the resulting rise in costs to the Department of Tourism and Renewable Resources, made wildlife managers reassess the approach. They began to recommend that farmers try intercept feeding in an effort to reduce the incidence of depredation. Mix-mills were used, wherever possible, to grind up the hay; this effort was made to make more of the hay palatable and thus reduce the waste. Many deer herds were supported by wildlife associations. Feeding sites were set up and volunteers organized to maintain them throughout the southeast portion of the province.

4.2.4 Manitoba

Funds from the Wildlife Control Fund were available for compensation payments (page 42). A total of 99 claims were made, compared to 19 the previous year. Many feeding sites were organized throughout the southwest part of the province, but wildlife officials avoided any official involvement.

Extensive habitat development work was undertaken during the winter (January and February, 1978), but the actual benefits for the deer were inconclusive. In the southeast, trails were cleared to give a local deer herd relief from the deep snow; these trails were used by a local fish and game association to transport hay into the herd.

4.3 Biological Assessment of Supplemental Feeding

4.3.1 External Effects

None of the affected areas (Minnesota, North Dakota, Manitoba or Saskatchewan) had overpopulated deer ranges. Despite evident malnutrition, range depletion was not a problem. In many cases the deer did not complete the annual fall migration to traditional wintering areas. In all cases the wintering areas were iced over and covered with snow. Deer were unable to find enough browse, and the ground foods were not accessible. The deer began to use agricultural products as an alternative food source.

Feeding sites were not located near wintering areas, so, any overbrowsing occurred in marginal deer habitat. Aggressive behavior was common at the feeding sites but did not exclude deer from having access to the food. In Manitoba, fawns adjusted their feeding times to arrive at the sites early. This behavior allowed them to avoid conflict with the larger deer. Predation was not a serious limiting factor at any of the feeding sites.

4.3.2 Physiological Effects

Different types of food were used at the feeding sites in the affected areas during the winter of 1977-78 (Table 6). Deer response to these foods was positive although some hays and one prepared ration (aspen based) used in Minnesota, were not used extensively. Sugar beet waste was a good food but deteriorated with exposure to weather. Most deer regained condition within 10 days of starting to feed. Observers noted that deer coming to the sites later in the winter took longer to regain lost condition.

The nutritional quality of the supplemental foods was better

than browse samples taken in Minnesota. Hay showed a wide variation which was attributed to storage and handling methods. Hay is vulnerable to the leaching of minerals and vitamins through the action of the weather. The incidence of rumenitis or rumen overload did not increase in any of the areas despite the use of feed grain as food (particularly in North Dakota and Manitoba).

Table 6

A Partial Comparison of Nutrient Content of Foods
Used for Supplemental Feeding Programs
During the Winter, 1977-1978.

Food	Crude Protein	Crude Fibre	Calcium	Phosphorous	Sodium
1. Alfalfa *	17.7	26.1	1.09	.29	.10
2. Prepared ** Deer Ration	16.4	31.0	2.00	.22	.33
3. Hay **	16.2±1.9	33.0±2.2	1.50±0.2	.23±.03	.09±.06
4. Buckwheat *** Screenings	14.0	-	.54	.37	-
5. Wheat *	14.0	26.1	1.09	.29	.10
6. Grain Dust ***	11.9	28.7	1.24	.34	-
7. Barley *	11.4	5.6	.08	.42	.02
8. Oats *	11.0	12.4	.09	.33	.07
9. Sugar Beet * Pulp	10.0	20.9	.75	.23	-
10. Willow **	8.0	47.3	.6	.2	.04

Sources:
* National Research Council.
** Karns (1978). Samples taken from Minnesota feeding sites.
*** Manitoba samples. Analysis based on one sample only.

Grain dust, from a grain elevator in Clearwater, Manitoba, was used successfully. The nutrient quality was high and the food was acceptable to the deer. By February, 1978, the deer at this site were in excellent shape (Figure 5). Feed specialists from the Manitoba Department of Agriculture suggested caution when using this food as the dust content could cause respiratory problems. Observers at the site did not report any difficulties.

4.4 Socio-Political Assessment of Supplemental Feeding

4.4.1 Public Role

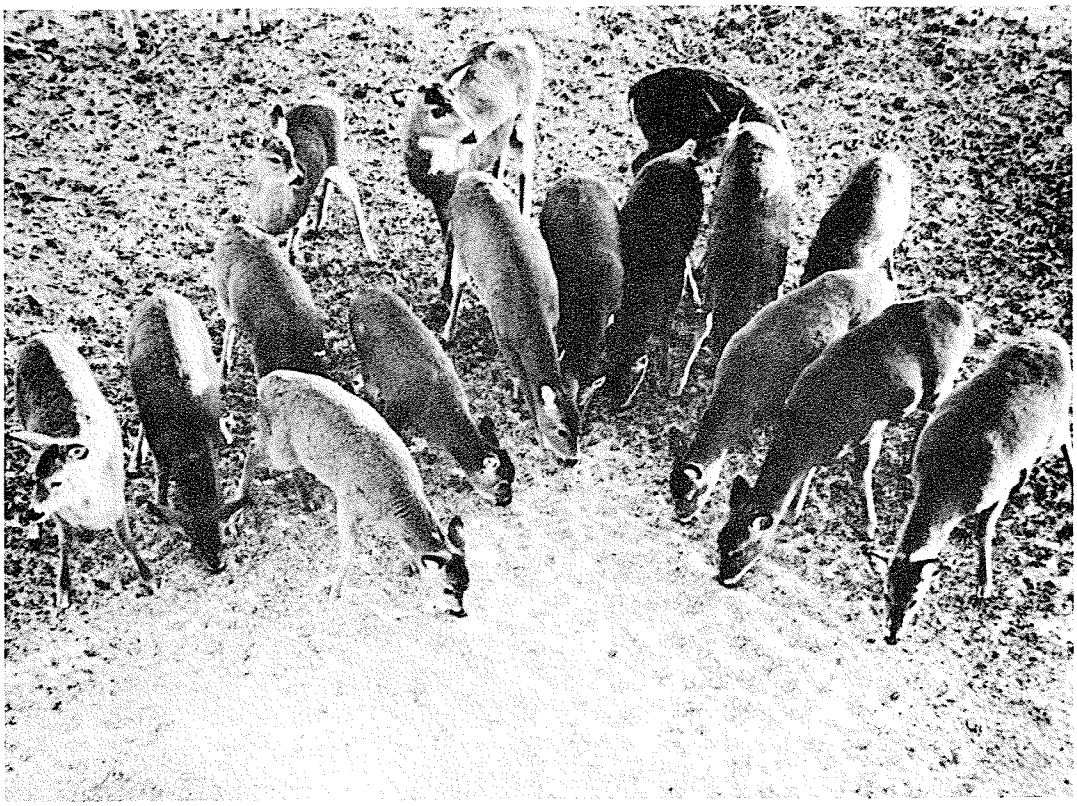
Minnesota. The persons involved in supplemental feeding were primarily rural residents of northwestern Minnesota. Farmers were among the first to notice larger than usual concentrations of deer and many started to feed immediately. Others demanded some action from the wildlife managers when the depredation problem became widespread. An effective lobbying group of sportsmen, farmers, and businessmen appealed to local legislative representatives for emergency assistance. The prime concerns were: (1) depredation, (2) economic loss associated with the closure of the hunting season, and (3) a high level of winter mortality affecting hunting opportunities.

Once feeding was shown to be successful, wildlife associations and snowmobile clubs started to locate isolated herds and tried to provide food. Once additional funds were available, the volunteers provided the momentum for the program and their effectiveness increased. Central coordinating points were organized for the collection of donations and the distribution of foods and equipment. In Roseau County, an estimated 200 persons were involved in the project.

Figure 5.

Deer Feeding at Grain Dust Pile,

Clearwater, Manitoba, February, 1978.



North Dakota. Farmers and Ranchers in the state succeeded in having the State Game and Fish Commissioner order plans for a special hunting season as a solution to the severe depredation problem. This season was never declared; the North Dakota Wildlife Federation was not prepared to allow the deer to be shot off the hay stacks. As an alternative, the Federation provided the organizational base for a state wide "Save the Deer" campaign. An agreement was negotiated with the officials of the State Game and Fish Department to start a feeding program. The Federation would raise the money to purchase food and the State would provide the administrative system for delivery of the program.

Campaign organizers utilized a state-wide media approach to publicize the problem and to ask for donations. Newspaper space and time on the radio and television were donated to the program. The response was $31,138 collected from 1,511 individuals, 17 businesses and 86 organizations.

Volunteers provided the manpower and equipment needed at the feeding sites. The "Save the Deer" campaign funded a total of 259 feeding sites, but an additional 200 sites were maintained by local organizations all across the state.

Saskatchewan. Farmers provided the momentum that had the emergency food purchase program reenacted for 1978. Although feeding was not the prime strategy in the province, the Saskatchewan Wildlife Federation worked to have their members active in locating isolated deer herds, delivering foods, and assisting farmers to protect their hay. The Estevan Wildlife Association fed an estimated 2,000 deer from February, 1978 until spring.

Manitoba. Despite discouragement from deer managers, individuals have fed deer on a regular basis in Manitoba, primarily in the southwest. The loss of deer caused by starvation was viewed as a needless waste of the deer resource. The main concern was the maintenance of local deer herds and continued availability of hunting opportunities. Residents of the southwest viewed deer concentrations and depredation as an indicator of snow conditions in the wintering areas and the need to start feeding. Supplemental feeding reduced the amount of damge and saved deer.

Through observation and experience, some residents of the area felt they knew when the deer needed assistance but were frustrated by the lack of interest, recognition, and involvement on the part of the provincial wildlife staff. Government involvement was not required for organizing or operating a program because one operated by volunteers was already in effect. The role of the provincial wildlife manager was defined as supportive (administrative and financial). Residents did not understand why the funds from the Wildlife Control Fund were not used for this type of program.

In the north central area of Manitoba, residents had a more passive approach to deer management. Their main concern was the maintenance of local deer populations, but they recognized that their area was at the northern edge of the deer range and that winter weather was the major limiting factor. Deer depredation was not a critical factor and most farmers were not worried about having deer around the farmyard.

Supplemental feeding was not common in the area because of the isolation of the herds. The area has lower deer densities than the southwest and the deer are spread over a wide area of unsettled land. One recent concern developing from the 1978 deer season was increased

hunting pressure in the area. This may have increased the hunting success and the idea was that perhaps supplemental feeding would be required to maintain the deer population at huntable levels. Volunteer labor and equipment would be available if this action was required in the future.

Government direction was an important input but there was a general view that a communications problem existed between wildlife managers and the local fish and game associations. This problem prevented them from knowing what the deer situation was each winter. Local residents wanted more information and more involvement in wildlife management programs.

Similar to the views in the north central area, residents of the southeast have adopted a cautious approach to supplemental feeding. They have relied on direction from regional wildlife managers before providing assistance. Feeding projects have been supported but on a small scale when compared to the southwest. Deer depredation was not a problem as the deer migrate east out of the agricultural areas into the wooded areas where better cover is available. The loss of local deer populations as a result of winter mortality was a prime concern.

4.4.2 Role of the Wildlife Managers

Minnesota. In the initial stages there were few alternatives for wildlife managers. Their role was limited by budget, by policy, and by attitudes. Payment of compensation for wildlife depredation was not a policy accepted by the Division of Wildlife, Minnesota Department of Natural Resources. Managers utilized available resources, including equipment and manpower, to assist farmers with depredation problems. It became obvious that the efforts were not adequate to have a significant

impact on the problem. The result was a growing public relations problem focusing on the effectiveness of the wildlife programs in the region. In the meantime, farmers and other local residents were having success with feeding.

Once the emergency funds were available, the managers had to decide what activities to support. Despite strong reservations about feeding, the funds were used to purchase food, clear trails for distributing food to isolated herds, and to pay compensation for damage to unharvested crops. Habitat development work was advanced in order to make natural browse available to the deer. Although department staff worked full time, the momentum for the program was maintained by the volunteers. Managers recognized that the situation did not fit the usual wildlife management patterns but did require administrative and technical support. The managers assumed that role and let the existing activities continue, but on a larger scale.

North Dakota. Similar to their counterparts in Minnesota, the managers in North Dakota were subject to political decisions. Traditional methods of preventing depredation did not reduce the problem. When the feeding alternative was presented there were three concerns: (1) evidence about the danger of rumenitis or rumen overload, (2) cost, and (3) the type of food to use. The final reasoning was that deer probably were using grain at other times in the year and that feeding grain in the winter would not be too great a diet shift for the deer. Once the program was operating the manager's role was primarily organizational and administrative.

Saskatchewan. The program, as developed, was essentially administrative and had little managment input, except for a monitoring role.

Manitoba. A mid-winter status report on whitetailed deer in February, 1978, outlined an emergency program for assisting deer in the event of continued winter severity. Three actions were suggested for the Minister's consideration.

1. Implementation of an intensive public relations effort to explain the ecology of the deer.

2. Creation of trails in wooded areas to improve mobility and browsing opportunities.

3. Provision of browse as food; this could be hand cut in critical areas.

Supplemental feeding and a special hunting season were considered as inappropriate actions in the event of an emergency. There was little or no communication with the people operating feeding sites in the southwest. None of the actions suggested was implemented and managers agreed that a major winter die-off had been averted because the weather moderated after February. Depredation was not a concern.

4.4.3 The Legislators

In all areas, except Manitoba, legislators did have a role in the implementation of supplemental feeding. Lobbying efforts in Minnesota, North Dakota and Saskatchewan succeeded in making depredation a political question that necessitated a response from legislators. The time frames were varied. In Minnesota the program was not approved until three months of severe depredation had passed. The North Dakota program was implemented within a month while the Saskatchewan compensation approach was approved quickly because a program precedent had been set in previous years. The legislative representatives in Manitoba were not involved and there was no concerted lobbying effort to gain provincial support.

4.5 Economic Assessment of Supplemental Feeding

4.5.1 Revenues

Funds for the purchase of food were provided in three ways: (1) special warrant granted by the legislative authority on an emergency basis (Minnesota), (2) general revenues (Saskatchewan), and (3) public donations (North Dakota). In each case the revenues provided were considered emergency support with no long term committment for continued programs. The compensation funds in Manitoba were provided from an earmarked fund collected from the sale of hunting licences.

4.5.2 Costs

The implementation of supplemental feeding has been regarded as an expensive undertaking by the wildlife managers. The programs run during 1977-78 used a variety of approaches which allowed some comparison (Table 7).

Two types of costs were associated with the programs. One included the extra costs arising directly from the programs themselves. The other costs were, essentially, that portion of the ongoing departmental expenditures that occurred while departmental resources were assigned to the programs. Manpower, equipment and food purchases were the three cost categories. Accurate sums were available for the extra costs, but precise estimates for the internal costs were not available.

Minnesota. The largest cost associated with the Minnesota program was for heavy equipment used to clear trails to the isolated deer herds. Over twice the amount of funds spent on food was used for the equipment. The manpower costs were not included excepting additional labor hired from outside the Department of Natural Resources. Five

Table 7

Costs of Emergency Assistance Programs for Whitetailed Deer in Manitoba, Minnesota, North Dakota and Saskatchewan 1977-78.

Location	Total Cost	Food	Equipment	Manpower
Manitoba *	-	$63,442	-	-
Minnesota **	$177,870	$59,365	$126,505	$16,500
North Dakota +	$ 82,203	$26,517	-	-
Saskatchewan ++	$200,000	-	-	-

Sources:
* Compensation paid to farmers (77/8 to 78/7). Manitoba Department of Mines, Natural Resources and Environment.
** Costs do not include state manpower inputs. Ordal (1978).
+ North Dakota Wildlife Federation.
++ R. MacLennan, Saskatchewan Department of Tourism and Renewable Resources.

wildlife managers were involved full time from January, 1978 to March, 1978.

North Dakota. There were no additional costs for the program except the grain purchased with the donations. The cost of grain was $2.23 per deer which provided enough food for the whole program period from January 15, 1978 to March 31, 1978. Feed grain was used as the food because of the availability, on or near the farms with depredation problems. There were no transportation costs. When the program was established, three staff members from the State Game and Fish Department worked full time while additional staff was used as required.

Saskatchewan. Compensation was paid on the basis of hay used by the deer. Farmers were paid full value for the hay or any other damage. The number of claims rose from 58 in 1976 to about 340 in 1978; the costs

increased to $200,000. Three staff persons were involved in the administration of the program.

Manitoba. After the winter 1977-78, deer depredation costs increased 10-fold over the same period the previous year. The average payment per claim was $640.00. Administrative costs were part of the annual Department estimates. One staff person was responsible for processing the claims. The compensation payments represented 75% of the actual value of the product. When making a claim the farmer was actually reducing the total cost of the depredation loss.

The costs of supplemental foods in Manitoba varied. The prepared deer ration, manufactured from a recipe in Minnesota, was priced at $170.00 per metric tonne, while grain dust was available at no cost. Given a ration of 1 kg of food per deer a day, the range of prices begins at zero and is highest at 17 cents.

An important factor in the choice of food was availability. The prepared ration was manufactured in Brandon, but any feed mill in the province could provide the ration. There were distribution costs, and there were no obvious nutritional advantages of this food over the feed grains. Farmers generally had some feed grain on hand to use for deer food. There were no distribution costs and the grain cost is about $60.00 per tonne. Alfalfa is not always availabile because it is an important livestock feed which would not be used as food for wildlife in the event of a shortage of quality hay. Reports from farmers indicated that deer waste more hay than they actually eat (with an increase in costs).

Grain screenings were used successfully at Clearwater from December, 1978 to March, 1979 (Figure 6). This food was primarily weed

seeds, millet, buckwheat and foreign material. In general, screenings have a high percentage of grain and are considered to be feed quality. A farmer who has grain cleaned at an elevator has the option to keep his screenings or the elevator pays him the market rate. This grain is then treated as feed grain and shipped to terminals. Most farmers do not keep their screenings as livestock cannot make use of the weed seeds. Cleaning operations usually occur in the spring and summer immediately after the period when the food could be used for feeding deer. The cost involved in shipping the food back from the grain terminals, as well as the storage costs, make this material of marginal use.

Grain dust was the only no cost food that was readily available. It is considered as waste material by the elevators. Grain dust is simply chaff and some weed seeds which are vacuumed off the grain handling equipment during loading and cleaning operations. The only cost associated with the food is for transportation. The dust is stored in bulk tanks and is not available in small quantities. Grain dust should not be confused with grain screenings. It is a waste by-product with no economic value to the elevator company.

4.6 Summary

4.6.1 The Problem

Weather patterns across sections of Saskatchewan, Manitoba, Minnesota, and North Dakota caused a change in normal deer behavior which resulted in large concentrations of deer close to feedlots, farmyards, and stored hay. Depredation damage was widespread and was the primary problem for farmers and for wildlife managers.

Supplemental feeding was an effective method of preventing deer depredation and reducing deer die-offs.

Figure 6.

Clearwater Wildlife Haven and Supplemental Feeding Site, Clearwater, Manitoba, February 1979.


Conservation
Private
Wildlife
Haven


FEDERAL

4.6.2 The Response

Biological. Aggressive behavior was not a problem at the feeding sites. None of the areas had overpopulated herds and the range was not depleted. Rumen overload did not increase as a result of the feeding programs. The only deer deaths reported occurred prior to feeding or in herds that were not being fed. Deer response to the foods was positive, although the earlier in the winter that a deer began to feed, the shorter the recovery period.

Economic. The revenues were not merely reallocations of existing resources; the programs required additional funds to provide the food for the deer. Manpower costs represented reallocation of existing staff within the departments in combination with additional labor hired for specific purposes. Extra manpower was used in Minnesota. Equipment was utilized in a similar manner and Minnesota was the only location where a large amount of equipment time was used. Food costs were minimized by using grain, hay, and livestock rations available on the farms, close to the feeding sites. This also minimized the transportation costs. No assessment of the value of volunteer inputs was made, but it was accepted that this contribution was the most important for the success of the programs.

Socio-political. Lobbying efforts on the part of farmers and other local rural residents of the affected areas were important for having governments and wildlife managers respond. The volunteers provided the momentum for the programs. While the leadership was provided by the volunteers, the wildlife managers played an important supportive role by providing administrative and technical assistance.

Except in Manitoba, wildlife managers received considerable praise for their participation in the progams. These same officials recognized the value of public participation and the resulting public relations benefits realized from the cooperative effort. These results did not accrue to Manitoba managers.

CHAPTER 5

DISCUSSION OF THE RESULTS

5.1 Introduction

Wildlife managers in Manitoba have considered supplemental feeding as biologically inconsistent with deer management programs and, from an economic point of view, too costly in relation to the results achieved. Many residents disagree with that approach because they successfully feed deer year after year. The methods of this study assessed feeding from both attitudes and collected important background information on the aspects of supplemental feeding, which is necessary for any management reassessment considered.

5.2 Biological Focus

Despite the physiological and the behavioral adjustments deer make to conserve energy in the winter, weather will cause malnutrition and death for some portion of a deer herd. Malnutrition results from range depletion, or from temporary interruption of access to natural foods caused by the characteristics of the snow cover. Deer malnutrition, in Manitoba, is the result of the effect of weather rather than range quality. Previous to 1978 this idea has not been accepted in Manitoba where much of the deer management emphasis is directed at habitat development. Range quality was not a limiting factor from 1974 to

1977, when the herd demonstrated excellent recovery instead of maintaining a new equilibrium determined by the carrying capacity of the range.

Winter mortality is the result of factors, primarily weather, which are independent of population density. The two most significant limiting factors on the Manitoba deer population are weather and hunting, both of which are density independent. There was disagreement on which weather factor was more critical, snow depth or temperature. Both factors are important but deer can effectively compensate for the energy trade-off caused by temperature with adequate food intake. Snow cover characteristics reduce access to foods and prevent them from seeking out alternative sources. This is consistent with weather patterns and deer behavior observed furing the winter, 1977-78.

The rate of winter mortality will have the same effect on a large population as on small population. A deer herd will exhibit similar genetic characteristics and sex-age ratios at all population levels. These are the characteristics that determine the capacity of an individual deer to survive a winter. An advantage of keeping the population high under these conditions is that the herd nucleus left after a winterkill will be larger and facilitate a faster recovery to former levels (sustained yield management). The important portion of the herd nucleus is the number of prime breeding does. These animals are critical for the continued high productivity of the Manitoba deer herd. During a severe winter, supplemental feeding is an effective method for maintaining these deer. Despite the negative effects winter has on deer, the pregnant does are the least vulnerable animals in the deer herd.

Variations in winter severity will result in different animal mortality rates but variations are also likely, in the same year,

between different regions of the range. Local herds could easily have quite different mortality rates because of the variability in weather. Deer in southwest Manitoba tend to be less vulnerable than the deer located in the north central area. Weather severity is no doubt an important determinant along with a difference in the alternate food sources. Depredation damage is not common in the north central area. When winter weather becomes severe, deer in the more isolated areas will suffer larger losses. This could mean a total removal of deer from a portion of the range.

There is a general misconception that supplemental feeding will kill deer. The incidence of this type of effect was minimal over the winter, 1977-78. Winter mortality is due to the physiological effects of malnutrition and not to the effects of feeding. There is a physiological state from which deer will not recover, but before a deer reaches this state, feeding is likely to be successful. A deer in a weakened state requires adequate nutritional quality in its food. Most foods available in the winter are not high quality and provide a marginal level of support. The nutritional quality of supplemental foods used at the feeding sites must have been adequate as there were few instances of dead deer reported. Each deer will have some stored nutrients remaining; the food used to supplement must meet the requirements of the most depleted deer.

Supplemental feeding is not necessary to maintain the deer population in Manitoba but it is a method of keeping winter mortality at a more acceptable rate. Keeping the deer population stable at high levels is only important from a user viewpoint, to ensure continued recreation opportunities associated with the deer. That level must be determined by managers before feeding is used.

5.3 Management Focus

In a severe winter, supplemental feeding is a way to reduce the rate of winter mortality and to stabilize the tendency for a herd to decline. An incidence of high winter die-off, when combined with a high harvest, has a cumulative effect which can reduce the deer population and force the cancellation of the sport harvest (Manitoba 1974 to 1977).

Habitat development work is the only management approach in Manitoba which attempts to offset the effect of winter weather. The weakness of this approach is that the variability of weather severity and the individual characteristics of the deer often reduce the overall effect. Deer will not necessarily have access to the food resources of a developed area as snow cover can seal off these foods or isolate the deer in undeveloped areas. The quality of the winter habitat is immaterial if the deer cannot use the available food. Depredation is an indicator of snow conditions on the winter range, and of the energy state of the deer. In Minnesota, food plots went virtually unused in some areas because the deer were trapped in other locations.

Consistent hunting pressure each year has never allowed the deer population to build to a level where it could overbrowse the range. The sport harvest in Manitoba is the only limiting factor which can be regulated, but restrictions on harvest have political costs. The Manitoba Wildlife Federation lobbied strongly for an earlier resumption of the deer season. The long delay before regulation takes effect reduces the impact of this management technique.

To avoid a decline in deer population, the management staff must be prepared to exercise harvest regulation, or to attempt to reduce the effect of severe winter weather. The sport harvest is not as

important a management technique in Manitoba as it is for the management of irruptive deer herds in the United States. However, the hunting demand in the province is too consistent, and the hunting population too large, to allow major annual adjustments in the allowable harvest. The Indian demand for harvest opportunity complicates the situation because it is, largely, beyond management control. In emergency situations, when the production of a harvestable surplus may not occur because of winter mortality, supplemental feeding could complement existing management strategies.

5.4 Public Relations Focus

The deer management staff of the Department of Mines, Natural Resources and Environment has an opportunity to solve a major public relations problem caused by the past response to the issue of supplemental feeding. Experience in other jurisdictions showed that managerial involvement has important public relations benefits. Officials should become more involved in order to provide the leadership that is expected of the wildlife professional, to have the opportunity to assess the impact, and to contribute some support.

Severe depredation could result in legislative action implementing a program without any preparation time. The time it takes to start from the beginning may be critical to the farmer and to the deer. Officials would be in a position of responding to a wide variety of situations instead of coordinating and directing functions. Preparation of an emergency feeding plan, and outlining the conditions for implementation, will provide managers with the opportunity to show flexibility, and to regain some of the public trust and cooperation. This would also have benefits for other wildlife programs. Another advantage to

developing guidelines for feeding intervention is that cost control is much easier.

5.5 Cost Focus

The most costly feeding alternative is the one where the government pays the full cost of food, distribution, labor, equipment and administration. This is the program that managers fear the most. Full scale responsibility for the program is not necessary as there is considerable volunteer support available (demonstrated in previous winters).

Using maximum use of volunteers, the department can assume a support role similar to the program in North Dakota. The costs are already provided in the budget estimates -- the manpower and administrative inputs would be in place. Food costs would be the only variable unknown.

Compared to the compensation program for depredation, feeding could cost less because the damage would be much reduced. Saskatchewan officials noted that their costs for food purchase would have been much less than the compensation they paid. Because the Wildlife Control Fund is available, some tradeoff could occur between the two approaches -- feeding and compensation. It is likely that a farmer with a depredation problem could reduce his own loss by initiating a feeding program on his own behalf.

The important factors concerning food are nutritional quality, availability and cost. Foods in Manitoba have a range from no cost to $170 per metric tonne. All the foods appear to give adequate nutritional support, considering the recovery period. A volunteer program would operate best with foods available locally close to the feeding site. Grain dust was used successfully in Clearwater, Manitoba.

Considering the number of grain elevators in rural Manitoba, and the fact that grain companies are willing to give the material away (or even pay to have it hauled away), grain dust may be a wasted food resource.

CHAPTER 6

THE STUDY CONCLUSIONS

6.1 Conclusions

The suggestion that supplemental feeding would disrupt the stability of the provincial deer population in Manitoba has no basis. The deer herd is not an irruptive herd -- it does not conform strictly to wildlife management principles developed on southern deer ranges where irruptive herds are common. Winter mortality in Manitoba is the result of weather interference in normal feeding patterns and is caused by malnutrition. Supplemental feeding can prevent malnutrition and offset the incidence of winter mortality, which is one of the two critical elements contributing to deer population instability.

Ecological principles help explain how deer adjust to winter conditions, and indicate why some percentage of the deer poulation will starve to death each year. On this basis, winter mortality is a naturally occurring event. However, weather conditions in Manitoba can frequently cause high levels of winter mortality. These are unacceptable to users of the resource, particularly hunters. An adequate, harvestable surplus is difficult to maintain if a high rate of harvest success is regularly followed by severe winter mortality. Deer managers are faced with a choice of trying to offset the effect of unusually severe winters, or regulating the harvest.

The annual harvest, the other critical limiting factor on the Manitoba deer population, is a useful technique for herd management. But it is not always a positive factor. When it causes lower annual increments, its effect is disruptive rather than beneficial. Regulation of the sport harvest is politically unpopular as a method of maintaining population stability, but the cumulative effect of a high winter mortality and consistently high harvest rates means a declining population and eventual loss of hunting opportunity. In the severe winters, supplemental feeding can be used to reduce the incidence of malnutrition and, consequently, offset the effect of winter mortality. Such action would be politically astute -- sportsmen are concerned with saving deer and maintaining local hunting opportunities.

Legislators can force the implementation of a supplemental feeding program on wildlife managers as a response to severe depredation problems. Supplemental feeding is an effective way to prevent this damage. The method of implementation will reflect the preparation of the managers for just such a contingency.

The cost of supplemental feeding is variable but would not restrict the use of other management programs in Manitoba. A program, organized and financed by government, is too costly and discounts the value of public participation. This is a critical element in the final determination of costs. The volunteer support is already well established in Manitoba. These individuals could provide the momentum required, and the only significant costs would be for administration and the purchase of food. Support for volunteer feeding projects would also have important public relations benefits for wildlife managers employed by the Manitoba Department of Mines, Natural Resources and Environment.

No evidence is available to suggest that a prepared ration

provides better results than feed grain. The availability and cost of the latter make it the most suitable choice for a volunteer feeding program. Grain dust also provides an adequate level of nutrients and is available throughout most of the Manitoba deer range. It should be considered for use as well. The cost of feeding deer in isolated areas does not warrant the effort; the final decision will be a political one, and must reflect local hunting pressure and attitudes of local residents.

CHAPTER 7

THE STUDY RECOMMENDATIONS

7.1 Introduction

A change in official attitude towards supplemental feeding is necessary for Manitoba, but the development of a full-scale government financed program is not the recommended approach. An alternative is a supplemental feeding program that emphasizes a public participation component and a specialized role for the deer management staff of the Manitoba Department of Mines, Natural Resources and Environment.

To achieve this alternative, management, research, and regional staff must focus on three objectives: (1) to improve the public relations atmosphere associated with existing feeding projects in Manitoba, (2) to develop guidelines for the application of department resources in feeding programs, and (3) to assess the potential of grain by-products as a source of low cost supplemental food for deer.

7.2 Public Participation

There is a definite public relations problem between the wildlife staff and the groups that feed deer. A major extension effort is required to regain the confidence of the public and to encourage cooperation on a joint approach to supplemental feeding. To establish a new working relationship with the volunteers a number of steps should be

taken before the next winter.

1. Department staff should contact organizations involved in feeding projects to exchange information and to compare alternative feeding approaches.

2. An extension pamphlet should be development by the Department to outline the guidelines an individual should follow when considering a deer feeding project.

3. Some consideration and discussion should be given to establishing an organization to assist managers to monitor winter conditions, to facilitate communication between the regions of the province, and to provide liaison between the Department staff and the volunteers. This organization should use Wild Gobblers Unlimited[1] as a model. An executive committee would provide the liaison group and plan feeding operations with the Department staff. Affiliated organizations would provide the volunteer manpower required in the event of an emergency. There could be regional representation on the executive from the main deer areas in the province. By promoting such an organization wildlife staff can shift some responsibility for deer management to the users of the resource and still maintain some level of control of the use of feeding in Manitoba. Several groups in the province have already assumed some responsibility voluntarily.

7.3 Guidelines for Participation

Supplemental feeding is effective in preventing depredation damage caused by deer. While traditional tactics may also be effective,

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[1]Wild Gobblers Unlimited is an association of farmers and sportsmen who introduced wild turkeys into southern Manitoba. The association worked with the Department to establish a Wild Turkey Hunting Season.

regional staff could include supplemental feeding as another alternative to recommend when damage is extensive. The following guidelines may be useful for application of feeding for this purpose:

1. Use the funds available from the Wildlife Control Fund to support intercept feeding as a preventative measure for depredation.

2. Cost share the program with the farmer on a 50/50 basis but consider only food costs.

3. The costs would be based on the prevailing feed grain prices.

4. The recommended ration would be 1 kg of grain for each deer per day.

5. Payment should be made for a maximum of 100 days and for situations where there are ten or more deer.

6. Application procedure should remain the same as for the present compensation program.

7. Assessment of each claim would be made by a conservation officer or delegate.

In cases where depredation is not a problem, the Department should consider providing some recognition to any individual or group donating time to feed deer that are under obvious stress. Each case is likely to be different and the following ideas could be implemented when considered appropriate:

1. Provide badges, crests, or certificates to the individuals providing assistance to deer herds in distress.

2. Offer a complimentary deer hunting licence to farmers who feed deer herds.

3. Provide a grant to cover the cost of food used for any project where a local organization is willing to accept responsibility for

the feeding site.

Before such steps are taken, the criteria for an emergency situation must be defined. The more important indicators should be: (1) depredation levels, (2) snow cover characteristics, (3) temperature, and (4) timing of winter weather patterns.

The Department should maintain a support role for a program that is essentially volunteer in nature. The role should emphasize three areas:

1. Provide financial support towards food cost;

2. Provide the administrative system to facilitate communication and to process any payments made for food; and

3. Provide the technical support required for monitoring the deer concentrations and assessing depredation.

7.4 Further Research

The area of food quality is not sufficiently assessed. Grain dust appears to be an important food resource as it has a high nutrient content and is readily available at no cost. An investigation of these aspects of this food should be undertaken to determine the reliability of supply, the overall nutritional quality, and any negative aspects of this grain by-product.

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APPENDIX A

SURVEY QUESTIONAIRE

Questionaire

Project Title: An Assessment of Supplemental Feeding of White-tailed Deer.

This project has three objectives. The first is to assess the feasibility of providing supplemental food supplies to white-tailed deer in their winter habitat. The second objective is to suggest under what conditions this type of program might be useful in managing white-tailed deer populations. A third objective is to provide a reference resource for the use of wildlife managers and the general public.

One important source of information is the portion of the general public which is interested in wildlife management. Your answers to the questions following will be important in achieving the above objectives. If you would like to have the results of the questionaire please include your name and address when you return your answers. The sheets can be mailed to:

Ian Menzies Box 575 Stonewall Manitoba ROC 2Z0

1) What reasons can you suggest in support for/or in opposition to a supplemental feeding program for white-tailed deer in Manitoba?

2) What types of feed are being used to supplement winter diets for deer? How do the deer accept these supplies?

3) Where would you recommend the use of supplemental feed in the Manitoba deer range?

4) What projects do you want to see started to assist deer through severe winters?

5) Does your association have projects that are related to white-tailed deer management? If so please include a description.

THANK YOU FOR YOUR PARTICIPATION. SHOULD YOU REQUIRE MORE SPACE USE THE REVERSE SIDE OR ANOTHER SHEET OF PAPER. FOR QUESTIONAIRE RESULTS INCLUDE YOU NAME AND ADDRESS.